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Enthusiasm truly can be contagious!



Dr. Mary-Irene Parker DC
Parrsboro, Nova Scotia
Chair, CCA Research Committee

As the newest Chairperson of the CCA's Research Committee I want you to know that I am most often serious and dedicated to the advancement of Canadian Chiropractic Research Foundation supported research. But that is not to say that I always grasp the intricacies and nuances of the reports and commentaries I read; I suspect like

many chiropractors, my time of journal reading often gets interrupted or forced aside by immediate problems that so often occur in our busy offices. However, because we are colleagues I want to share with you an experience I shared with other CCA Board members upon listening to a recent presentation of current events in research. The talk was conducted by Dr. Mark Erwin DC, PhD, a researcher quite capable of talking well above my head in terms like, "interleukin-1 beta and Fas-Ligand" and how they factor in degenerative disc disease.

You may want to note that while Dr. Erwin is a very accomplished and awarded researcher he is also the charming guy next-door with an easy smile, a keen sense of humour and an enthusiastic speaking voice ... all of which captivates all members of his audience quite readily. With just a few slides and introductory comments Dr. Erwin had silenced the room and intensified the atmosphere such that we were following his every line. The silence was indeed golden; eyes flicked from speaker to screen and back again. Slide changed ... eyes moved across and shoulders leaned forward. There was a pause by our speaker and the silence was thickened. "This," he said with a smile, "is where you should have applauded!"

Yes, indeed we should have applauded! But we were too captivated by the information we saw before us and the enthusiastic infusion of information most of us thought would only be considered years from now! Amazing investigation and stunning research findings concerning degenerative disc disease and related connective tissue disorders! So amazed that we sat there with, "Yes, yes, tell us more." written upon our faces like those of small children at a library story-telling. So lavishly were we involved in the research news that we completely ignored the opportunity to praise its purveyor!

It is this is the enthusiasm I want to share with you concerning CCRF supported researchers! All too often we are asked to fund an event we never can attend or a cause from which we neither hear nor see results ... now we have one which not only touches our generosity but it gives credence to both our profession and our professionalism! CCRF supported researchers are our kin and the work they do is not only cutting-edge, it is leading

chiropractic and particularly Canadian chiropractic to the very cusp of health care! It is my hope that you will bear this in mind when you financially support CCRF research for indeed Dr. Erwin and all of his chiropractic research colleges across Canada are making certain that you get value for your investment. Their work is amazing; learn of it and you will be inspired – and who knows, you may even sit in your office and applaud!

Canadian Chiropractic Research Foundation



Creating a culture of research

Why Canadian chiropractors need to support an increased research role



Dr. John Church PhD*

In the September 2011 edition of this journal, two commentaries outlined reasons for the development of a strong research arm to the profession in Canada.^{1,2} This commentary will further this argument by referring to the development of professions in general and two major health professions in Canada, physicians and nurses, in particular. The commentary concludes with a discus-

sion of the relevance of recent activities by the Canadian Chiropractic Research Foundation.

As Eliot Friedson noted in his classic study of professions, certain occupations are elevated to a special status in the minds of the public through the development of certain distinct characteristics: exclusive claim to control over a core body of knowledge; occupational monopoly; control over entry into the marketplace, and service orientation.³ This commentary will focus on the relevance of a number of these characteristics to the development of medical doctors, nurses and chiropractors in Canada.

While medicine is now considered the most well established profession in health care and historically was viewed as one of three learned professions, its rise to power in the health field occurred only through the emergence of Friedson's characteristics. During the 18th Century, medicine was little more than a loose collection of practitioners of various "medical" arts (barber-surgeons, barber-apothecaries, self-taught healers and surgeons) with little cohesion among the various practitioners. Education was provided through a variety of sources: guild academies, apprenticeships, proprietary schools and universities.

Jumping across the pond to Canada, barber-surgeons and barber apothecaries were the first of these groups to seek government support for establishing professional credentials. By the end of the 18th Century, these occupational groups had been relegated to second class status by the more highly trained British surgeons. By 1818, the first government-sponsored licensing board was appointed in Upper Canada (now Ontario). Efforts to achieve self-regulation met with continuing opposition (1845, 1849, 1859 and 1860) because of skepticism about medical science. In Ontario, homeopaths and eclectics were actually

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given the right to self-regulate before medical doctors. In Quebec, a college was established to ward off self-taught Thomasonian herbalists, homeopaths and eclectics.

More formalized medical education began to emerge as early as the 1820s and was well entrenched by the early 20th Century with medical schools at McGill, Toronto, Laval, Queen's, Western, Dalhousie and Manitoba. Provincial medical associations had also proliferated by this time.

All of this occurred at the expense of other occupational groups. Midwives were officially barred from practice in 1865. Homeopaths declined in numbers. Osteopaths were eventually assigned second class status through the Drugless Practitioners Act in 1925. Chiropractic training was judged inadequate by a royal commission in 1917.⁴

The net result of all of this was the creation of a state-sanctioned, self-regulating, standardized system of credentialing for medical doctors leading to an occupational monopoly over medical services and control over entry into the medical marketplace. Through the centralization of the education process, the profession was able to establish an exclusive claim to control over a core body of knowledge that became central to the modern understanding of health care in Canada. This core body of knowledge and the preferences of organized medicine continue to dominate contemporary thinking about health care.

While less dramatic than the story of physicians, the rise of the nursing profession in Canada is equally instructive. Nursing in Canada originated from several sources. Originally, male nurses were part of the 17th Century French military presence in Acadia. By the 18th Century, several orders of nuns (Ursuline and Grey) had been established in Lower Canada.

From these early beginnings nursing was cast in the role of supportive caring. In some respects, this is attributable to the predominance of women in this occupational group and the larger social role attached to the gender. With the rise of the medical profession in the late 19th Century, nursing was relegated to a supportive role for physicians. As care moved from community to institutional settings and the traditional role of midwives diminished, nurses were assigned many menial tasks related to patient care. Training occurred in hospital (as opposed to classroom) settings under the supervision of physicians. Emphasis was placed on the values of obedient commitment in a supportive role to physicians. The goal of this training

was to produce a cheap, subservient, readily available work force armed with basic knowledge of hospital and sanitary procedures.

Established in 1908, the Canadian National Association of Trained Nurses, the precursor to the Canadian Nursing Association, lobbied to have nursing incorporated into the state-funded education system. The first university-based, nursing degree program was established at the University of British Columbia in 1919, but the previous philosophical focus on occupational subservience persisted. While other university- and college-based programs followed, the overall quality of nursing education continued to be criticized. A report prepared for the Royal Commission on Health Services during the 1960s characterized nursing education as "haphazard, outdated, educationally unsound, and inadequate for the needs of nurses or the health-care system."⁵

It would not be until the 1980s and beyond that nursing education would become standardized through community college diplomas programs and university baccalaureate programs. In addition, graduate level training began to emerge and proliferate. An important part of the transformation in nursing education was a shift from the traditional philosophy and training associated with subservience to an increasing focus on "credentialing, specialization, nursing research and medical technology."⁶

More recently, "nursing research" as a distinctive body of knowledge has been further legitimated through the creation of a designated envelope of funding through the Canadian Health Services Research Foundation, a federal government mandated and financially supported organization. These funds are specifically designated to support the research of university-based nurses.⁷

The above discussion of the development of doctors and nurses as professions in Canada is relevant for the current discussion of developing a stronger research base for chiropractors. Like both doctors and nurses, chiropractors in Canada have acquired self-regulatory status through provincial regulatory Colleges. However, as Biggs observed, unlike either medicine or nursing, chiropractic has been most hampered in gaining full recognition as a profession because of its "restricted knowledge base" and lack of scientific verification. Nor, historically, has chiropractic made significant strides in elevating its education process in Canada through establishing university-based education.⁸ Recent research has continued to identify

both a lack of scientific verification and university affiliation as self-reinforcing barriers to enhancing the professional status and societal legitimacy of chiropractors in Canada.^{9,10,11}

One final observation from the above discussion, relates to the internal division within nursing between proponents of hospital-based and university-based education. Even the move to college and university-based training has not altered the underlying division within the profession between service-oriented versus a broader knowledge-oriented form of training. The majority of nurses still receive their first degree through more service-oriented college diplomas. Continuing divisions within Canadian chiropractic about the nature and content of training and the scope of practice of chiropractic need to be resolved so that other health professions and political decision makers have a clear understanding of the profession. While good progress has been made in recent years, there is still work to be done.

The bottom line remains that until there is a significant critical mass of university-based, chiropractic researchers, establishing what is viewed more broadly as a clear scientific basis to further legitimate chiropractic in Canada will remain elusive. This is key for two important reasons. First, opposition from the medical profession continues to focus on a perception that the practice of chiropractic is not based on legitimate scientific knowledge.⁹ Second, governments are concerned about public safety and cost and are thus interested in scientific research demonstrating both the efficacy and the cost effectiveness of chiropractic treatments.¹⁰ Without this, pressuring governments to provide funding for university-based training in Canada, which in turn will lend greater public legitimacy to the profession, will likely be difficult to achieve.

Viewed in this larger context, the recent activities of the Canadian Chiropractic Association and the Canadian Chiropractic Research Foundation to a) obtain funding for the establishment of a national network of academically-based chiropractic researchers and b) to support the creation of academic positions for chiropractors at Canadian universities are important steps towards enhancing the status of the profession. Both of these strategies represent more of a gradual approach to advancing the status of the profession. While perhaps a longer term endeavor, in light of past failed attempts to establish university-based programs, this approach may ultimately yield better results.

The recent upsurge in new university-based, academic positions for chiropractors funded through state-supported, scientific research funding agencies such as the Canadian Institutes for Health Research bodes well for the future of chiropractic in Canada. The Canadian Chiropractic Association and the Canadian Chiropractic Research Foundation have made significant progress in capitalizing on these emerging opportunities. There are currently 15 Canadian university-based chiropractors with PhDs and another 15 in the academic training pipeline. A number of these new and emerging chiropractic researchers are supported through a combination of Foundation and CIHR funding.¹² Finally, through CIHR funding, a national research network has been established including 27 chiropractic and non-chiropractic researchers. If these trends continue, Canadian chiropractors will be able to inform their clinical practice with increasingly rigorous research. They will also be able to add a legitimating knowledge base to their collective political arsenal.

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Canadian Chiropractic Research Foundation



Creating a culture of research

Developing a model curriculum for ethical practice building at Chiropractic Colleges: Part 1: qualitative analysis of opinions from an International Workshop

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Introduction

An increasing number of veteran doctors and new graduates are engaging in – or are being coerced into considering engaging in – unethical practice activities that put their own pecuniary interests ahead of the best interests of their patients. A recent report by the Canadian Federation of Chiropractic Regulatory and Education Accredited Boards (CFCREAB) stated that the number of complaints against chiropractors with respect to allegations of professional misconduct (i.e. poor record keeping, sexual misconduct, practicing outside the scope of chiropractic practice, substance abuse) has not risen in proportion to the growing number of new graduates in Canada overall, with one notable exception: a steady increase in allegations of Commercial Misconduct (insurance fraud, for example).¹ This is especially puzzling since a recent audit of jurisprudence and business management courses taught at chiropractic colleges in North America revealed that all colleges teach codes of conduct and ethical behavior in their core curriculum, although the exact nature of this content was not described.² This is consistent with the mandate of the chiropractic academic accrediting agency in Canada and the United States agency which both state with respect to “Professional Issues”:

“The student must demonstrate an ability to:

- a) exhibit ethical attitudes regarding the provision of patient care services, fees, financial arrangements, billing practices and collection procedures;
- b) identify and acknowledge an obligation to refrain from illegal and unethical patient care and practice management procedures”^{3,4}

Recommended Codes of Conduct and Ethical Behavior have also been promulgated by various chiropractic professional advocacy organizations towards practitioners. For example, the Canadian Chiropractic Association delineates 40 duties and obligations practitioners have with respect to their patients, their colleagues (including obligations to provide fair and equitable contracts to potential associates), issues of jurisprudence (advertising, avoiding conflicts of interest, professional fees, third-party assessments), the profession, the research community and society at large, with the preamble of this document asserting:

“These principles are intended to aid chiropractors individually and collectively in maintaining a high level of ethical conduct. They are not immutable laws, for the ethical practitioner needs no such laws, but standards by which a chiropractor may determine the propriety of conduct in relationships with patients, colleagues, members of other health care professions and with the public.”⁵

A similar Code of Ethics has been disseminated by the American Chiropractic Association (ACA)

“II. Doctors of chiropractic should maintain the highest standards of professional and personal conduct, and should comply with all governmental jurisdictional rules and regulations.

XIII. Doctors of chiropractic have an obligation to the profession to endeavor to assure that their behavior does not give the appearance of professional impropriety. Any actions which may benefit the practitioner to the detriment

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of the profession must be avoided so as to not erode the public trust.”⁶

These ethical codes, however, are tantamount to “motherhood” statements that carry no statutory authority and are thus unenforceable by a licensing body. However, many jurisdictions have word-smithed these ethical codes and woven them into their professional misconduct regulations, which are indeed enforceable. A breach of these regulations can lead to a referral to a Discipline Panel that can, in turn, impose penalties up to and including loss of licensure. In addition the U.S. Department of Health & Human Services (Office of the Inspector General or OIG) recently published an even more provocative document, a “Road Map” for healthcare providers to enable them to avoid Medicare and Medicaid fraud and abuse. The Road Map cited several examples of practitioners who violated various national laws and described the punishment for their transgressions; penalties including loss of licensure, jail terms and fines in the hundreds of thousands of dollars.⁷

How then, to explain the discordant findings that despite the fact students and practitioners are inundated with curricular content, guidelines and enforceable regulations specifying appropriate codes of conduct and ethical behavior, some chiropractors nevertheless engage in unethical practice activities upon graduation? In order to investigate this phenomenon, the lead author of this manuscript organized a Workshop at the 2011 Association of Chiropractic Colleges Research Agenda Conference (ACC-RAC).⁸ The ACC-RAC was selected as the most suitable venue to conduct this workshop since the vast majority of attendees are teaching faculty at accredited chiropractic colleges from around the world and, as such, it was posited they would be in a unique position to provide valuable perspectives on issues related to this topic including; whether or not unethical practice building practices are on the rise in their home jurisdictions; if they are, the type of unethical behaviors that occur; causes of unethical conduct and; viable solutions to the problem. Based on these assumptions, the lead author of this article developed the following workshop objective: *“To identify challenges graduates will encounter that complicates their ability to develop a successful, ethical, patient-centered chiropractic practice; challenges that may lead them to succumb to unethical behavior and; develop strategies to overcome*

these challenges.” In Part I of this project, this article will provide a qualitative analysis of the consensus opinions with respect to these challenges as identified by participants of the workshop. Part II, which will be based on an upcoming workshop in 2012, will discuss the action steps that participants posit colleges can take in order to combat these challenges.

That said, the authors recognize that, from a pragmatic point of view, it will be impossible to eradicate fraudulent activity from the chiropractic professional – or any healthcare profession – altogether. There are members in every profession who believe the rules do not apply to them and are essentially ungovernable.

Operationalization of the Workshop

Thirty conference registrants attended the workshop. The workshop began with a brief introduction by each of the panelists who respectively provided an overview of (i) the objectives of the workshop and the concept of professional obligations, (ii) issues germane to cultural authority ethics and (iii) the importance of practicing with passion and purpose.

Each of these presentations touched upon the issue of “moral blind-spots.” Moral blind spots or moral shortsightedness occur when an otherwise moral person ignores a specific moral issue or the moral implications to a specified group or situation. Thus, rather than the comprehensive moral insensitivity of the depraved person, the moral blind spot is a focal insensitivity to an issue. The moral shortsighted are insensitive to the effects of a behavior on a specific group or in a specific situation. These types of problems in moral reasoning are fairly common and some might say that everyone has some moral blind spots or shortsightedness.

Immediately following the introduction, workshop attendees were randomly assembled into four working groups and charged with the following three tasks: (i) identify what they felt were the motivators behind unethical practice activities (ii) list different types of “*moral blind-spots*” that lead to chiropractors engaging in inappropriate conduct and (iii) provide preliminary solutions that chiropractic colleges could inculcate into their curricula to address these concerns. A representative from each group then provided the group’s consensus opinions. The discussion was then opened up to all attendees for further discussion. The collective opinions are summarized below.

Discussion

Workshop participants divided the forces behind unethical behavior into *internal* and *external* forces.

Internal Forces

The overall consensus opinion of the participants was that the internal forces driving unethical behavior exhibited by new graduates was their debt load, an amount typically in excess of \$150,000. The requirement to serve this debt upon graduation, coupled with the necessity of earning sufficient funds to pay for basic living expenses, gives the impetus towards making decisions based on financial gain rather than clinical need. Many attendees noted that Millennial or the Echo generation children (children of the baby boomers) often have no patience to obtain economic success by what is colloquially termed “sweat equity” – the requirement to build a loyal patient base founded on a solid reputation over time. Other attendees, seasoned hands in chiropractic education, commented on the sense of entitlement many students now demonstrate and how this sense of entitlement spills over to practice activities. These students are unable to delay gratification and instead seek the illusion of wealth. These attitudes may be further strengthened by the poor role-modeling of highly paid and successful celebrities such as Martha Stewart or Bernie Madoff. This all results in a downward-spiral of unethical behavior whereby vulnerable graduates want it all; they want it now and they do not particularly care how they get it.

External Forces

At the same time, new graduates are exposed and vulnerable to external forces contributing to poor ethical practice. “Practice Management Programs” were specifically mentioned by the workshop participants, especially those programs that teach chiropractors to deliver pre-packaged messages to patients that appear to push patients towards unnecessary and an excessive number of visits. Lengthy schedules of care were cited as an apparent outgrowth of these programs. Excessive treatment independent of patient needs is a practice activity that hinders the development of the cultural authority of the profession and tarnished its image, at least according to some.⁹ The problem of pre-payment plans has prompted the ACA to develop a policy warning doctors and a series of questions a practitioner ought to answer in order to determine

whether or not a prepayment plan is in the patient’s best interest.¹⁰ Although the ACA does not call these plans inherently unethical, many of the workshop attendees opined that they are.

It should be mentioned that none of the workshop participants argued against recommending patients adhere to either a supportive care (a form of care that, when withheld, results in a return of clinical symptoms) or maintenance care (a form of periodic care that is provided even in the absence of symptoms and has many theoretical benefits including optimizing a person’s health, identifying a new problem as it emerges, enhancing wellness and preventing reoccurrence of the chief complaint) since evidence exists in support of these care plans.^{11–18} However, the decision to adhere to these ongoing care plans ought to rest with the patient, not the doctor, and the patient’s decision ought not be influenced by unethical tactics (fear-mongering, for example). Furthermore, since the patient ought to be the final arbiter what is in his or her best interest, should a patient decide to discontinue care once their chief complaint is resolved that decision must be respected. Such thinking is at the root of “patient-centered health care.”

Combating the Problem

Not surprising, given the fact that the majority of attendees were academic faculty at accredited chiropractic colleges, workshop participants asserted that the colleges were not taking a lead role in this area of professional development. It would appear that colleges may be abrogating their responsibility to students by not offering more ethical practice guidance. The vacuum left by their absence was being filled by practice management firms.

Business courses should include content that provides real-life examples of “bad behavior” exhibited by field doctors, as gathered from annual reports published by licensing bodies and it ought to include reviewing contract clauses that are not equitable to the new graduate. Workshop participants emphasized that students need mentors and role-models who inspire them to practice with pride and to strive for excellence. It was suggested this could be achieved by requiring students visit successful alumni from a roster of doctors who were pre-screened by each chiropractic college. This approach was preferred to simply requiring students visit *any* field practitioner since without some over-sight, a student may inadvertently visit an unethical, albeit financially successful, doctor and

consider emulating his or her practice behaviors upon graduation.

For example, although a practitioner may be able to boast efficient office policies and procedures, commercial success and high satisfaction rates among his or her patient base, this may be achieved by improper behaviors. Such unethical tactics may include fear-mongering, overly-aggressive scheduling strategies, unsubstantiated guarantees of results, false and misleading advertising, conspiracies to defraud third-party payors and other unscrupulous tactics. One tactic that has been identified as a source of concern recently is the requirement of a patient to bring their family members to an “education seminar” prior to the commencement of patient care. Although an argument can be made that it is far easier for a patient to adhere to a schedule of care and to perform home-care exercises or to refrain from certain household chores (i.e. laundry, snow shoveling) if there is support from the entire family, some chiropractors make attendance to an educational seminar a requirement in order to receive treatment. This has prompted the chiropractic licensing boards in some provinces in Canada (Alberta and Saskatchewan for example) to expressly prohibit this form of practice activity.

Not only should colleges maintain a roster of pre-approved (or pre-vetted) practitioners that exemplify appropriate practice activities that students may shadow, but it was suggested that these practitioners be offered training to ensure their alignment with the educational learning objectives of that chiropractic program.

Workshop participants suggested business courses in the core curriculum offer practice management skills along with patient management skills. Such skills include; understanding the terms and conditions of a lease or agreement of purchase and sale; basic accounting skills; effective advertising; how to use demographic information to increase patient traffic; staff training; insurances that must be maintained; requirements to maintain licensure and so on. As importantly, students should be shown examples of associate agreements, especially those clauses that can lead to strife upon dissolution of the agreement. Such clauses include; termination; save-harmless; moral turpitude; requirement to maintain malpractice insurance; requirement to maintain licensure (professional registration); non-competition and distribution of records.

Some workshop participants expressed the need to edu-

cate students about the risks and benefits of purchasing a practice. Methods to calculate purchase price- including the attribution towards the “Goodwill” of the practice- need to be taught. Students should be cautioned to avoid purchasing a practice solely built on a “cult of personality,” since the practice’s success may hinge upon the patient’s preference towards the doctor selling the practice (the vendor). Students should also be forewarned that some vendors require the purchaser hire them for a period of time at an outrageous fee in order to ensure patient retention and mentoring.

Workshop participants suggested that colleges should devote time to “success” stories, not just “horror” stories. This may be achieved by organizing panel discussions involving successful alumni. Lastly, “evidence-based practice” should include elements of “ethical-based practice” activities throughout the college curriculum.

Future Action Steps

Workshop attendees were asked to complete a brief questionnaire. All attendees indicated that they found the workshop insightful and would be willing to attend a follow up workshop in 2012 if it was scheduled. With that in mind, a proposal was submitted to the program organizers of the 2012 ACC-RAC to schedule a second workshop on this topic that will focus on the action steps required to inculcate these solutions into college curricula. In addition, the importance of teaching “leadership skills” has also been offered as an important component of this educational model. This proposal was recently accepted and the second workshop on this topic is scheduled to take place during the 2012 ACC-RAC in Las Vegas, Nevada on March 17, 2012.

Summary

Overall, participants of the Ethical Practice Management workshop of the 2011 ACC-RAC expressed their satisfaction with it. This article described challenges chiropractors, especially new graduates, will encounter that may tempt them to conduct fraudulent activities. At the end of the day, it is hoped that workshops such as these will be used to develop a “Model Curriculum” for ethical practice activities taught throughout the profession.

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The JCCA is delighted to announce the recent appointment of Dr. Jeff Quon DC, PhD to Associate Editor



Dr. Jeffrey A. Quon, DC, MHSc, PhD, FCCS(C)*

Dr. Jeffrey Quon graduated from the Canadian Memorial Chiropractic College in Toronto in 1986. He completed a postgraduate residency in chiropractic clinical sciences in 1988, and became a Fellow of the College of Chiropractic Sciences in 1989. He subsequently completed a Master of Health Science degree in 1998, and a PhD in epidemiol-

ogy in 2007 at the University of British Columbia (UBC). During his research training he was supported by a University Graduate Fellowship Scholarship from UBC, a doctoral fellowship from the Michael Smith Foundation for Health Research, and a postdoctoral fellowship from the Canadian Institutes of Health Research, Canadian Chiropractic Research Foundation, and British Columbia College of Chiropractors. He also received generous in-kind support from the Centre for Health Evaluation and Outcome Sciences (CHÉOS) at St. Paul's Hospital, and the Combined Neurosurgical and Orthopaedic Spine Program (CNOSP) at Vancouver General Hospital (VGH) in Vancouver. Dr. Quon is currently a Clinical Assistant Professor in the School of Population and Public Health, Faculty of Medicine at UBC, and a Research Associate at The International Collaboration on Repair Discoveries ("ICORD", which is part of the Vancouver Coastal Health Research Institute and the Faculty of Medicine) at UBC. His research has been presented at major conferences internationally and published in scholarly peer-reviewed journals such as *The Spine Journal*, and *Spine*. In addition to his ongoing involvement in both health services research and clinical trials of spinal manipulation and other nonoperative spine treatments, he is still actively involved in clinical work as the Chiropractic Consultant/Advisor at WorkSafeBC (Workers' Compensation Board of British Columbia), and as a practitioner at The Cambie Chiropractic Centre in Vancouver.

Congratulations to Dr. Quon!

* Clinical Assistant Professor, School of Population & Public Health, Faculty of Medicine, University of British Columbia, Research Associate, International Collaboration on Repair Discoveries (ICORD), Vancouver Coastal Health Research Institute.

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The JCCA is delighted to announce the recent appointment of Dr. André Bussi res DC, PhD candidate to Assistant Editor



Dr. Andr  Bussi res, DC, MSc, FCCS(C), PhD candidate*

Dr. Andr  Bussi res is a CMCC graduate (1991) and holds the Fellowship of the College of Chiropractic Sciences Canada (1993). He completed a BSc in Nursing in 1987 and an MSc in Kinesiology in 2008. He is a full time professor at UQTR (2002) and was program director of the chiropractic department between 2005 and 2008.

Dr. Bussi res will shortly complete his PhD training in Population Health and the University of Ottawa under the supervision of Dr. Jeremy Grimshaw, Director of Cochrane Canada. His thesis project is to establish a scientific rationale for interventions to translate research findings into clinical practice. Dr. Bussi res is the recipient of the 2009 CCA Young Investigator Award, a prestigious CIHR Fellowship Award and a KT Canada Fellowship Award. He was recently awarded the CCRF Professorship in Rehabilitation Epidemiology at McGill University. This research position focuses on a scientifically sound approach to Clinical Practice Guideline (CPG) development, dissemination and implementation.

His research interest focuses on knowledge translation exchange including knowledge synthesis, dissemination and implementation research and professional behaviour change to improve clinical practice and patient outcome. To date he has written over 24 scientific and clinical articles and 3 book chapters. He was the principal investigator of three diagnostic imaging practice guidelines for musculoskeletal complaints in adults for chiropractors and primary care professionals. These were published in the Journal of Manipulative and Physiological Therapeutics and posted on The National Guideline ClearinghouseTM. He serves as a peer reviewer to a number of journals including the JMPT, CMT, Chiropractic and Osteopathy, and the J Chiro Ed, and has given over 50 invited scientific presentations.

Congratulations to Dr. Bussi res!

* CCRF Professorship in Rehabilitation Epidemiology, Assistant Professor, School of Physical and Occupational Therapy, Faculty of Medicine, McGill University, Professor, D partement chiropratique, Universit  du Qu bec   Trois-Rivi res.

  JCCA 2012

Multiple Myeloma presenting as sacroiliac joint pain: a case report

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Multiple Myeloma (MM) is the most common primary cancer of bone in adults. The clinical presentation of MM is varied and depends on the sites and extent of involvement. Most importantly for chiropractors, the leading clinical symptoms of MM are related to bone neoplasm and may mimic pain of musculoskeletal origin. The following is the case of a 56 year old male chiropractic patient presenting with a 6 month history of sacroiliac joint pain previously diagnosed and managed unsuccessfully as a hematoma by multiple providers. Physical examination, imaging, and laboratory investigations confirmed a diagnosis of MM. The case report describes relevant pathophysiology, clinical presentation, imaging, and management for MM, while illustrating key issues in patient management as they relate to chiropractic practice and the recognition of pathology in the context of musculoskeletal pain. (JCCA 2012; 56(2):94–101)

KEY WORDS: myeloma, cancer, diagnosis

Introduction

Multiple Myeloma (MM) is a primary malignancy of bone marrow characterized by clonal proliferation of plasma cells and production of monoclonal immunoglobulin. It is the most common primary bone cancer in adults^{1,2} con-

Le myélome multiple (MM) est le cancer primitif des os le plus fréquent chez les adultes. La manifestation clinique du MM est variée et dépend des lieux et du degré d'envahissement. Plus important encore pour les chiropraticiens, les signes cliniques prépondérants du MM sont liés au sarcome osseux et peuvent ressembler à une douleur d'origine musculosquelettique. Voici le cas d'un patient de 56 ans en chiropratique éprouvant depuis six mois une douleur aux articulations sacro-iliaques, qui avait préalablement reçu le diagnostic d'hématome et traité sans résultat par de multiples fournisseurs de soins. Après un examen physique, une imagerie médicale et des essais en laboratoire, le diagnostic de MM a été confirmé. Le rapport du cas décrit la pathophysiologie apparentée, la manifestation clinique, l'imagerie médicale et la prise en charge du MM, tout en illustrant les enjeux majeurs relatifs à la prise en charge du patient, car ils concernent la chiropratique ainsi que la reconnaissance de la pathologie dans le cadre d'une douleur musculosquelettique. (JCCA 2012; 56(2):94–101)

MOTS CLÉS : myélome, cancer, diagnostic

tributing to 1.3% of new cancer cases in Canada and 1.9% of cancer deaths.³ In 2008, an estimated 6000 Canadians were living with the disease, including 2100 newly diagnosed.³ Myeloma is slightly more prevalent in males^{4,5,6} and blacks.^{4,5,7} The median age at diagnosis is 66, with

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the majority diagnosed over the age of 60;^{8,9} however in a review of 1027 patients diagnosed with MM, 30% were under the age of 60 and the age of diagnosis ranged from 20–92.⁸ The most common symptoms reported are those related to bone neoplasm including unexplained backache that is often severe and precipitated by movement.^{8,11} These symptoms may motivate a patient to seek conservative care for what is assumed to be a complaint of musculoskeletal origin. This case emphasizes key components of patient management as they relate to chiropractic practice and the recognition of pathology in the context of a patient presenting with pain of presumed musculoskeletal origin.

Case Presentation

History

A 56 year old male presented to a tertiary care centre with a six month history of pain in the left gluteal/sacroiliac joint region. The complaint progressively worsened following its onset after heavy lifting. His pain varied in intensity and was often exacerbated following activity. The most recent and intense exacerbation occurred in the week prior to his hospital presentation and was insidious in onset. Symptoms included radiation of pain down the left leg of two days duration described as stabbing in nature with an intensity of 7/10. The patient did not report any associated numbness or paresthesias and was not experiencing any weakness. Aggravating factors included sitting and lying supine. In addition, he reported occasional waking during the night due to pain. The patient reported a mass in the left gluteal region which had slowly increased in size over the preceding month. This mass was diagnosed and managed as a hematoma 6 months prior to his hospital presentation. His family physician prescribed Tylenol-3 and physiotherapy. Two visits with a physiotherapist consisting of a passive assisted stretching technique and traction aggravated his complaint. He then consulted a chiropractor who treated him with spinal manipulative therapy for more than 12 visits over 6 weeks. The patient reported minimal short-term relief over this period of time with no change in the soft tissue mass. Following his lack of response to conservative chiropractic management, the patient was referred by the chiropractor to the local hospital emergency department for further medical assessment.

The patient reported his health status as otherwise healthy. He denied a history of fever, night sweats, or recent changes in his weight and did not report any bowel or bladder dysfunction. A systems review was unremarkable.

Physical Examination

Upon hospital presentation, examination revealed a palpable warm soft tissue mass in the left buttock region, approximately 10 cm in diameter. Hip and lumbar spine ranges of motion were pain-free and within normal limits. Neurological examination including sensory, motor, and reflex testing of the upper and lower limb was unremarkable. Straight leg raise was negative bilaterally. Sacroiliac (SI) compression and FABER (Flexion Abduction External Rotation) were both positive on the left, reproducing pain over the patient's left SI joint. No tenderness was noted on lumbar spine palpation. An abdominal examination failed to reveal any tenderness or palpable masses and there was no evidence of lymphadenopathy peripherally. Vital signs were within normal limits.

Diagnostic Imaging

A computed tomographic (CT) examination of his abdomen and pelvis demonstrated a 12 × 7 × 12 cm soft tissue mass causing expansion and cortical destruction of the superomedial aspect of the left iliac bone, including the sacroiliac articular surface, with extension into the gluteus medius muscle (Figure 1). Additionally, small osteolytic lesions were noted in the inferior aspect of the S1 vertebral body and in the right iliac bone. No evidence of intraabdominal or pelvic adenopathy was noted. A bone scan revealed decreased uptake in the left iliac bone, corresponding to the location of the soft tissue mass. A chest CT revealed no evidence of metastatic disease or primary lesions in the lung parenchyma. A later radiographic skeletal survey demonstrated an osteolytic lesion involving the left posterior iliac crest corresponding to the CT finding that was visible on plain radiographic examination (Figure 2). Differential diagnoses at this time included; plasmacytoma/multiple myeloma, primary sarcoma, and metastatic disease.

The patient was admitted to hospital for further diagnostic testing. Peripheral blood smear and other laboratory testing revealed a normocytic normochromic anemia, marked rouleaux formation, and elevated protein levels (with an IgA-kappa light chain monoclonal spike on pro-

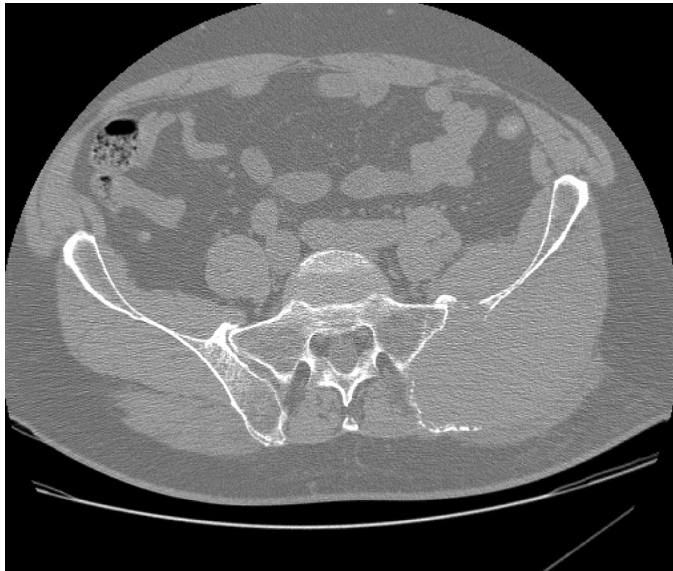


Figure 1a Axial CT scan of the pelvis (bone window) demonstrating a soft tissue mass with expansion and cortical destruction of the superomedial aspect of the left iliac bone including the sacroiliac joint surface with extension into the gluteus medius.



Figure 2a AP Pelvis view depicting an osteolytic lesion in the left superior iliac bone extending to the sacroiliac joint surface.



Figure 1b Reformatted coronal CT image in a soft tissue window further depicting the extent of the soft tissue mass causing destruction in the left iliac bone and sacroiliac joint.



Figure 2b Oblique view of the pelvis further demonstrating the osteolytic destruction in the left superior iliac bone extending to the sacroiliac joint surface.

tein electrophoresis). A bone marrow aspirate demonstrated plasma cells making up over 50% of the total cell population. These findings were consistent with multiple myeloma given the osseous lesions noted in the left iliac bone and S1 vertebral body.

Management

Once admitted to the hospital, the patient was referred for consultations with hematology and oncology. He received transfusions to correct his anemia and was administered his initial 4 day cycle of chemotherapy. His pain was controlled effectively through the use of regular strength Tylenol. A referral was made to radiation oncology for consideration of radiation therapy. The patient received 6 cycles of chemotherapy, subsequent radiation therapy and autologous stem cell transplant over the duration of one year. Despite some initial improvement in symptoms and activities of daily living, upon last follow up new lesions were discovered in his liver. His prognosis for recovery at the time of last follow-up was poor.

Discussion

Pathophysiology

The pathophysiology of MM begins with cytogenetic changes that occur in the plasma cell lineage within the bone marrow.¹⁰ Monoclonal expansion of myeloma plasma cells within the bone marrow interferes with the production of normal blood cells. Myeloma cells produce abnormal immunoglobulin (M protein), light chain proteins (κ and λ), and other factors, such as cytokines. Excessive M protein causes hyperviscosity of the blood, whereas excessive light chains cause end organ damage (for example renal failure). Lesions of bone are largely caused by the release of cytokines⁷ that promote bone resorption via upregulation of osteoclast activity, differentiation, and maturation.^{7,9} Unrestrained osteoclast activation leads to the release of mediators that stimulate further clonal proliferation of myeloma cells and subsequent tumour growth.¹⁰ The result is a vicious cycle of bone destruction and tumour growth, leading to further bone destruction.

Clinical Manifestations/Presentation

Symptoms of MM are the result of bone marrow infiltration, the development of bone neoplasms, and the effects

of the disease process on the renal system.^{5,7} Proliferation of abnormal plasma cells within bone marrow results in reduced production of normal blood cells causing anemia, thrombocytopenia, and leucopenia.⁷ Fatigue, weakness, and malaise are common symptoms experienced by approximately 1/3 of patients,⁸ most commonly due to anemia.^{7,8} Thrombocytopenia causes excessive bleeding and/or bruising, whereas leukopenia leads to frequent recurrent infections.^{7,10} The leading symptoms of multiple myeloma are those related to bone neoplasm.¹¹ Unexplained backache or bone pain in the long bones, ribs, skull, or pelvis are common presenting complaints^{7,10} and may be present in up to 58% of patients.⁸ Pain is often severe and precipitated by movement.⁸ Pathological fractures as a result of diffuse osteopenia or expansile tumours may be the presenting complaint in 26–34% of patients.^{5,7} Vertebral compression fractures are common and can result in spinal cord or nerve root compression.² Peripheral neuropathies and paresthesias may also occur, the most common being carpal tunnel syndrome,^{7,10} Hypercalcemia becomes prominent as bone resorption continues, and can result in numerous symptoms such as: anorexia, nausea, vomiting, polydipsia, constipation, abdominal pain, bone pain, impaired concentration and memory, lethargy, muscle weakness, and itching.^{7,10,24} High levels of M protein in the blood can lead to symptoms of hyperviscosity including headache and bruising.¹⁰ Although there are many symptoms associated with multiple myeloma, studies have shown that up to 34% of patients report an absence of symptoms prior to their diagnosis.⁵

For patients experiencing pain, correct diagnosis relies on a thorough history. MM's variable presentation makes it difficult to provide a list of symptoms that are highly sensitive or specific to confirm or rule out the diagnosis. Typically, pain of pathological origin is suspected in the presence of red flags including age over 50, a previous history of cancer, no relief with rest, and constitutional symptoms such as unexpected weight loss, fever, and fatigue.^{17,18} Individually, these indicators have high specificity but low sensitivity.^{17,18} The specificity of a clinical test speaks to its ability to identify true negative test results, whereas sensitivity is related to a test's ability to identify true positive test results. With high specificity, the chance of receiving a false positive result is low; however with a low sensitivity, there is a higher chance of

receiving a false negative result. When trying to rule out a condition where there is a high cost for a missed diagnosis such as malignancy, a clinical test must have high sensitivity. Due to their low sensitivity, the absence of any one red flag cannot accurately rule out the presence of significant pathology. When combined, red flags may have higher sensitivity, emphasizing the importance of asking about all possible red flags.¹⁷ Berenson et al. suggest that multiple myeloma should be considered as a diagnosis in a patient over the age of 50 with back pain persisting for more than one month and one or more of the following symptoms; pain worse in the supine position, pain worse at night or pain that awakens the patient from sleep, band like distribution of pain around the body, pain not responding to conservative care or rest, constitutional symptoms, or progressive neurological deficit.¹⁰ Upon hospital presentation, the patient discussed in this case reported aggravation with lying supine and occasional waking due to night pain, symptoms fulfilling these criteria that may or may not have been present initially, emphasizing the importance of continued evaluation to ensure the recognition of latent symptoms of pathology.²³

This patient also experienced a 6 month history of worsening pain and a growing mass. The mass was initially diagnosed as a hematoma and was unresponsive to conservative management. The presence of a growing mass is a red flag, particularly where a diagnosis of hematoma is given. The natural history of a hematoma indicates that the mass should have diminished in size, rather than increase over 4–6 weeks. Failure to respond to conservative care is another significant red flag. The Glenerin Guidelines (1996) suggest that lack of improvement after 12 visits may imply the diagnosis is incorrect, the treatment is incorrect, or there is a co-existing condition. After 6 weeks of no improvement, a referral is warranted.¹⁹ Guidelines, however, do not take the place of clinical reasoning. Clinical decision making is guided by case complexity, the best available evidence, provider expertise and experience, and patient preference and beliefs.^{20,21,22} A decision must be made prior to implementation of care regarding expectations for improvement based on available evidence regarding natural history and individual patient factors or case complexity.²⁰ A lack of expected improvement warrants a change in treatment approach or referral.^{20,21,22} Information regarding a patient's progress is obtained from continued frequent evaluation; even when a diagnosis has

been provided by another health professional. It is the consulting health professional's responsibility to re-evaluate and formulate a diagnosis that is consistent with history and physical examination findings as well as the patient's response to management given previous diagnoses. For the patient in this case who was treated for pain of musculoskeletal origin and a hematoma, the natural history of the complaint should have been considered. Combined with his emerging symptoms consistent with pathology, his lack of response to conservative management should have resulted in an earlier decision for imaging or referral.

Physical Examination

Within the primary care setting, the suspicion of MM may be based solely on information gathered in the history. When the most prominent symptom is pain, a physical examination is performed to confirm or rule out pain of musculoskeletal origin; however it is important to note that the pain associated with neoplasm of bone can be reproduced much like pain of musculoskeletal origin. Pain precipitated by range of motion is a common symptom in patients with bone neoplasm, including multiple myeloma.^{8,12} A musculoskeletal examination of the patient in this case reproduced the chief complaint, emphasizing that positive musculoskeletal provocation tests do not rule out pain of pathological origin. In addition, chronicity of a complaint also does not rule out pain of a pathological origin. The authors of a retrospective case review involving primary sarcomas of the pelvis (excluding multiple myeloma) suggested one of the reasons for delayed diagnosis was that primary care practitioners were misled by chronicity which is less consistent with rapidly growing malignancies. In the pelvis, tumours can occupy larger areas without detection due to the relatively large surrounding space.¹² This patient developed chronic pain due to the lack of attention to his growing tumour which was originally diagnosed and managed as a hematoma, further placing him outside of the typical presentation of malignancy.

Imaging Findings

Imaging plays a role in the diagnosis and prognostic classification of multiple myeloma. Radiography is of key interest to chiropractors as many have access to this form of imaging. Clinical indications for radiographic imaging include the presence of red flags and lack of response to

treatment. Radiographic findings of multiple myeloma include punched out osteolytic lesions without reactive sclerosis, osteoporosis, and pathological compression fractures.^{2,8} The most frequently involved bones are the skull, pelvis, ribs, sternum, and long bones.² Approximately 79% of patients have positive radiographic findings at the time of their diagnosis.⁸ Up to 25% of those with an absence of radiographic findings subsequently developed positive findings in follow-up examination, emphasizing the lack of sensitivity of radiographic imaging in early phases of the disease.^{8,11} Radiography also lacks sensitivity in identifying myeloma-related osteoporosis, as 50% trabecular loss is required for its visualization.² Due to this lack of sensitivity, additional imaging such as Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) may be required when suspicions of multiple myeloma are high.^{8,11} CT is able to provide detailed information regarding the extent of cortical involvement of the tumour, whereas MRI is able to demonstrate marrow infiltration as well as diffuse patterns of infiltration that may not be adequately visualized using radiographic imaging alone.^{1,11} In addition, MRI is able to demonstrate the extent of soft tissue and neurovascular involvement.¹¹ On MRI, myeloma tumours have a low T1 and high T2 weighted signal intensity with enhancement after the administration of intravenous contrast.² As there is no increase in osteoblastic activity, bone scans are of less importance in MM and may result in false negative findings, leading to misdiagnosis.¹³ In the diagnosis of the patient in this case, CT, plain radiographic imaging, and bone scan provided findings that were consistent with findings of MM; however earlier referral for radiographic imaging or diagnostic ultrasound for his growing mass may have lead to more prompt diagnosis and management.

Laboratory Findings

Laboratory tests used to screen for MM include a complete blood count (CBC), peripheral blood smear, erythrocyte sedimentation rate (ESR), chemistry panel (including electrolytes, calcium, uric acid), and serum and urine protein electrophoresis. For confirmation of a diagnosis of MM, a bone marrow biopsy and immunofixation should also be performed. A CBC will demonstrate normocytic normochromic anemia in most patients⁸ and may also reveal leukocytopenia and thrombocytopenia. Rouleaux, a characteristic finding of MM, will be seen with a periph-

eral blood smear in roughly half of all patients.⁸ ESR is often elevated.^{8,13} A chemistry panel will reveal hyperuricemia and hypercalcemia¹³ and serum creatinine will be elevated in the case of renal insufficiency (due to renal failure, myeloma kidney, hypercalcemia).⁸ Serum albumin may also be decreased.¹³ Protein electrophoresis will demonstrate a characteristic M-spike in the serum and/or urine of most patients, indicating monoclonal gammopathy.^{8,13} Bone marrow biopsy confirms a diagnosis of multiple myeloma through the demonstration of malignant plasma cell infiltrates.¹³ In the current case, laboratory findings were used to rule out the differential diagnoses and confirm the diagnosis of multiple myeloma following the discovery of a tumour in the posterior ilium.

Diagnosis

The diagnosis of MM is dependent on findings from a number of investigations including clinical examination, imaging, and laboratory testing. As chiropractors, the clinical picture and imaging are used to indicate the need for referral for appropriate follow-up diagnostic testing. In order to properly diagnose MM, World Health Organization criteria include plasmacytosis, an M spike on serum, plasma, or urine protein electrophoresis, and plasmacytoma proven on biopsy.^{10,13} Additional findings considered in the diagnosis of MM are osteolytic lesions and decreased polyclonal immunoglobulins.¹³ Differential diagnoses vary depending on the clinical picture. For chiropractors, relevant differential diagnoses will be based on initial imaging findings of an osteolytic bone tumour or the patient's clinical presentation. Differential diagnosis of an osteolytic bone tumour in a patient over the age of 50 includes metastasis, multiple myeloma, and lymphoma. Staging of MM is achieved using radiographic skeletal surveys and further CT or MRI and is helpful in the development of a plan of management and in determining a prognosis.

Management

Standard medical management of symptomatic MM involves chemotherapy with or without an autologous stem cell transplant for patients under the age of 70.¹³ Intravenous administration of bisphosphonates are used in conjunction with chemotherapy and have been shown to decrease the progression of osteolytic lesions and the development of vertebral and non-vertebral fractures, to

treat hypercalcemia and bone pain, and improve quality of life.^{9,10,14,15,16} Bisphosphonate treatment is recommended for patients with radiological evidence of osteolytic lesions or osteoporosis and is continued monthly for a period of 2 years.¹⁵ Supportive therapy for patients with MM may include maintenance of fluid and electrolytes with regular hydration, erythropoietin and transfusions to replace red blood cells and platelets, pain control using analgesics (NSAIDs are contraindicated due to potential for renal complications), promotion of mobility to prevent osteoporotic fractures, spinal decompression surgery for spinal complications, and radiation therapy for focal skeletal lesions.^{4,7,13,15}

Prognosis

The mean overall duration of survival after being diagnosed with multiple myeloma is 33 months with considerable individual variation.^{8,13} Negative prognostic indicators include older age, a previously diagnosed plasma cell disorder, and key laboratory findings.^{2,8,10} Laboratory findings indicating a worse prognosis include elevated β -2 microglobulin, serum albumin, and C-reactive protein.^{2,10} Bone marrow cytogenetics can also be used to help determine prognosis upon diagnosis.^{5,10}

Conclusion

In addition to a discussion on relevant clinical presentation, diagnosis, treatment, and prognosis of multiple myeloma, this case of a 56 year old male chiropractic patient with multiple myeloma illustrates key issues in patient management as they relate to chiropractic practice and the recognition of pathology in the context of musculoskeletal pain. An estimated 0.7% of patients with back pain in the primary care setting have neoplastic disease.¹⁷ As diagnosticians, the chiropractor's role is to rule out these serious causes for a patient's pain. Due to the low sensitivity of red flags, their absence cannot be used exclusively to rule out significant pathology.^{17,18} Further complicating the elimination of a pathological diagnosis is the fact that provocation of pain during the musculoskeletal examination does not rule out the presence of serious pathology, nor does the chronicity of the complaint. Decisions must be made prior to implementation of care regarding expectations for improvement based on available evidence regarding natural history, provider experience, and patient-related factors.^{20,21} With continued frequent evaluation,

the recognition of a lack of expected improvement warrants a change in treatment approach or referral.^{20,21} This case illustrates that without proper benchmarking of care, pathology can be missed, even in the event of the inclusion of multiple health professionals. For chiropractors, understanding the limitations of initial history and examination findings, as well as the importance of ongoing re-evaluation in the detection of a lack of expected improvement is crucial to appropriate patient management and the recognition of underlying pathology in the context of seemingly musculoskeletal pain presentations.

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Pregnancy-related symphysis pubis dysfunction management and postpartum rehabilitation: two case reports

Emily R. Howell, BPHE (Hons), DC, FCCPOR(C)*

Objective: *Two case reports review the chiropractic treatment and rehabilitation management of Symphysis Pubis Dysfunction (SPD).*

Clinical features: *Patient 1: a 35-year-old female presented at 30 weeks pregnant with severe left sided Symphysis Pubis Dysfunction and low back pain. Patient 2: a 33-year-old female also 30 weeks pregnant, presented with right sided Symphysis Pubis Dysfunction and sacroiliac pain.*

Intervention and Outcome: *Treatment included soft tissue therapy, pregnancy support belt, side-lying mobilizations, pelvic blocks and instrument-assisted pubic symphysis adjustments. Home advice included: ice, staying active, moving as a unit, stretching, use of a pillow between the knees while sleeping, regular breaks from sitting and pelvic floor (Kegel) exercises. Both patients reported some relief with treatment and home care. Post-partum, rehabilitation exercises were prescribed to restore muscular endurance, control and pelvic stability. On long-term follow-up patient 1 reported no pubic symphysis pain, but some low back pain secondary to a subsequent knee injury. Patient 2 reported being mostly pain free with a rare re-exacerbation of pubic symphysis pain.*

Summary: *Conservative chiropractic management appears to reduce pain and improve mobility and function for SPD. Post partum rehabilitation of the associated lumbo-pelvic musculature with specific stabilization exercises is recommended to reduce*

Objectif : *Deux rapports de cas passent en revue les soins chiropratiques et la gestion de la réadaptation dans le cadre d'une dysfonction affectant la région de la symphyse pubienne (DSP).*

Caractéristiques cliniques : *Patiente 1 : Une femme âgée de 35 ans a ressenti à 30 semaines de grossesse des douleurs intenses liées à une dysfonction de la symphyse pubienne au côté gauche ainsi qu'à une lombalgie. Patiente 2 : une femme âgée de 33 ans également enceinte de 30 semaines a ressenti des douleurs liées à une dysfonction de la symphyse pubienne au côté droit et des douleurs sacro-iliaques.*

Intervention et résultat : *Leur traitement comportait entre autres une thérapie des tissus mous, le port d'une ceinture de soutien de grossesse, des mobilisations en position couchée sur le côté, des cales pelviennes, et des réajustements de la symphyse pubienne assistés par des instruments. Chez elles, on leur avait conseillé de mettre de la glace, de rester actives, de bouger tous les membres en même temps, de faire des étirements, de placer un coussin entre les genoux en dormant, de ne pas rester trop longtemps en position assise et de pratiquer des exercices pelviens au sol (Kegel). Les deux patientes ont constaté un certain soulagement à la suite du traitement et des soins prodigués chez elles. Les exercices post-partum et de réadaptation ont été prescrits afin de restaurer l'endurance musculaire, le contrôle et la stabilité pelvienne. Après un suivi à long terme, la patiente 1 n'a constaté aucune douleur au*

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pain, improve long term outcomes and prevent chronicity.

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KEY WORDS: chiropractic, pregnancy, pelvic pain, pubic symphysis, rehabilitation, exercise

Introduction

The incidence of pelvic pain in pregnancy has been reported as between 48–71%.^{1,2,3} Pubic symphysis dysfunction has been reported in 31.7% of pregnant women.¹ The reporting of symphysis pubis pain is also rising due to low reports in the past and/or greater recognition by practitioners.^{1,2,3} There are many terms describing pelvic pain in pregnancy, including peripartum pelvic pain, Pregnancy-related Pelvic Pain (PRPP), Pregnancy-related pelvic girdle pain (PGP), anterior or posterior pelvic pain, and symphysis pubis dysfunction (SPD). This case report will use SPD as its main descriptor, since this was the primary complaint in both cases. SPD has been long recognized as an obstetrical condition in the literature but, until recently, there has been a lack of clinical interest.² It is often confused with diastasis pubis (a separated symphysis pubis of more than 10 mm, or symphysiolysis), pelvic rupture (rupture of the symphysis pubis and sacroiliac joints simultaneously, which is extremely rare), and even osteitis pubis (partial or complete rupture of the symphysis pubis and requires aggressive treatment).^{2,3} The disability related to symphysis pubis pain in pregnancy can vary from mild to severe, but is significant and any therapy that can help to reduce the discomfort is a welcome possibility.^{2,3,4,5}

niveau de la symphyse pubienne, mais une lombalgie consécutive à une blessure du genou. La patiente 2 ne ressentait presque plus de douleur mise à part une rare ré-exacerbation de la douleur au niveau de la symphyse pubienne.

Resumé : *La prise en charge chiropratique conventionnelle semble réduire la douleur et améliorer la mobilité et la fonction de la symphyse pubienne chez les patientes atteintes de DSP. La réadaptation post-partum de la musculature lombo-pelvienne associée à des exercices de stabilisation spécifiques est recommandée en vue de réduire la douleur, améliorer les résultats à long terme et empêcher la chronicité.*

(JCCA 2012; 56(2):102–111)

MOTS CLÉS : chiropratique, grossesse, douleurs pelviennes, symphyse pubienne, réadaptation, exercice

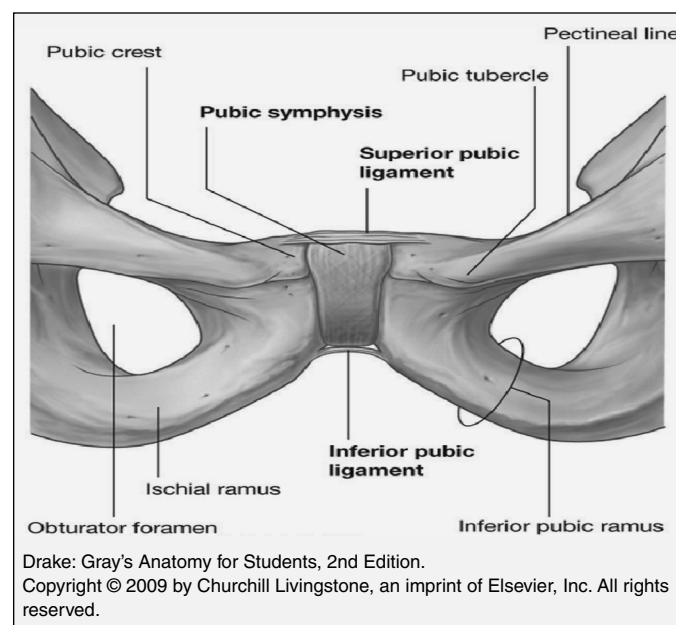


Figure 1 *Pubic symphysis and associated ligaments*

Symptoms of SPD:

- “shooting” pain in the symphysis pubis;
- radiating pain into the lower abdomen, back, groin, perineum, thigh, and/or leg;

- pain on movement, especially walking, unilateral weight bearing or hip abduction;
- pain with activities of daily living, including bending forward, standing on one leg, rising from a chair, go up or down stairs, turning in bed;
- pain relieved by rest;
- clicking, snapping or grinding heard or felt within the symphysis pubis;
- dyspareunia;
- occasional difficulty voiding;
- unmotivated fatigue.^{2,4}

Signs of SPD:

- tenderness over the pubic symphysis and/or sacroiliac joints;
- palpable gap in the pubic symphysis;
- suprapubic oedema and swelling;
- positive Trendelenberg's sign on one or both sides;
- positive Lesague's sign on one or both sides;
- Patrick test may be positive;
- waddling gait with short steps;
- paravertebral, gluteal, and piriformis muscles and sacrotuberous ligament tenderness.^{2,4}
- self-administered tests (alternative to the painful but highly sensitive and specific symphysis pubis palpation): pain drawing and a painful MAT-test (patient abducts and adducts the hip, simulating the movement of pulling a mat). These have shown the same results as palpation without the increased discomfort.⁶

Differential diagnosis for SPD:^{2,4,7}

- Ectopic pregnancy,
- STDs,
- urinary tract infection,
- round ligament pain,
- femoral vein thrombosis,
- nerve compression (intervertebral disc lesion),
- pubic osteolysis,
- osteitis pubis,
- bone infection (osteomyelitis, TB, syphilis),
- tumours,
- mechanical low back pain,
- myofascial pain,
- pelvic inflammatory disease,
- cysts,

- IUD displacement,
- endometriosis,
- postpartum fracture,
- abscess,
- pelvic mass,
- osteomyelitis,
- osteoporosis.

Theoretical causes of SPD:^{3,4,5}

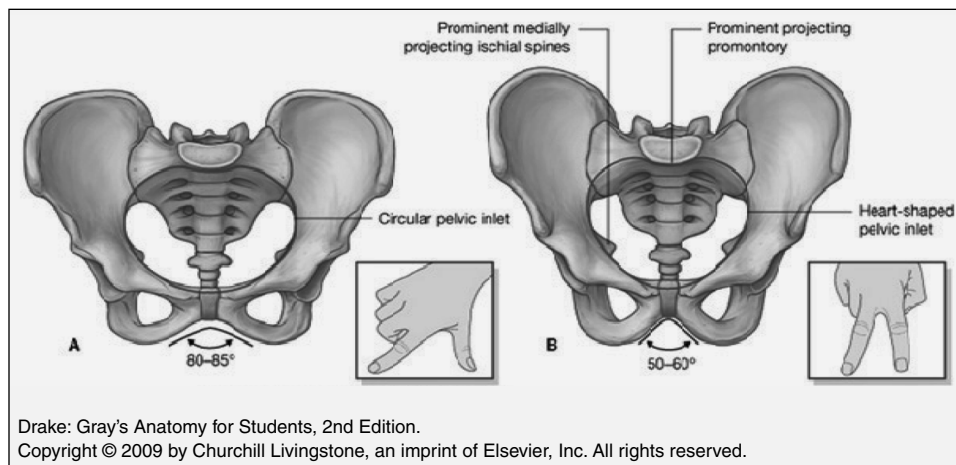
- biomechanical strains of the pelvic ligaments and associated hyperlordosis,
- anatomical pelvic variations,
- metabolic (calcium) and hormonal (relaxin and progesterone) changes leading to ligamentous laxity,
- pathological weakening of the joint,
- tearing of the fibrocartilagenous disc during delivery,
- narrowing, sclerosis and degeneration of the joint,
- muscle weakness
- increased fetal and pregnancy-related weight gain.

Predisposing factors for SPD and pelvic pain:^{2,3,4,7,9,10}

- genetics,
- family history,
- personal pregnancy history,
- early menarche,
- oral contraceptive use,
- multiparity,
- high weight,
- high levels of stress,
- low job satisfaction,
- history of low back pain,
- previous pelvic or back pathology or trauma,
- history of back or pelvic injury,
- lack of regular exercise (including long-distance running specifically),
- hypermobility,
- macrosomia or post-term delivery in pregnancy in labour,
- postpartum breast feeding
- neonatal developmental hip dysplasia.

The onset of pregnancy-related SPD can vary, with 74% in a first pregnancy and 12% in the first trimester, 34% in the second trimester and 52% in the third trimester.⁴ Women who develop SPD during pregnancy generally have a good prognosis, as delivery is usually curative.

Figure 2 Structure of the bony pelvis. A. In women. B. In men. The angle formed by the pubic arch can be approximated by the angle between the thumb and index finger for women and the angle between the index finger and middle finger for men as shown in the insets.



Most women's pain regresses over the first 1–6 months post partum, with 25% having pain 4 months post partum and only a small number after 12 months.^{2,4} The exception to this are patients who may develop SPD after a traumatic delivery, which is approximately 1–17.4% of women.^{2,4} One study reported that non-invasive Doppler imaging of asymmetric laxity of the sacroiliac joints in women with moderate to severe pelvic pain in pregnancy can help to predict persistent pain postpartum (by three times).¹¹ It has also been found that the higher intensity of pain reported during pregnancy and an earlier onset were predictive of pelvic pain persisting post partum.¹¹ The rates of reoccurrence have been reported between 41–77%, including 85% with a new pregnancy, 53–72% with menstruation, 22% with breast feeding.^{2,4}

Case Reports

Case 1

A 30 weeks pregnant, 35-year-old marketing professional presented with pre-partum anterior pelvic pain in her pubic symphysis (worse on the left), left sided low back pain and radiating pain to her inner thigh with standing. She reported the pain had been present for one week prior and was constant. She had no prior occurrence of this type of pain, as this was her first pregnancy. She described the pain as “shooting” and rated it as severe (but could not

quantify it when asked a numerical value on the visual analogue scale). She stated that the pain was progressively getting worse over time and greatly interfered with the activities of her daily life, such as walking, stairs, sitting, lying on her sides, rolling over in bed and getting in and out of the car. Relieving factors included lying down in the supine position, having her legs lifted for her and keeping her legs together with most movements. She reported having no previous chiropractic care or any other therapies. She reported taking no medications, and supplementing with a prenatal vitamin and folic acid. She reported that her sleep was “good” and usually lasted 8 hours per night but that she did have some night pain with rolling over in bed. She did not smoke, exercised three times per week (cardiovascular and weight training), and rated her diet as “good”. She reported a previous motor vehicle collision, wisdom teeth surgery and E. coli poisoning in her personal medical history. She stated that she had not been diagnosed with any medical conditions and that she had no significant health conditions in her family history. The red flags were negative (no bowel/bladder function problems, no weight loss, no night sweating, no fevers or infections) and she reported no other areas of complaint.

The physical examination revealed that the visually estimated ranges of motion in the lumbar spine were painful and limited in all directions (by approximately 25% in flexion, rotation and lateral bending and by approximate-

ly 50% in extension). Postural observation demonstrated anterior head carriage, increase thoracic kyphosis and increase lumbar lordosis. Motion and static palpation revealed restricted motion of the left sacroiliac joint and the left pubic symphysis. Soft tissue palpation revealed tight and tender muscles: bilateral lumbar erector spinae, quadratus lumborum, gluteals and iliotibial band (all worse on the left side). Neurological examination was unremarkable in the lower limbs. Positive orthopaedic tests include (reproduced her pain): left Thomas, Patrick/Fabere/Distracton test, belt test (patient performs active straight leg raise while therapist holds sides of ilium or puts a pelvic belt on the patient to see if this relieves pain patient experiences, therefore supporting the use of a belt),¹² Ober's, and side SI compression. Active straight leg raise was initially negative, but was positive later as the pregnancy progressed. Prone tests could not be performed.

The working diagnosis was pregnancy-related SPD and pelvic girdle pain. The prognosis was rated as good, since most cases subside within 6 months post delivery.² The plan of management included weekly visits consisting of soft tissue trigger point therapy, lateral recumbent Diversified mobilizations to the sacroiliac joints, pelvic blocks and instrument-assisted pubic symphysis adjustments.¹³⁻¹⁹ Home instructions included wearing a pregnancy support belt (Trainer's Choice®, see Figure 3) as needed, staying as active as possible, moving as a unit (legs together), stretching bilaterally of the iliopsoas, quadratus lumborum and piriformis muscles, icing the pubic symphysis and lower back (as needed), using a pillow between the knees while sleeping, regular breaks from sitting and pelvic floor (Kegel) exercises. She had five subsequent weekly treatments before she delivered her baby. After the initial visit, the patient reported feeling relief, but that the treatment effects did not last very long. She reported not icing, but that she did do her Kegel exercises. On her second visit, she stated that her pubic symphysis pain was "ok" in the morning, increased by midday and was still aggravated with walking. She stated that the overall intensity of pain had decreased, but was unable to quantify it. She reported that her lower back was somewhat "sore" at night. She was given the pregnancy belt at this visit (as it had to be ordered). On her third visit she reported that sitting for shorter periods of time reduced her pain and the belt greatly helped to decrease



Figure 3 Pregnancy pelvic support belt (Trainer's Choice®)

her pain with walking. On her fourth, fifth and sixth visits she reported that the baby was "lower" in her abdomen and that her pain had plateaued to a "manageable" state.

After approximately eight and a half hours of labour and four hours of active pushing/delivery, the patient delivered a healthy 9lb 5oz baby girl five days past full term.

She presented three months post partum after injuring her low back after overexerting herself while doing squats and jumping. She reported that the pubic symphysis pain had started to decrease one week after delivery and was better three months later, with only a little soreness on the left side. She reported that her right sacroiliac joint was now achy and sharp in certain positions. On physical re-examination, the positive orthopaedic tests included: PA SI compression and bilateral Kemp's. Lumbar spine ranges of motion were restricted with flexion (by approximately 25%), extension (by approximately 75%) and left rotation and lateral bending (by approximately 25%). Static and motion palpation revealed a restrictions at the L4/5 and the right SI joint. Soft tissue palpation revealed tight and tender bilateral lumbar spine erector



Figure 4A *Beginner prone plank (on knees)*



Figure 5A *Beginner side bridge (on knees)*



Figure 4B *Advanced prone plank (straight legs)*



Figure 5B *Advanced side bridge (straight legs)*

spinae, quadratus lumborum and gluteal muscles. The working diagnosis was acute right sacroiliac joint dysfunction and myofascial strain. Treatment included interferential current (IFC), soft tissue trigger point therapy and lateral recumbent sacroiliac and lumbar spine Diversified adjustments.^{13,14} Home recommendations included: icing, Epson salts baths, continuing pelvic floor exercises (Kegels), as well as adding deep abdominal bracing and gluteus maximus activation during her daily activities to re-establish her core strength and endurance. On her next visit four days later she reported the pain was much better, having greatly decreased in intensity had an increase in her mobility. She reported that taking over-the-counter Tylenol[®] helped as well. After a similar treatment, home recommendations included the same as the previous visit with the addition of short distance walking (within her

tolerance and gradually building up to greater distances and speeds). On the next visit one week later she reported her pain worsening after prolonged standing, but that the pain had resolved again. The next visit nine days later she reported that her back was overall improved and only felt “stiff.” The following visit five days later she reported occasional mild pain and much greater mobility. At this point, she was prescribed rehabilitation exercises progressed to include: prone planks on knees and working to straight legs (instead of modified curl ups, since she tested positive for rectus diastasis with palpation during a supine curl up), side bridges (on knees and working to straight legs) and later bird-dogs (at first with one leg, then one arm working to opposite leg and arm), all in a neutral spine posture and deep rectus abdominus contraction (see figures 4A, 4B, 5A, 5B & 6). The exercises were



Figure 6 *Bird dog*

instructed to be performed daily with 8–10 second holds and progress to more repetitions as tolerated.²⁰

The patient reported a minor set-back a two weeks later after a long walk while wearing her baby in a front loading baby carrier on the treadmill. Advice was given to walk shorter distances without wearing the baby (which overloaded her anteriorly) and to continue to work on her core endurance training. She had two subsequent visits and reported relief after each, but then then cancelled her next appointment due to scheduling difficulties. The patient then returned to work at 6 months post-partum and therefore was not able to return for treatment.

On long term follow-up (eleven months later) the patient reported low back pain secondary to a knee injury. She reported that the pubic symphysis pain had not returned after it had originally dissipated a few months post partum. She is currently seeing another health professional who is located close to her work.

Case 2

A 30 weeks pregnant, 33-year-old physiotherapist presented with pre-partum right-sided pubic symphysis pain for one week and right sided sacroiliac pain for the previous three months. She described the sacroiliac pain as sharp and intermittent. She reported the pubic symphysis pain as constant and “shooting”. She reported no prior occurrence of this type of pain, as this was her first pregnancy. Activities of daily living that were most affected were turning and standing on one leg at a time (i.e. getting dressed). She reported that the pain worsened as the day progressed and that it was interfering with her work. Re-

lieving factors included wearing a soft elastic pregnancy support belt. Previous therapies included three monthly massage therapy treatments. She reported that she had never received any previous chiropractic care. She reported taking no medications and taking only Pregvit prenatal vitamins daily. She was a non-smoker, who walked regularly for exercise and rated her diet as “good”. She reported sleeping well for 6–7 hours per night. Her previous history included a right sided knee injury, left elbow surgery, low blood pressure and a history of migraine headaches. She reported having no medical conditions or any relevant family history of medical conditions. Red flags were unremarkable.

The physical examination revealed the visually estimated lumbar ranges of motion to be painful and limited in left rotation (by approximately 25%). Motion and static palpation revealed restricted motion of the right sacroiliac joint and pubic symphysis. Soft tissue palpation revealed tight and tender bilateral gluteal, piriformis, quadratus lumborum, iliotibial bands and psoas muscles. Positive orthopaedic tests (which reproduced the pain she was experiencing) included: bilateral standing Kemp’s, right sided active straight leg raise and belt test.¹² Neurological examination of the lower extremities was unremarkable. The working diagnosis was pregnancy-related SPD and posterior pelvic pain due to pregnancy. The prognosis was deemed as good, since most SPD cases tend to resolve after delivery.² The plan of management included soft tissue trigger point therapy, lateral recumbent Diversified sacroiliac mobilizations, pelvic blocking and instrument-assisted pubic symphysis adjustments.^{13–19} Home care advice included ice (at the pubic symphysis and lower back as needed), moving as a unit (legs together), pelvic floor exercises (Kegels), gluteus maximus activation and a more structured and supportive pregnancy specific pelvic belt (Trainer’s Choice®, see Figure 3), staying as active as possible, stretching bilaterally of the iliopsoas, quadratus lumborum and piriformis muscles, and using a pillow between the knees while sleeping. On her second visit, the patient reported that she felt much better after the first treatment. She stated that she had scaled back to working half days, since she was pain free in the morning but was re-aggravated by the end of her first full day back. She also reported that the more structured belt really helped her symptoms.

The patient did not return for treatment until after her

delivery. After 10 hours of labour and 2 hours of attempted delivery/pushing, the delivering obstetrician used forceps to deliver a healthy 8 lb 1 oz boy at full term.

The patient presented three months post-partum reporting some symphysis pubis pain, no sacroiliac pain and some thoracic spine pain secondary to nursing. She reported that her obstetrician suspected the pubic symphysis pain may have been due to a pubic symphysis separation during the instrument assisted birth. Aggravating factors included sitting on the toilet, standing on one leg, long walks and lifting heavy objects. Relieving factors included wearing the belt, sitting and lying down. Physical re-examination revealed limited visually estimated lumbar ranges of motion with extension, lateral bending and bilateral rotation (all by approximately 25%). Soft tissue palpation revealed tight and tender bilateral thoracic and lumbar erector spinae, rhomboids, trapezius and psoas muscles. Static and motion palpation revealed restrictions at T4-6, T8-10, and the right side of her pubic symphysis. The working differential diagnoses were SPD (secondary to delivery-related trauma), pubic symphysis separation and mechanical thoracic spine dysfunction (secondary to postural strain). Treatment included soft tissue trigger point therapy, lateral recumbent Diversified spinal manipulative therapy, instrument-assisted pubic symphysis adjustments and pelvic blocks.¹³⁻¹⁹ Home care and rehabilitation exercise advice included: pelvic floor exercises (Kegels), deep abdominal bracing, gluteus maximus activation, stretching of the quadratus lumborum, iliopsoas and pectoral muscles, using a stool while using the toilet, and postural correction. On the next visit one week later she reported tenderness in her pubic symphysis after walking a long distance without wearing the belt. Prone planks (instead of curl-ups, as the patient tested positive for rectus diastasis) and side planks in a neutral spine posture with rectus abdominus contracted were prescribed (see figures 4A, 4B, 5A & 5B). She was instructed to perform the exercises daily with 8–10 second holds and progress to more repetitions and more difficult positions as tolerated (pain free).²⁰ A few weeks later, the patient reported that she had no pubic symphysis or low back pain and that she was able to walk longer and even go on hikes. Two months later the patient came in for treatment for her thoracic spine stiffness and reported her pubic symphysis was still pain free. The patient then moved away from the area seven months post partum, so treatment was discontinued.

On long-term twelve-month post-partum follow-up, she reported being mostly pain free. She stated that she very rarely had mild pubic symphysis pain and sacroiliac pain depending on the type of activity she was doing. Aggravating factors include walking too much, shovelling, lifting any heavy weight, lunges, side squats, and planting her right foot and pivoting (i.e. transferring patients at work). She reported she was planning on using an SI belt at work (since it seemed to relieve her pain), but that she had discontinued doing the rehabilitation exercises.

Discussion

Conservative management of SPD can include pelvic support belts, which have been studied in the literature with contradictory results. One paper reported that belts are no better than exercise alone and recommended that patients strengthen their musculature for longer term stability instead.¹ Subjects were given an exercise booklet with unspecified exercises to be performed 3 times daily using a logbook and had a single demonstration.¹ Another study recommended 50N of tension and a higher belt position (just caudal to the anterior superior iliac spines) to resist pelvic shear.²¹ Pelvic belts have also been found to significantly decrease mobility in the sacroiliac joints.¹² A belt has also been theorized to be most helpful in the later stages of pregnancy, when deep abdominal muscle activation is not possible, since the belt provides a “locked in” position to decrease the hypermobility in the pelvis that is associated with pregnancy related changes.²² It has been recommended to do muscular core training postpartum to provide this intrinsic stability.²²

Other treatments include elbow crutches, a walking frame or wheelchair may have to be used when mobility is compromised in extremely painful cases.² Simple analgesics can be recommended by the obstetrician or midwife.^{2,22} TENS, rest, ice, heat, massage, acupuncture and mobilization or manipulation help to reduce discomfort as well.^{2,5,7,22} One retrospective case report of osteopathic treatment of SPD showed positive results (including soft tissue massage, manipulation the thoracolumbar junction, muscle energy and articulatory mobilization technique to the symphysis pubis, L5 and left innominate and strain-counterstrain technique).²² Chiropractic treatment (including interferential therapy, massage, gentle lateral recumbent mobilization, home cryotherapy and exercises) has been shown to be beneficial and effective in

treating SPD in one study that surveyed SPD patients and their chiropractors.⁸ Postural and ergonomic advice, use of a wedge-shaped pillow, and self-help group information may also help.² In rare extreme cases of SPD and/or symphysis pubis separation, referral to an orthopaedic surgeon for suturing of the symphysis pubis or a pubic wedge resection may be a last resort treatment.²

Rehabilitation exercise during pregnancy should include isometric and non-isometric exercises with short arc movements of the lower limbs and the avoidance of one-sided movement combinations to prevent aggravating symptoms.^{24,25} Also, supporting musculature should be targeted locally and globally to support the entire pelvis and low back, including aerobic conditioning, light stretching, relaxation exercises and ergonomic advice.^{24,25} Water aerobics have been found to help reduce pain and sick days in pregnant women with low back and pelvic pain.²³ Much of the research states that individualized physical therapy has shown to lead to better functional outcomes and reduction in pain, but many of the articles do not specify what exercises are prescribed, the dose and the reasons they are chosen.²³ One article prescribed three pelvic girdle stabilizing exercises (using a ball between the knees in sitting, standing and kneeling position), plus four strengthening exercises (lateral pulls, standing leg-press, sit-down rowing and curl-ups), as well as stretching of the hamstrings, hip flexors and calf muscles to pregnant participants.⁵ Unfortunately they found no difference in any of their three groups (information, home exercise and in clinic exercise groups) during pregnancy or on follow-up.⁵

Post-partum rehabilitation exercise prescription recommendations include: restoring hip stability, lumbo-pelvic stability and motor control by training the transverse abdominis and multifidus muscles, activating the related muscle-fascia-tendon slings and pelvic floor muscles, with slow progressions within patient tolerance.^{3,5,10} These muscle slings connect with ligaments and fascia to contribute to stability and create a compressive “force closure” on the pelvis.¹⁰ This differs from “form closure” of the closely fitting joint surfaces that help to allow the pelvis to resist shear forces.¹⁰ Transversus abdominis contraction has been shown to decrease the laxity of the sacroiliac joint in non-pregnant women, while women with pelvic pain three years postpartum have been found to have poor muscle function.¹² Stuge et al. used a specif-

ic stabilization exercise program to improved functional status and reduce pain in women with postpartum pelvic pain.¹⁰ The program included specific transversus abdominis training during daily activities with multifidus coactivation, as well as gluteus maximus, abdominal obliques, erector spinae, quadratus lumborum, hip abductors and adductors training.¹⁰ The participants exercised 30–60 minutes, 10 repetitions per exercise, 3 days per week for 18–20 weeks.¹⁰ The success of this program was helped by individual training, the use of a training diary, as well as having home equipment.¹⁰ The authors found that the participants who did the specific exercises had less pain, improved function and a better quality of life.^{3,5,10}

Pelvic pain is a common presentation in chiropractic practices (up to 23.6% of patients), but chiropractors report that they rarely see pregnant patients.²⁶ Pregnant patients require a gentle, drug-free alternative for treating their discomfort and chiropractic care offers a safe and effective treatment option. In these two cases, it appears that reassurance, symptomatic care of the related structures and advice for self-care improved both patients’ symptoms and their quality of life. The rehabilitation exercises prescribed to the patients had the goal of re-establishing muscular endurance and function to improve overall pelvic stability.

Summary

When reporting on two retrospective pregnancy-related SPD cases, caution must be made to extrapolate any results to other pregnant patient cases since the resolution of their symptoms postpartum could be due to the natural history of the condition. Further study of this condition is recommended to include controls, randomization, the use of objective outcome measures and larger groups with specific individualized exercises. Although SPD tends to be a self-limiting condition, it is a very difficult condition for patients to cope with while they are pregnant. Therefore, it is important to investigate further how to manage this early and proficiently to reduce patient’s pain, improve their outcomes and prevent chronicity.

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Conservative management of De Quervain's stenosing tenosynovitis: a case report

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Objective: *To chronicle the conservative treatment and management of a 32-year old female patient presenting with radial wrist pain of 4 months duration, diagnosed as De Quervain's stenosing tenosynovitis.*

Clinical features: *The primary clinical feature is wrist pain at the radial styloid with resultant impairment of wrist, hand, and thumb function.*

Intervention and outcome: *The conservative treatment approach consisted of activity modification, Graston Technique®, and eccentric training. Outcome measures included verbal pain rating scale, QuickDASH Disability/Symptom Score, and a return to activities of daily living (ADLs). The patient attained symptom resolution and at 6 month follow-up reported no recurrence of wrist pain.*

Conclusion: *A combination of conservative rehabilitation strategies may be used by chiropractors to treat De Quervain's stenosing tenosynovitis and allow for an individual to return to pain free ADLs in a timely manner.*

(JCCA 2012; 56(2):112-120)

KEY WORDS: radial wrist pain, stenosing tenosynovitis, De Quervain's, Graston Technique®, eccentric training

Objectif : *Rendre compte du traitement et de la prise en charge conventionnels d'une patiente âgée de 32 ans souffrant de douleurs au bord radial du poignet depuis 4 mois, qui avait reçu le diagnostic de ténosynovite sténosante de De Quervain.*

Caractéristiques cliniques : *La principale caractéristique clinique est la douleur au poignet au niveau de la styloïde radiale ayant pour conséquence une défaillance de la fonction du poignet, de la main et du pouce.*

Intervention et résultat : *L'approche conventionnelle du traitement a inclus un changement de ses activités, la technique Graston® et un entraînement excentrique. Dans les indicateurs de résultats, on a pris en compte notamment l'échelle verbale d'évaluation de la douleur, le questionnaire QuickDASH/Symptom Score, et la reprise de ses activités de la vie quotidienne (AVQ). Les symptômes de la patiente ont disparu et, après six mois de suivi, elle n'a constaté aucune réapparition de ses douleurs au poignet.*

Conclusion : *Les chiropraticiens peuvent avoir recours à une combinaison des stratégies conventionnelles de réadaptation afin de traiter la ténosynovite sténosante de De Quervain et permettre aux patients de reprendre rapidement leurs activités de la vie quotidienne sans souffrir.*

(JCCA 2012; 56(2):112-120)

MOTS CLÉS : douleurs au niveau du bord radial du poignet, ténosynovite sténosante, De Quervain, technique Graston®, entraînement excentrique.

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Introduction

De Quervain's stenosing tenosynovitis (DQST) is a disorder that is characterised by wrist pain and tenderness at the radial styloid.^{1,2} It is caused by impaired gliding of the tendons of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) muscles.¹ These musculo-tendinous units control the position and orientation, force application and joint stability of the thumb. The impaired gliding is believed to be as a result of thickening of the extensor retinaculum at the first dorsal (extensor) compartment of the wrist, with subsequent narrowing at the fibro-osseous canal.³⁻⁷ Severe cases of DQST have been associated with extensor retinaculum thickening that is three to four times greater than normal.^{3,5}

The term "tenosynovitis" implies the presence of an inflammatory condition. However, the pathophysiology of DQST does not involve inflammation and has histopathological findings similar to those of other tendinopathies such as fibrocartilagenous metaplasia, deposition of mucopolysaccharide,^{8,9} and neovascularization.¹⁰ Neovascularization is known to be accompanied by an in-growth of nerve fascicles that have both sensory and sympathetic components capable of transmitting pain.¹¹ Thus, the mechanical impingement of the APL and EPB tendons in the narrowed fibro-osseous canal is the likely stimulus of nociceptors and pain.^{7,8} This creates resultant impairment of wrist, hand, and thumb function with activities such as lifting, pushing, pulling, and gripping.

In a large community based study from the United Kingdom, the prevalence of DQST was found to be 0.5% in men and 1.3% in women.¹² Epidemiological studies in industrial settings have shown a point prevalence of 8% when wrist pain and a positive Finkelstein's test, with or without tenderness to palpation of the radial wrist were used as diagnostic criteria.^{13,14} The highest prevalence of DQST has been reported among subjects 30–55 years of age.^{1,3,5} There are no reports available that definitively describe the natural history of untreated DQST.²

According to the National Board of Chiropractic Examiners 2005 Job Analysis of Chiropractic, the chief presenting complaint on initial visit of 8.3% of chiropractic patients in 2003 was in an upper extremity.¹⁵ Chronic tendon pathology is a soft tissue condition commonly seen in chiropractic practice.¹⁶ Chiropractors offer a number of conservative interventions that can be employed to treat tendinopathy.¹⁷ This case study was conducted to chron-

icle the conservative treatment and management of a 32-year old female patient presenting with chronic pain at the radial styloid diagnosed as DQST.

Case report

A 32-year old, right hand dominant female presented with gradual onset over four months of right-sided radial wrist pain. The patient was a stay at home mother. Her pain started after pulling her two children (boys aged seven months and three years old) in a wagon during her daily walks. She originally felt only mild discomfort in the right wrist and base of the thumb that did not limit any of her activities of daily living (ADLs). Over the following weeks, she noticed a gradual increase in her wrist and thumb pain, especially after holding her seven-month old son at her side. She visited her family physician who provided a diagnosis of "tendonitis." The physician recommended over the counter medication (ibuprofen), and a thumb spica splint to manage her symptoms. She found the thumb spica splint to be cumbersome and impractical during participation in most household chores and child minding activities, and therefore discontinued use.

The patient rated her current pain level on the Verbal Pain Rating Scale (VPRS) where 0 is "no pain" and 10 is the "worst pain that she had ever experienced". She reported her pain as ranging from 3/10 at rest to 8/10 when aggravated by activity. Evaluation of her disability was completed using the QuickDASH (disability of the arm, shoulder and hand). Her QuickDASH Disability/Symptom Score (QDDSS) was 80 out of a possible score of 100. The pain was described as a constant ache that became sharp in character with use of her right hand. This resulted in functional limitations with many of her ADLs (i.e. meal preparation, carrying laundry and groceries, home cleaning duties, vacuuming, picking up her children). She did not report any other previous history of significant right upper extremity injury. A systems review and family health history was unremarkable.

Upon examination, inspection did not reveal any swelling of the right wrist, hand, or thumb. A cervical spine screen and neurological screen (reflex, motor, sensory testing) for the upper extremities were within normal limits. Radial nerve tension testing as described by Magee¹⁸ and Butler¹⁹ was unremarkable. Provocative joint testing and range of motion (ROM) for the right elbow joint were within normal limits. Active wrist ROM revealed



Figure 1 *Stretching for the thenar muscle group*

discomfort at end ranges of flexion, extension, and radial deviation. Ulnar deviation as well as active thumb extension and abduction movements were limited by 50%. In addition, Finklestein's test (deviating the wrist to the ulnar side while grasping the thumb) was positive for pain. The first CMC joint grind test¹⁸ did not reproduce the patient's symptoms. There was no reported tenderness with joint play of the metacarpals and no evidence of instability. Palpation revealed tenderness and hypertonicity in the muscles of the thenar eminence (Abductor Pollicis Brevis, Flexor Pollicis Brevis, and Opponens Pollicis). Soft tissue tenderness with accompanying lumpy tissue texture was palpated most notably in the proximal APL and EPB, and to a lesser extent the extensor muscle groups of the forearm (Extensor Digitorum, Extensor Carpi Radialis Longus and Brevis). Tenderness was also palpated at the radial styloid and first dorsal compartment of the wrist. There was only mild tenderness palpated in the flexor muscle groups of the forearm.

Based on the above historical and physical examination findings the patient was diagnosed with DQST and treatment was initiated. The importance of activity modification and minimizing exposure to positions that aggravated the symptomatic right wrist was discussed at the outset. This included increasing the use of her unaffected left arm and hand during ADLs, task division and pacing strategies, and temporarily assigning some of the problematic household chores to her husband. Graston Tech-

nique® (GT®) was administered by a certified provider using GT® protocols to all the affected soft tissues of the right upper extremity. Care was taken in the initial stages to not administer treatment over the painful first dorsal compartment at the radial styloid.

The patient was initially prescribed exercises consisting of static stretching for the thenar muscle group (Figure 1) and forearm extensors/flexors. In addition, eccentric unweighted hammer curl exercises with no concentric component were prescribed (Figure 2 A–C). The patient was instructed to assist with the other hand during the concentric (radial deviation) movement phase. In week 3, eccentric thumb extension and abduction exercises with an elastic band (Figure 3 and 4), were introduced. At the beginning of week 5, eccentric wrist extension and flexion exercises with a dumbbell (Figure 5 and 6), along with eccentric forearm pronation and supination exercises with theraband® (Figure 7 and 8) were introduced. All eccentric exercises were performed without the concentric component permitted. A summary of the full rehabilitative exercise treatment protocol is included in Table 1.

The patient was seen twice a week for 4 weeks and then once per week for 4 weeks. At the end of week 8, the patient reported a VPRS score of 0/10 consistently at rest, and 1–2/10 with functional activities formerly reported as painful. The patient began gradually resuming her previously problematic ADLs in week 8. She continued with her home exercise program over the next 4 weeks. She had one treatment visit in week 10. At week 12, the patient continued to report a VPRS score of 0/10 at rest, and now reported a VPRS score of 0/10 with resumption of functional activities. Her QDDSS was calculated as 0 indicating no disability. Physical examination at this time was unremarkable for pain, with only mild stiffness reported during Finklestein's test and end ranges of thumb extension and abduction movements. The patient was subsequently discharged from active care and advised to return if her symptoms recurred. At 6 month follow-up conducted via telephone, the patient reported no recurrence of wrist pain.

Discussion

DQST has traditionally been linked to a combination of repetitive movements involving pronation and supination of the forearm, ulnar and radial deviation of the wrist, and abduction/extension of the thumb.³ It is believed the

Figure 2 A–C The eccentric training protocol. (A) The patient starts with the unweighted hand in the hammer curl position. (B) The wrist is then eccentrically loaded by slowly lowering the hand into a position of ulnar deviation. (C) The patient returns to the starting position using the contralateral unaffected hand to avoid concentric loading (radial deviation)



consequence of this biomechanical overloading is that the extensor retinaculum thickens to resist the cumulative strain.^{3,4} As a result, individuals who use their thumbs in repetitive pinching, wringing, lifting, grasping, or extension activities with the wrist and hand become susceptible to progressive stenosis in the first dorsal compartment of the wrist.^{1,4} Welch²⁰ postulated that the primary predisposing factor for the development of DQST is small muscles with inadequate blood supply. He indicates that training the muscles would increase vascular supply thereby decreasing the degree of predisposition. Anatomical variations with partitioning of the first dorsal compartment and its tendons into several sub-compartments and tendon strands has been observed more commonly among individuals with DQST than controls.^{1,3,4} A relationship between pregnancy and DQST in lactating mothers within the first three months of delivery has also been reported.^{21–23} Endocrine influences on fluid retention are thought to be the primary contributor to this association,²⁴ although the role of mechanical stress on the thumb from holding the baby may also be responsible.²²

Individuals with DQST often report a gradual onset of pain or tenderness at the radial styloid that may be accompanied by swelling.^{1,3,5} Additional findings on physical examination may include decreased abduction and extension ranges of motion at the first carpometacarpal joint, pain with isometric activation of the APB and EPB tendons, and crepitus of tendons moving through the thickened extensor sheath.²⁵ Finkelstein's test is typically

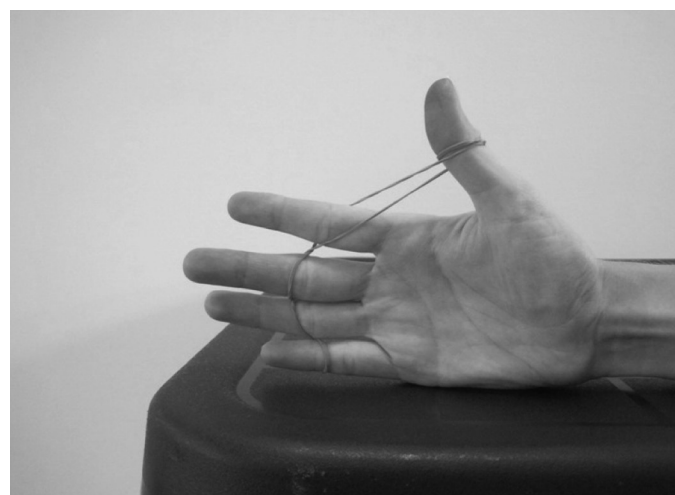


Figure 3 Starting position for eccentric thumb extension exercise

positive but should not be relied upon as the only finding for diagnosis of DQST. Ruling out other causes of pain along the radial aspect of the wrist and forearm is critical for accurate diagnosis. The superficial radial nerve supplies sensation to the radial aspect of the forearm and wrist, with the anterior terminal branch passing almost directly over the first dorsal compartment and providing sensation to the dorsum of the thumb.¹ As a result, an entrapment of the sensory branch of the superficial radial nerve (Wartenberg's Syndrome) may result in a positive Finkelstein's test. Osteoarthritis of the carpom-

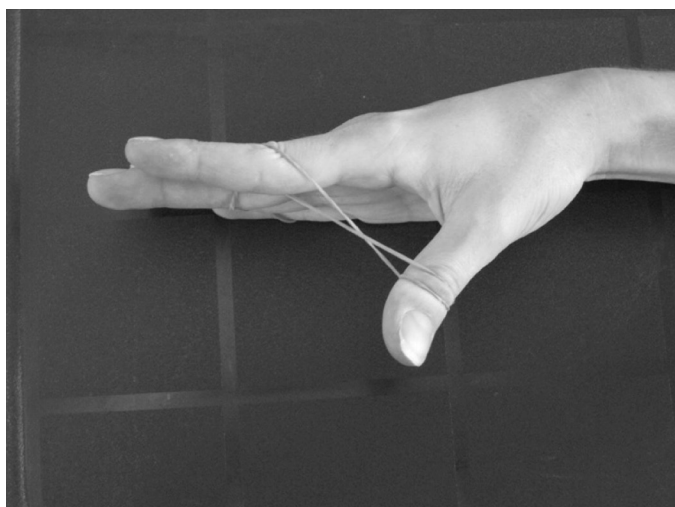


Figure 4 Starting position for eccentric thumb abduction exercise

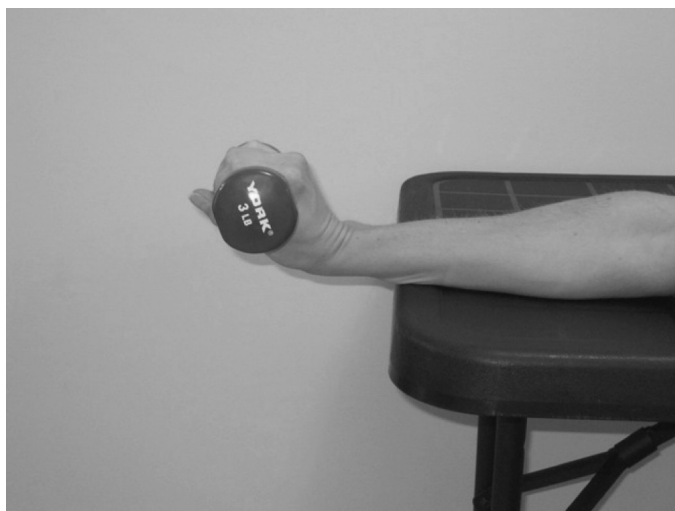


Figure 5 Starting position for eccentric wrist extension

etacarpal joint of the thumb can imitate the pain of DQST and also produce a positive Finkelstein's test.⁶ The differential diagnostic list in patients with radial wrist pain should also include C6 cervical radiculopathy, intersection syndrome, intercarpal instabilities, scaphoid fracture, and arthroses of the intercarpal (IC) and radiocarpal (RC) joints.²⁶ Radiographic examination may be useful for ruling out any offending bony pathology.

Initial conservative management of DQST should con-



Figure 6 Starting position for eccentric wrist flexion

sist of relative rest and activity modification, primarily to minimize repetitive loading of the first dorsal compartment.^{27,28} The use of a thumb spica splint is commonly employed to immobilize the wrist and thumb. Splinting may reduce gliding of the APL and EPB tendons through the stenosed fibro-osseous canal, thereby minimizing mechanical impingement of the tendons against the retinaculum.¹ As demonstrated in this case, modifying activities to reduce repetitive and sustained loading on the first dorsal compartment may also be sufficient for management.

GT[®] is a form of augmented soft tissue mobilization (ASTM) in which stainless steel instruments are utilized to apply controlled microtrauma to the affected soft tissues.²⁹ Studies suggest that the controlled microtrauma induces healing via fibroblast proliferation,³⁰ which is necessary for tendon healing.^{30,31} Additional studies have shown clinical efficacy using GT[®] for the treatment of various soft tissue disorders.^{29,32–36} The soft tissue healing effect of GT[®] was combined with active physical conditioning (Table 1). Resistance exercise is believed to deliver cyclical tensile loads to stimulate the remodeling of collagen³¹, and has demonstrated efficacy in the management of chronic tendinopathy.³⁷ Eccentric training has demonstrated some application in the treatment of DQST. In a study by Knobloch et al, it was shown that the combined treatment of Power Doppler controlled sclerosing therapy and consecutive eccentric training led to

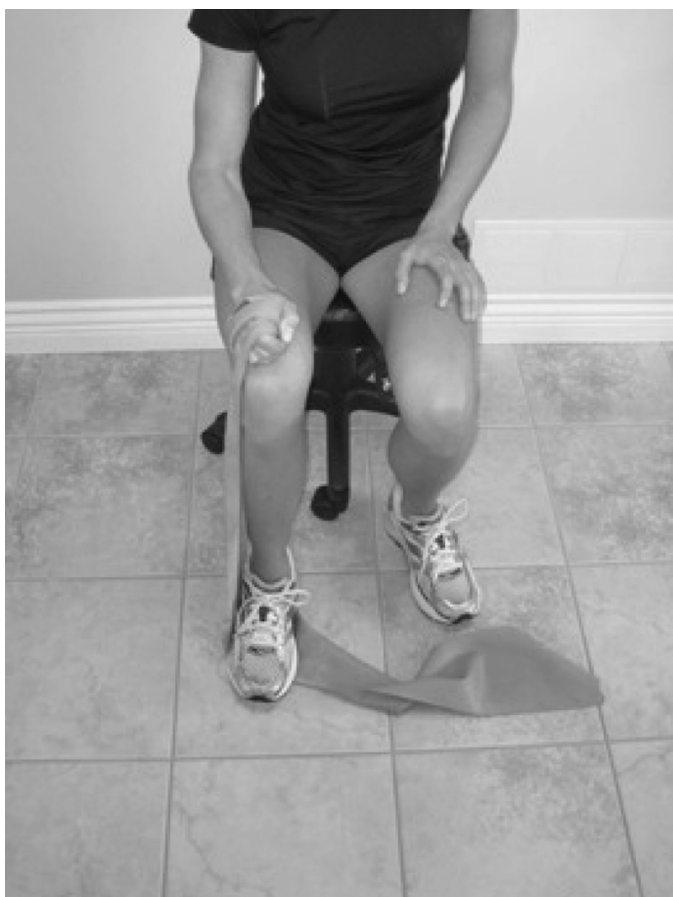


Figure 7 Starting position for eccentric forearm pronation



Figure 8 Starting position for eccentric forearm supination

encouraging pilot results in terms of pain reduction and functional improvement within one month of therapy.¹⁰ An eccentric exercise program was implemented in this case and well tolerated by the patient.

Corticosteroid injection is a common non-operative treatment utilized in the treatment of DQST. The apparent effectiveness of these injections has been previously reported in a systematic review by Ritchie et al.,³⁸ however, a recent Cochrane Review found major shortcomings with this report.² The Cochrane group concluded that given the weak evidence base it is not possible to draw any firm conclusions regarding the effectiveness of steroid injections for DQST.² Furthermore, several potential complications have been cited following steroid injections including local infection and depigmentation of the skin, atrophy of subcutaneous fat, and less frequently, ten-

don rupture.^{39,40} Surgical intervention (slitting or removing a strip of the tendon sheath) has been reported to be effective with a 91% cure rate, but is more invasive and associated with higher costs and the possibility of surgical complications.⁴¹

The treatment program in this case was multi-modal, thus several factors may have influenced the favourable outcome attained. Initial management consisted of activity modification and minimizing repetitive and sustained loading of the right wrist and thumb regions during problematic ADLs. This prevented ongoing injury and decreased pain levels while still allowing for the patient to participate in less aggravating activities. Graston Technique® was useful in decreasing the soft tissue tenderness and dysfunction and theoretically aiding soft tissue healing. In consideration of the time consuming nature

Table 1 Overview of the rehabilitative exercises prescribed in this case

EXERCISE	INSTRUCTIONS
• Thenar muscle group stretches (Figure 1) • Forearm extensor/flexor stretches	• 15–20 second holds, 8–10 reps for each respective stretch, 5 ×/wk.
• Eccentric unweighted hammer curls (Figure 2 A–C) • Eccentric weighted hammer curls	• 3 sets of 10–15 repetitions 5 ×/wk • Assist with other hand during concentric (radial deviation) movement phase • Add 1 lb. dumbbell once functional tolerance for 15 repetitions attained
• Eccentric thumb extension and abduction exercises with elastic band (Figure 3 and 4)	• 2 sets of 10–15 repetitions for each respective exercise, 5 ×/wk. • Assist with other hand during concentric movement phase • Progress to 3 sets of 15 repetitions; add resistance once functional tolerance for 15 repetitions attained
• Eccentric wrist extension/flexion with dumbbell (Figure 5 and 6) • Eccentric forearm pronation/supination with Theraband® (Figure 7 and 8)	• 2 sets of 10–15 repetitions 5 ×/wk. Add weight once functional tolerance for 15 repetitions attained • 2 sets of 10–15 repetitions 5 ×/wk. Add resistance once functional tolerance for 15 repetitions attained • Assist with other hand during concentric movement phase

of eccentric loading exercises, it is noted that the patient in this case was strictly compliant with her scheduled office visits and the prescribed active exercise conditioning protocol outlined in Table 1. This active exercise conditioning protocol also likely played an important role in the resolution of radial wrist pain.

Summary

DQST shares histopathological and clinical characteristics similar to other tendinopathies. This case demonstrates the management of DQST using conservative interventions that can be employed by chiropractic practitioners. Although favourable results were obtained, it is important to note that the nature of this investigation was that of a case study, and therefore the treatment protocol utilized may not be appropriate for all individuals presenting with DQST. There is a dearth of quality scientific research documenting conservative management strategies for DQST.⁴² Interventions that focus on returning individuals back to ADLs in a timely manner require further investigation to evaluate short and long-term benefits.

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Creating a culture of research

Conservative care of De Quervain's tenosynovitis/tendinopathy in a warehouse worker and recreational cyclist: a case report

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Objective: *This case study was conducted to evaluate the conservative management of a patient presenting with right sided wrist and thumb pain diagnosed as De Quervain's tenosynovitis/tendinopathy.*

Clinical features: *A 49-year-old female warehouse worker and recreational cyclist with right-sided De Quervain's tenosynovitis/tendinopathy that began after a long-distance cycling trip.*

Intervention and outcome: *Treatment included ultrasound, soft tissue and myofascial release therapy, tool assisted fascial stripping or "gua sha", acupuncture, mobilizations and kinesiology taping. Home advice included icing, rest, wrist bracing, elevation and eccentric rehabilitation exercises. The positive outcome was a complete resolution of the patient's complaint.*

Summary: *This case demonstrates how De Quervain's disease is a challenging condition to treat with conservative methods and can be aggravated with new exacerbating factors as treatment continues. In this case, the addition of the active care (including eccentric exercises and self-care) helped to reinforce the passive care given in the office and accelerate the recovery. (JCCA 2012; 56(2):121-127)*

KEY WORDS: De Quervain's disease, tenosynovitis, tendinopathy, tendinosis, chiropractic, exercise, rehabilitation

Objectif : *La présente étude de cas a été menée afin d'évaluer la prise en charge conventionnelle d'une patiente souffrant de douleurs au côté droit du poignet et du pouce associées à une ténosynovite de De Quervain/tendinopathie.*

Caractéristiques cliniques : *Une ouvrière d'entrepôt de 49 ans pratiquant le cyclisme durant ses loisirs souffrait de ténosynovite de De Quervain/tendinopathie au côté droit, douleur qu'elle a commencé à ressentir après une longue randonnée à vélo.*

Intervention et résultat : *Son traitement a inclus l'ultrasonothérapie, la thérapie de relâchement myofasciale et des tissus mous, la friction des fascias assistée par des instruments ou «gua sha», l'acupuncture, les mobilisations et les bandes kinésiologiques. On lui avait conseillé chez elle de mettre de la glace, de se reposer, de porter une attelle palmaire, de pratiquer des exercices de soulèvement et des exercices de réadaptation excentriques. Le résultat s'est avéré positif pour la patiente dont les douleurs ont complètement disparu.*

Résumé : *Le présent cas démontre comment la maladie de De Quervain est un état pathologique difficile à traiter à l'aide des méthodes conventionnelles, lequel peut s'aggraver par de nouveaux facteurs exacerbant au fur et à mesure du traitement. Dans le présent cas, l'ajout des soins actifs (y compris des exercices excentriques et les soins prodigués à la maison) a contribué à renforcer les soins passifs administrés au cabinet et a accéléré la guérison. (JCCA 2012; 56(2):121-127)*

MOTS CLÉS : maladie de De Quervain, ténosynovite, tendinopathie, tendinose, chiropratique, exercices, réadaptation

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Introduction

Fritz de Quervain first described De Quervain's tenosynovitis in 1895.^{1,2} De Quervain's disease is described as painful stenosing tenosynovitis of the first dorsal compartment of the hand.^{3,4} It is usually caused by overuse or an increase in repetitive activity, resulting in shear microtrauma from repetitive gliding of the first dorsal compartment tendons (abductor pollicis longus or APL, and extensor pollicis brevis or EPB) beneath the sheath of the first compartment over the styloid of the radius leading to thickening of the extensor retinaculum of the wrist (and not related to inflammation as was once thought).^{2,3,5} Predisposing movements include forceful grasping with ulnar deviation or repetitive use of the thumb (which includes many athletic pursuits, such as golf, fly-fishing and racquet sports).³

Patients usually present complaining of radial wrist pain with thumb movements and tenderness over the first dorsal compartment.²⁻⁴ Diagnosis is usually concluded by a positive Finkelstein's test (which causes a reproduction of pain at the radial styloid), as well as the presence of a tender nodule over the radial styloid.^{2-4,6} Finkelstein's test was first described in 1930 and has recently been described as being performed in four stages: first with the application of gravity assisted gentle active ulnar deviation at the wrist, then the patient actively deviates the wrist in an ulnar direction, then further passive ulnar deviation by the examiner, and in the final stage, the examiner passively flexes the thumb into the palm.^{5,6} The reliability, validity, specificity and sensitivity of this test has not been reported, but authors have claimed that the staged method of testing may be more accurate with higher sensitivity and specificity.⁵⁻⁷ It has also been suggested that a patient must have pain four days out of seven.⁸ Other tests are indicative of this condition, including a decrease in pinch and thumb strength measurements on the symptomatic side, a decrease in thumb active range of motion bilaterally (but more pronounced on the symptomatic side), and the EPB entrapment test which has been shown to demonstrate subjects with a positive test were more likely having two compartments than one.⁹⁻¹¹

It has been reported that 8.3% of patients present with upper extremity conditions as their chief complaint in chiropractic practices.^{2,12} The incidence of De Quervain's is not known in primary care, but the prevalence has been reported in the general population in the UK as 0.5% in

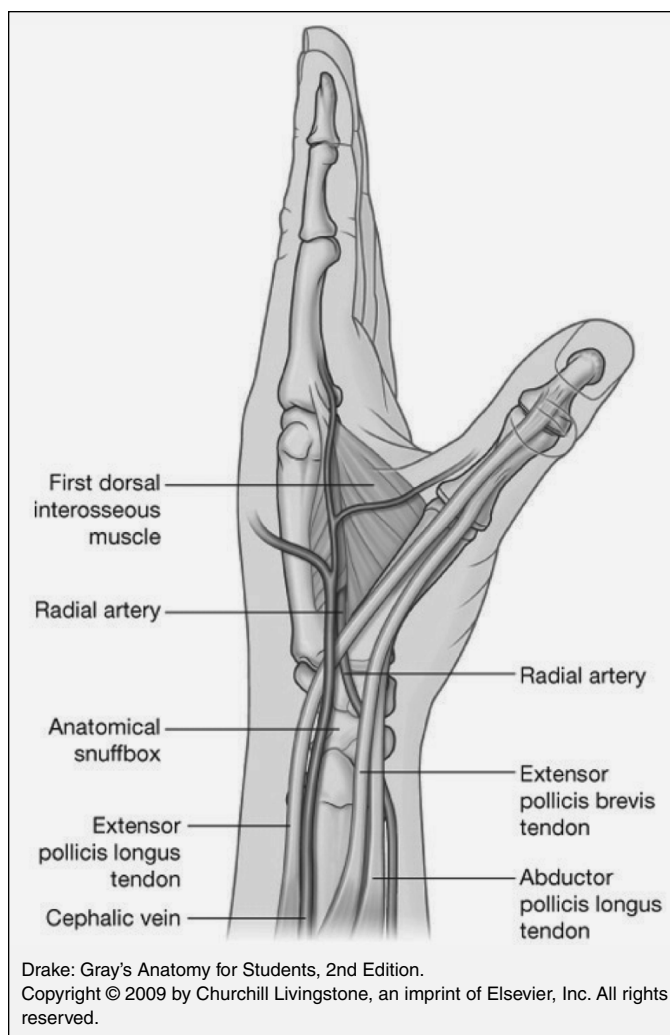


Figure 1 Anatomical snuff box

men and 1.3% in women.⁸ De Quervain's has also been shown to usually present in the fifth and sixth decades of life, as well as being more common in pregnant and lactating women.⁴

Case report

A 49-year-old female presented complaining of right-sided wrist pain and thumb pain at the base of the styloid of the radius that referred up her forearm. She stated that pain had started after a mid-summer long distance fundraising bike ride. She described the pain as "achy" and occasionally "sharp" with certain movements. She did not rate the pain numerically. She also reported no weakness

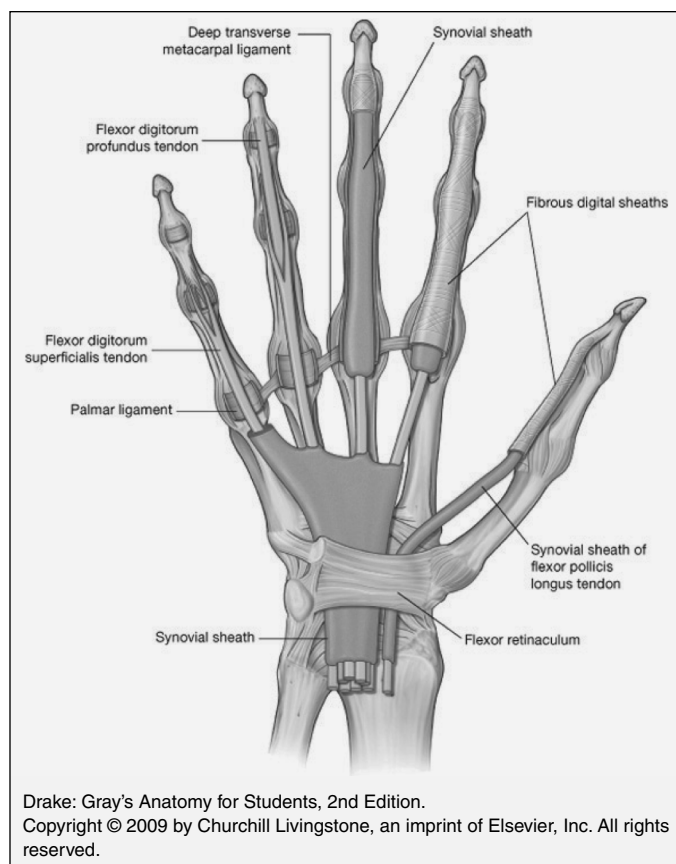


Figure 2 *Fibrous digital synovial sheaths of the hand*

or previous episodes of this type of pain. She reported that pinching (between the thumb and her first finger), lifting a jug of water and pronation all aggravated her pain. She stated that there were no relieving factors. Otherwise she reported being “healthy,” that she took no medications and that she did take some supplements, including B12, calcium, multivitamins, and Greens Plus® (a whole food high fiber chlorophyll supplement). She reported smoking 1–2 cigarettes per day “sporadically.” She reported exercising regularly, including cycling, walking, hockey and yoga. She reported her diet as “good” and that she slept well, with 6.0–6.5 hours per night. Previous accidents included a fall from a ladder the previous winter, which she had fully recovered from. She also reported having an ovarian cyst removed in 1984 and a jaw fracture in 1986. Her family history included heart disease, diabetes and hypertension. The systems review was unremarkable. All red flags were normal. She reported not having any

Table 1 *Differential diagnoses*^{5,13–16}

- Osteoporosis and/or lytic lesions of the radial styloid,
- scaphoid fracture,
- entrapment,
- radiculopathy,
- C6 cervical radiculitis/radiculopathy,
- tethering or inflammation of the peripheral nerves (including the superficial radial nerve, known as cheiralgia paresthetica),
- carpal tunnel syndrome,
- osteoarthritis,
- intersection syndrome,
- Keinbock disease (osteonecrosis of the lunate),
- dorsal ganglion of the wrist,
- congenital synostosis between scaphoid and trapezium.

imaging performed on her right hand, wrist or arm. Her other complaint included severe eczema on both hands.

The physical examination revealed a positive Finkelstein’s on the right, with the patient stating it recreated her pain. Ranges of motion of the right wrist revealed decreased active, passive and resisted extension (by 50%), painful active and passive pronation, ulnar deviation (active, passive and resisted) and active and passive radial deviation. Thumb ranges of motion on the right revealed painful active and resisted abduction, passive adduction, flexion (at the end of active and passive), resisted extension and active and resisted opposition. Soft tissue palpation revealed tight and tender right abductor pollicis longus, extensor pollicis longus and brevis (tendon palpation recreated the pain and not palpation at the muscle belly), as well as the wrist extensors.

The working diagnosis was acute right-sided De Quervain’s tenosynovitis/tendinopathy. The prognosis was rated as good. The plan of management recommended treatments of twice a week for 2–3 weeks, followed by a re-evaluation. The treatments included ultrasound, myofascial release therapy, tool assisted fascial stripping using (gua sha^{17,18}) and acupuncture as necessary. Home care advice included neutral positioning, bracing, icing with elevation, pain-free range of motion exercises and self-administered soft-tissue therapy.

Figure 3 Kinesiology tape for De Quervain's. Tape is placed without tension for a relaxation effect from the insertion (I) to the origin (O) [Figure 3A: without, and Figure 3B: with a corrective strip over the snuff box and parallel to tendons]¹⁹

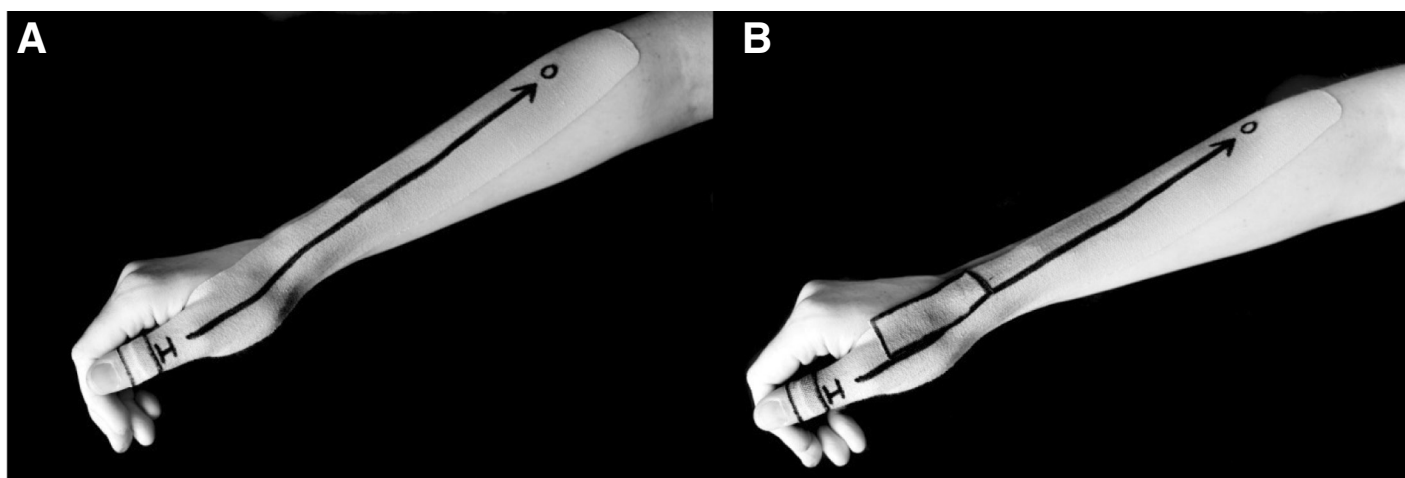
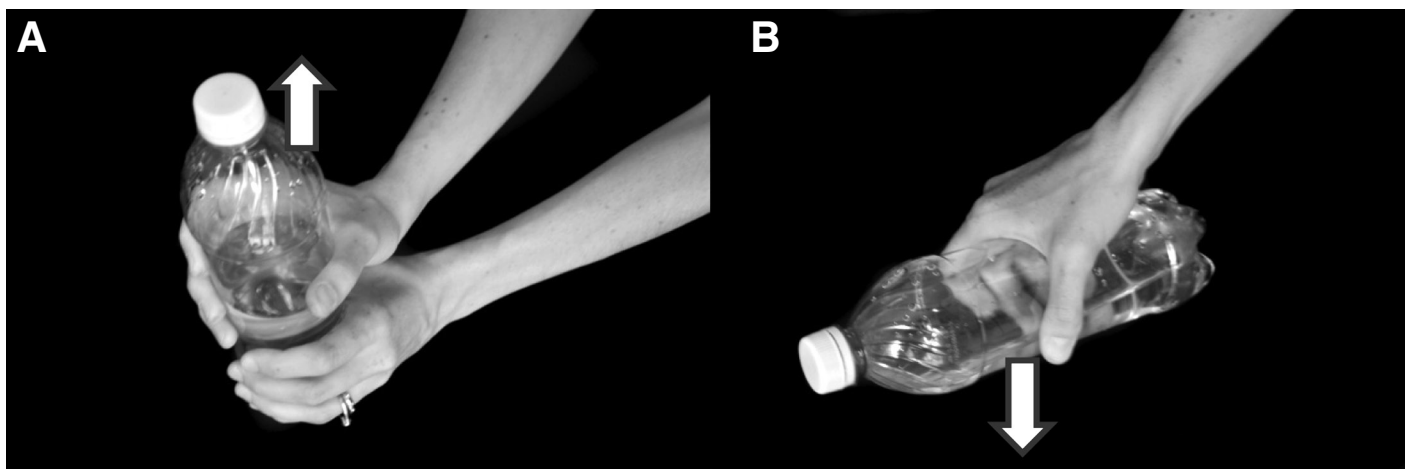


Figure 4 (A) Concentric radial deviation “up” (B) Eccentric ulnar deviation “down”



On the second visit, one week later she reported being “sore” after the initial visit, but “better” the next day. She had started icing, but had not yet purchased a brace. Twisting and lifting of the right wrist and hand/thumb continued to aggravate her complaint. Kinesiology tape was added on this visit (see Figures 3A & 3B), as well as acupuncture (bilateral GB34, LI4; Du20, right sided snuff box/Ah shi point, LI10, LI11 and LI5). On the third visit, she stated she had purchased a Thumb Spica brace,

which seemed to help. She had noticed no change in her pain with the addition of acupuncture to her previous treatment and therefore it was not repeated on subsequent visits. She found that the kinesiology tape seemed to help, so that was continued. On subsequent weekly visits aggravating factors included not wearing the brace, heavy lifting, and doing less home care. By the seventh visit, the patient reported an improvement in her elbow and thumb with more icing and wearing the brace. Discus-

sion did occur for alternative assessment and treatment options, including a referral for a diagnostic ultrasound, NSAIDS and corticosteroid injections, which she chose not to pursue. A re-evaluation was performed on the eighth visit which revealed a positive Finkelstein's test. In addition to the self-care she was previously prescribed, she was given a small "gua sha" tool to do gentle soft-tissue release on alternate days at home. Subsequent visits showed less of an improvement since the patient had not done as much home care. The patient then felt some improvement after seeing a registered massage therapist, since she only had pain directly over the tendon after their treatment. Subsequent visits showed an improvement in her condition with time off from work, after which the pain in her forearm resolved. An increase in seasonal work demands aggravated her complaint, but with rest, more icing and soft tissue therapy, she reported tenderness only at the base of her thumb with palpation. Eccentric exercises were prescribed (working up to 3 sets of 15 repetitions, see Figures 4A & 4B), but the patient took some time to commence them.²⁰ Patient visits were then staggered once every two weeks, but she experienced a few set-backs due to walking her newly adopted dog, starting the spring cycling season and accidentally hitting her wrist on a hard surface. Again, with treatment and an increase in home care, her condition improved. After four more visits, she had only mild soreness/"burning" and an overall improvement. Another re-evaluation revealed that active and passive ranges of motion were normal at the wrist and elbow, while resisted thumb abduction and Finkelstein's were still painful on the right side. After purchasing a new bicycle with more comfortable handle bars the patient rarely reported mild pain. Patient visits were then staggered to once every three weeks. She had additional set-backs related to accidentally hit her wrist on a hard surface, increased occupational lifting and prolonged painting without wearing her brace. Once the patient increased the frequency of her eccentric exercises and home care, she felt an improvement. After three more visits the patient's complaint was completely resolved, even while she started practicing yoga and increased her work demands. On her final visit 14 months after the initial visit she continued to remain pain-free, at which point she was discharged. On long-term 22 months follow-up the patient reported that she remained pain-free in her arm, hand and thumb.

Discussion

Injuries of the hand and thumb can be challenging, since most patients frequently use them in their daily lives, thus delaying healing time. Predisposing factors include pregnancy, lactation and newborn care, musicians, dental hygienists, assembly workers, golfers, machinists, mountain bikers and video game playing.^{4,21-26} Risk factors include repetitive movements, hand position, frequency of movement and static postures.²⁷

There are many recommended conservative treatments, including rest, early immobilization, or corticosteroid injection.³ Lightweight Thumb Spica splints have been recommended to reduce ulnar deviation and thumb flexion.^{1,25} Other conservative measures include heat, cold, diathermy, strapping, rest, transverse friction massage, counter irritants and medications (such as NSAIDS in the early stages).^{2,16,25,28} Guasha is a traditional East Asian therapeutic surface myofascial frictioning tool that has been shown to increase microcirculation and decrease local and distal pain.¹⁸ Active treatment options include active pain-free range of motion exercises, strengthening, tendon gliding, self-administered friction massage and eccentric training exercises.^{20,25}

Many reports have been made on the efficacy of injections. A Cochrane review found that corticosteroid injections showed positive results, but had limited applicability to larger populations due to the small number of subjects.^{4,29} A literature evaluation reported an 83% cure rate with injection alone when compared with other therapies (including splinting alone, splinting plus injection or NSAIDS).^{6,28,30} One or two injections of triamcinolone acetate was shown to lead to short and long term improvements when compared with a placebo injection.² A recent randomized prospective study found that casting alone had less successful outcomes when compared to methylprednisone acetate injections plus casting.³¹

A suprafibrous corticosteroid injection technique has been found to be more accurate, less risky and easier than an intrasynovial injection.³² Injections have the potential for rare side effects which may make patients hesitant to pursue them as a treatment option.^{31,33} These include temporary pain, skin color changes, subcutaneous fat atrophy, flare, non-tender nodules and superficial thrombophlebitis, tendon rupture or infection.^{31,33} Anatomical variations may predispose patients to having De Quervain's disease or make certain treatments more challenging to perform

and succeed with.^{34,35} These include an extended EPB to the thumb-interphalangeal joint, which then resides in the first dorsal compartment, as well as multiple tendons of the APB muscle.^{34,35}

Ultrasound has been found to be helpful in detecting anatomic variations in De Quervain's cases by visualizing the intra-compartmental septum in the first extensor compartment.^{36,37} Detecting this variation assists injection accuracy and improves treatment results, since the EPB compartment can be missed because of its separate, small and deep location.^{36–38} MRI has also been suggested to reliably detect increased tendon thickness or the APL and EPB and peritendinous edema in patients with a confirmed diagnosis of De Quervain's disease.³⁹

For non-progressive cases, surgical release/decompression may be recommended since many patients with De Quervain's have been found to have the EPB tendon in its own compartment.³ Surgical cure rates are reported as 88–91%.^{2,40} Unfortunately, surgery is more invasive, more costly and can be associated with more complications.²

This case had a favorable outcome, but many treatment modalities were used. These modalities were chosen with the goals of reducing inflammation and pain, increase ranges-of-motion and strengthen the affected muscles and tendons. It is difficult to determine which modality was most effective, but it appeared that the patient experienced relief after the treatments. Also, considering that once the patient was more consistent with the home care and exercises, her complaint resolved quickly. Her recovery may have occurred in a more rapid manner with more closely spaced treatments and the reduction or removal of the multiple aggravating factors. Unfortunately, this did not occur due to occupational, recreational, financial and time constraints.

Summary

Conditions of the wrist and hand can be challenging to treat since patients use their upper extremities in many daily activities. This case report demonstrates a single patient; therefore it is difficult to extrapolate the results to other cases. The resolution of her symptoms could also be due to the natural history of the condition. Generally, most recent reviews have found no strong evidence for or against conservative treatments for this condition. Further research with greater subject numbers, randomization and controls would assist in clarifying which conserva-

tive treatments are effective for this condition, since most evidence that is available are case reports.⁴¹ The results of this case may suggest that conservative treatment may be useful in treating De Quervain's disease before more invasive procedures are pursued.

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The use of spinal manipulative therapy for pediatric health conditions: a systematic review of the literature

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Introduction: *This study had two purposes. These were: (i) to conduct a search of the literature between 2007 and 2011 investigating the use of spinal manipulative therapy (SMT) for pediatric health conditions and (ii) to perform a systematic review of eligible retrieved clinical trials.*

Methods: *The Index of Chiropractic Literature and PubMed were electronically searched using appropriate search words and MeSH terms, respectively, as well as reference tracking of previous reviews. Studies that met the inclusion criteria were evaluated using an instrument that assessed their methodological quality.*

Results: *Sixteen clinical trials were found that met the inclusion criteria and were scored.*

Discussion: *Six clinical trials investigated the effectiveness of SMT on colic, two each on asthma and enuresis, and one each on hip extension, otitis media, suboptimal breastfeeding, autism, idiopathic scoliosis and jet lag. None investigated the effectiveness of SMT on spinal pain.*

Conclusion: *Studies that monitored both subjective and objective outcome measures of relevance to both patients and parents tended to report the most favorable response to SMT, especially among children with asthma. Many studies reviewed suffered from several methodological limitations. Further research is clearly required in this area of chiropractic health care,*

Introduction : *La présente étude avait deux objectifs : (i) effectuer un dépouillement d'ouvrages spécialisés rédigés entre 2007 et 2011 portant sur le recours à la manipulation rachidienne pour traiter des états pathologiques chez les enfants et (ii) effectuer un examen systématique des essais cliniques extraits qui ont été admissibles.*

Méthodes : *On a fait des recherches électroniques dans les bases de données de l'Index of Chiropractic Literature et PubMed à l'aide des critères de recherche appropriés et des termes du MeSH, respectivement, ainsi qu'un suivi des références des examens précédents. On a évalué les études répondant aux critères d'inclusion grâce à un instrument d'évaluation de leur qualité méthodologique.*

Résultats : *On a trouvé seize essais cliniques répondant aux critères d'inclusion et on les a notés.*

Discussion : *Six essais cliniques analysaient l'efficacité de la manipulation rachidienne sur les coliques, deux essais sur l'asthme et deux sur l'énurésie et les autres essais portaient respectivement sur l'extension de la hanche, l'otite moyenne, l'allaitement sous-optimal, l'autisme, la scoliose idiopathique et le décalage horaire. Aucun essai n'abordait l'efficacité de la manipulation rachidienne sur la douleur lombaire.*

Conclusion : *Les études qui ont surveillé à la fois les indicateurs de mesure de pertinence subjectifs et objectifs des patients et de leurs parents avaient tendance à ne rendre compte que de la plus favorable réponse à la manipulation rachidienne, notamment chez les enfants souffrant d'asthme. Dans de nombreuses études examinées, il manquait l'analyse de différentes autres méthodologies. De toute évidence, des recherches*

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especially with respect to the clinical effectiveness of SMT on pediatric back pain.
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KEY WORDS: pediatric, manipulation, spinal

Introduction

The use of complementary and alternative medicine (CAM) by pediatric patients is increasing,¹ with one study estimating the utilization rate of CAM by children to be 11.8%.² A Danish study reported that predictors of CAM use were concerns with the adverse effects of allopathic medications, limited clinical success of conventional treatment, increased school absenteeism and being under the age of 11 years, at least among a group of patients with gastrointestinal disorders.³ A Canadian cross-sectional descriptive study of patients visiting a pediatric outpatient clinic reported that factors influencing their use of CAM were “word of mouth,” physician referral, personal experience by the parents and no adequate resources offered by traditional medicine to manage many clinical conditions affecting children.⁴ Although most patients in that study were also under the care of a physician, almost one half of parents did not inform their medical provider they were seeking CAM care concurrently. Almost half of parents surveyed reported they did not believe CAM therapy conveyed any potential adverse effects and CAM users were less satisfied with primary care than were nonusers.⁴

The Centers for Disease Control and Prevention reported that manual therapy was the most commonly chosen type of CAM therapy for children, and the most common conditions presenting for care were of the musculoskeletal (MSK) system.⁵ Chiropractors were the most common CAM provider visited by children and adolescents,⁶ and the 2005 Job Analysis of the National Board of Chiropractic Examiners (NBCE) reported that patients aged 17 years and younger comprise 18.2% of a chiropractor’s practice.⁷ A 2009 Job Analysis published by Humphries⁸ reported that 91% of Swiss chiropractors treated children ages 6–17 years, and 78% of these chiropractors reported treating children younger than 5 years old.

Verhoef and Papadopoulos conducted a survey of Canadian chiropractors in 1999 that sought to determine how

plus approfondies s’imposent dans ce domaine des soins de santé chiropratiques, notamment par rapport à l’efficacité clinique de la manipulation rachidienne sur la douleur lombaire chez les enfants.
(JCCA 2012; 56(2):128–141)

MOTS CLÉS : enfants, manipulation, lombaire

frequently, and for what reasons, chiropractors treat patients under the age of 18 years.⁹ Based on the data extracted from 643 returned questionnaires and 525 diary cards, the researchers reported that the most common conditions treated were MSK complaints, followed by headache and muscular sprains/strains. Other conditions treated were asthma, articular joint conditions, otitis media, postural problems, enuresis, gastrointestinal, hyperactivity, colic, menstrual complaints and immune system problems (the order in which these conditions presented varied between the questionnaire and the diary cards).

In this study, Verhoef and Papadopoulos also reported that the frequency of presentation of various conditions was age-stratified.⁹ For patients under the age of 2 years old, the most common reason to seek out chiropractic care was for prevention (31.3%), colic (16.1%) and otitis media (16.1%). For patients aged between 2 and 4 years, reasons for seeking out care were prevention (42.1%), musculoskeletal problems (21%) and otitis media (7.1%); the order of presenting conditions was identical for patients aged 5 and 10 years. For patients older than 11 years the most common presenting complaint was MSK (52.5%), prevention (17.6%) and headaches (11.4%). Over 80% of chiropractors reported they provide either maintenance or supportive care for their pediatric patients. The most common treatment modality used by chiropractors was spinal manipulative therapy, followed by exercise, stretching, soft tissue therapy, ergonomic/postural advice and nutritional counseling. Lastly, it was reported that chiropractors who were themselves younger and presumably more likely to have received both formal and informal training specific to treating pediatric patients were more likely to treat patients under the age of 18 years.⁹

A decade later Miller *et al* conducted a survey that sought to describe the characteristics of pediatric patients presenting to a chiropractic teaching clinic between 2006 and 2010.¹⁰ Of all patients that presented to the clinic in

that time period, roughly 1 out of 5 were between the ages of two days and 15 years old. The most common presenting pediatric health condition was MSK (35%), followed by “excessive crying” (previously referred to as colic, at least according to Miller *et al*), which was the most common chief complaint (62.3%) among the largest cohort of pediatric patients seen at that clinic- patients under the age of 12 weeks. All children had previously presented for medical care and most of the infants (83%) under the age of 12 weeks had been referred to the chiropractor by their medical physician. In fact, Miller *et al* reported that the younger the child, the more likely the medical referral to a CAM.¹⁰ A contemporaneous survey by Hestbaek *et al* conducted in Denmark also reported that babies were the largest cohort of pediatric patients seen by chiropractors, most often for infantile colic, whereas older patients most commonly presented with MSK conditions, usually chronic in nature.¹¹

Gotlib and Rupert conducted two reviews of the literature, one published in 2005 and the other in 2007 that sought to determine the extent of evidence related to the use of manipulation for pediatric health conditions.^{12,13} Essentially the first study found a relative dearth of published clinical trials and these investigators judged the studies that did exist constituted a low level of scientific evidence.¹² Their second review was equally unsuccessful in terms of finding clinical trials that substantiate the claims of effectiveness made by many chiropractors in the field.¹³ This led the researchers to assert that there was no substantial shift in the body of knowledge during the intervening three and a half years between their two reviews.¹³ Since there were so few retrievable clinical trials from both literature reviews, the authors chose not to conduct a systematic review of each clinical trial retrieved at that time.

The purpose of this study was two-fold. First, we conducted a systematic review of the literature between 2007 and 2011, essentially advancing on the 2007 review by Gotlib and Rupert.¹³ Second, we performed a systematic review of all retrieved clinical trials that investigated the effects of spinal manipulative therapy on various clinical conditions affecting children.

Methods

The Index to Chiropractic Literature was searched using the subject keyword “manipulation,” which retrieved all

the ChiroSH (Chiropractic Subject Headings) containing the word “manipulation.” This was combined with the subject keywords “infant” or “child” or “adolescent.” Text words were also searched and included the following truncated words: “manipulat*” or “adjustment*” and “pediatric*” or “paediatric*” or “child*” or “adolescent*” or “infant*”. Some publication types were eliminated (letters, editorials, book reviews, meeting abstracts) and results were restricted to the years 2007–2011. PubMed was searched using the following MeSH terms: “Manipulation, Chiropractic” or “Manipulation, Spinal,” combined with the Mesh terms “Infant” or “Child” or “Adolescent.” In addition, the truncated text word “chiropract*” was searched, with appropriate age (birth to 18 years), language (English) and date (2007–2011) limiters. All results were examined and inclusion and exclusion criteria were applied. Reference tracking was performed of the citations in the previous reviews by Gotlib and Rupert^{12,13} as well as the UK Evidence Report by Bronfort *et al*¹⁴ completed in 2010 since that Report is widely accepted as one of the most comprehensive reviews of clinical studies investigating the effectiveness of manual therapies (including manipulation of the spine and peripheral joints) for all health conditions published to date.

Inclusion/exclusion criteria

Several inclusion/exclusion criteria were used to select studies eligible for this review. Inclusion criteria were as follows: subjects were age 18 or less; studies must involve more than two subject; treatments must have been administered by a chiropractor; treatment administered was manual, high-velocity low-amplitude (HVLA) thrusting spinal manipulations, most commonly associated with Diversified technique within the chiropractic profession; papers were written in English; were published between January 1980 and March 2011; prospective or retrospective studies including randomized controlled trials, controlled clinical/quasi-experimental trials, prospective cohort studies or retrospective case series; studies using some type of outcome measure for determining the effect of chiropractic care; published in peer-reviewed journal; and only studies involving human subjects.

Conference abstracts were excluded since, in general, the process for acceptance into a conference is less rigorous than the process of acceptance into a peer-reviewed journal. Similarly editorials, commentaries and expert

opinions were judged ineligible for inclusion in this study since these forms of evidence have been labelled as “Grey Literature” or “grey lit” in some circles¹⁵ and are considered of limited scientific value. We did find some studies that investigated the use of ‘osteopathic manipulation’ (OM) for some childhood illnesses, such as the study by Mills *et al.*¹⁶ However, OM often involves a manual therapy that often resembles segmental mobilization (low-velocity, low-amplitude oscillating motion): We therefore chose not to include studies using OM in our review. A study by Macias *et al* was excluded since it involved comparing the use of two non-manipulative manual procedures performed by medical doctors to reduce radial head subluxation.¹⁷

Using these criteria, 16 articles qualified for review.

Instrument Used to Review Eligible Articles

The articles selected for review were evaluated using an instrument developed by Sackett (see Table 1).¹⁸

Four authors (BG, JA, AM, EM) independently reviewed the studies meeting the inclusion criteria. Each author reviewed two articles, and the reviewer pairings were randomized for the 16 studies. The data from all included articles were recorded onto a data extraction sheet by the authors as part of the review. The authors checked and edited all entries for accuracy and consistency. Recorded data included study authors and quality score, details of the study design, sample, interventions, outcome measures, and main results/conclusions of the study. The four authors met on July 20th, 2011 to compare their graded scores. Any discrepancies of scores between the authors were settled via discussion until consensus was reached.

Results

The initial search strategy yielded 79 articles. Of these 79 articles, only 4 met our inclusion criteria.^{19–22} Although the study by Sandell *et al* included subjects age 17 to 20 years old, a decision was made to include it in this review.²⁰ The reviews by Gotlib and Rupert yielded 10 studies eligible for our review.^{23–32} Reference tracking yielded an addition two studies.^{32,33} After methodological quality assessment of each article using the grading instrument was conducted, papers were allocated scores out of a possible 50 points (Table 1). Articles are listed in descending order of their score using the Sackett criteria, along with a brief description of each study; in the event two or more

articles had the same score, they were arranged alphabetically (Table 2).

Overall, a total of 1980 children and adolescents were investigated in the 16 clinical trials that met our inclusion criteria. The largest number of paediatric patients investigated in any one study was 697,²¹ the fewest was six.²³ Six clinical trials investigated the effectiveness of SMT on colic, two on asthma, two on enuresis, and one each on hip extension, otitis media, difficulties with breast-feeding, autism, idiopathic scoliosis and jet lag. Although high velocity, low amplitude (HVLA) thrusts characterize SMT in general, since the patients in the clinical trials reviewed here were often infants, the intervention was often modified to use extremely low forces. Some authors characterize this form of SMT as pediatric-SMT (P-SMT) and we have adopted that convention where applicable. Studies in our review received scores between 48/50 and 18/50.

Discussion

Six studies investigated the use of SMT on children with colic.^{19,21,22,25,28,33} Five^{19,21,22,28,33} of the six studies reported that there was a reduction in the amount of “crying time” following the use of pediatric spinal manipulative therapy. Unfortunately four of these studies had limited or no follow up^{19,21,28,33} and three studies received the lowest scores using the Sackett scale. The study by Browning *et al* did report that both SMT and occipital-sacral decompression (OSD) resulted in decreased crying time (there was no control group).²² This study received a score of 41/50; however, since that study compared the use of one manual therapy (SMT) to another form of manual therapy (OSD) it is possible that the reduced rates of crying time could be attributed to the benefits of physical touch. The study by Olafsdottir *et al*, which was assigned a score of 37/50, reported no benefits in colic from P-SMT as compared to placebo.²³ Ferrance and Miller opined that there may be several reasons why clinical trials have not reported effectiveness of SMT for colic.³⁵ They posit there may be subgroup of colicky crying babies as yet unidentified, obfuscating the success of chiropractic interventions. They cite one study that reported improvement in outcome when crying infants were subdivided into “infant colic,” “irritable infant syndrome for musculoskeletal origin” and “ineffective feeding” groups. These authors do state that it is reasonable for parents to seek out chiropractic care for

Table 1 *Scoring of methodological quality of each article using grading criteria developed by Sackett*¹⁸

ARTICLE/CRITERIA	Bronfort JMPT 2001	Balon NEJM 1998	Rowe Chiro Osteo 2006	Browning Clin Chiro 2008	Olafsdottir Arch Dis 2001	Wiberg Nordsreen JMPT 1999	Sawyer JMPT 1999	Sandell JCM 2007
ASSIGNMENT OF PATIENTS (/9)	9	9	7	9	9	9	5	9
BASELINE VALUES OF GROUPS (/8)	8	8	4	8	4	8	8	8
RELEVANCE OF OUTCOMES & CLINICAL SIGNIFICANCE (/7)	7	7	7	3	7	3	7	5
PROGNOSTIC STRATIFICATION (COMORBIDITY AND RISK FACTORS) (/6)	6	6	6	6	6	6	6	3
BLINDING STRATEGIES (/5)	5	3	5	3	3	3	3	2
CONTAMINATION/ CO-INTERVENTION (/4)	4	3	4	4	0	2	0	0
COMPLIANCE OF SUBJECTS TO STUDY PROCEDURES (/4)	3	3	4	2	2	2	2	4
DROP-OUT RATES OF SUBJECTS (/3)	3	3	3	3	3	3	3	2
FOLLOW-UP LEVELS (/2)	2	2	1	2	2	1	2	0
DATE OF PUBLICATION (/1)	1	0	1	1	1	0	0	1
TOTAL (/50)	48	45	42	41	37	37	36	34

Table 1 (Concluded)

ARTICLE/CRITERIA	Reed JMPT 1994	Khorshid JSVR 2006	Straub JMPT 2001	Lebouef JMPT 1991	Miller & Miller JMPT 2009	Klougart JMPT 1989	Wiberg JMPT 2010	Miller JMPT 2008
ASSIGNMENT OF PATIENTS (/9)	7	7	9	5	5	5	4	4
BASELINE VALUES OF GROUPS (/8)	8	4	0	8	0	4	4	0
RELEVANCE OF OUTCOMES & CLINICAL SIGNIFICANCE (/7)	7	7	7	5	7	3	3	3
PROGNOSTIC STRATIFICATION (COMORBIDITY AND RISK FACTORS) (/6)	6	3	0	6	6	6	6	6
BLINDING STRATEGIES (/5)	0	0	3	0	0	0	0	0
CONTAMINATION/ CO-INTERVENTION (/4)	0	0	0	0	0	0	0	0
COMPLIANCE OF SUBJECTS TO STUDY PROCEDURES (/4)	1	0	4	1	0	0	0	1
DROP-OUT RATES OF SUBJECTS (/3)	3	3	0	0	3	3	0	3
FOLLOW-UP LEVELS (/2)	1	2	2	0	0	0	1	0
DATE OF PUBLICATION (/1)	0	1	1	0	1	0	1	1
TOTAL (/50)	33	27	26	25	22	21	19	18

Table 2 Summary Chart of all 16 Clinical Trials Reviewed

Reference	Objective	Trial Design	/50	Patients/ Conditions	Interventions	Main Outcome Measures	Follow-Up Period	Main Results/ Conclusions
Bronfort, JMPT 2001	To determine if SMT in addition to optimal medical management resulted in asthma-related outcomes in children. To assess the feasibility of conducting a full-scale, RCT in terms of recruitment, evaluation, treatment and ability to deliver sham SMT.	Prospective clinical case series with observer blinded, pilot randomized and 1 year follow-up	48	36 patients 6–17 years old with mild to moderate asthma	20 chiropractic treatments over the course of 3 months (active or sham SMT)	Pulmonary function test, parental diary, parental Q of L form, severity, am/pm peak expiration flow.	12 months post-treatment follow up	After 3 months in combination with SMT and optimal medical management the children's Q of L increased significantly and were maintained at 1 year follow up. No change in lung function or hyper-responsiveness. Improvements unlikely to be from SMT alone. Further research is required as to which aspect of the encounter is responsible for improvement.
Balon, NEJM 1998	To compare the effect of true SMT to sham SMT on asthmatic children.	RCT	45	80 children aged 7–16 years with mild to moderate asthma	Treatment group received SMT and STT. Control group received STT and pressure to spine. No changes to pre-trial medication.	Change from baseline of peak expiratory outflow plus several other more qualitative outcomes.	Immediate (journals) and 2 and 4 months.	Small improvements in peak expiratory outflow as well as other indicators; no significant differences.
Rowe, Chiro Osteo 2006	To conduct a pilot study and explore issues of safety, patient recruitment and compliance relevant to planning a RCT.	Pilot RCT	42	6 subjects over 6 months with idiopathic scoliosis.	Standard medical care, standard medical care and chiropractic manipulation, standard care and sham manipulation.	Cobb angle and scoliosis QLI.		There were not enough subjects to compare outcomes between treatment groups, however the study was successful in providing researchers with information needed to plan a full-scale study.
Browning, Clin Chiro 2008	To compare 2 interventions for infantile colic (SMT and OSD).	Single-blinded, randomized comparison trial	41	43 infants less than 8 weeks old who cried >3 hr/day 4 out of the previous 7 days.	SMT and OSD	Change in daily hours crying.	4 weeks	Both SMT and OSD had significant benefits in reducing infant colic. Both groups cried less and slept more after 2 weeks of treatment.
Olafsdottir, Arch Dis 2001	To investigate the efficacy of chiropractic SMT in the management of infantile colic.	Randomized, blinded, placebo controlled clinical trial	37	86 infants	SMT and control	Parent diaries of hours crying.	8 -14 days	Chiropractic SMT is no more effective than placebo in the treatment of colic.
Wiberg & Nordgreen, JMPT 1999	To determine if there is a short-term effect of SMT in the management of infantile colic.	RCT	37	41 infants aged 2–10 weeks	SMT and dimethicone	Parent diaries of hours crying.	Immediate or none	During days 4–7 crying decreased 1 hour in dimethicone group and 2.4 hours in SMT group. During days 8–11 crying decreased 1 hour in dimethicone group and 2.7 hours in SMT group.

Table 2 (Continued)

Reference	Objective	Trial Design	/50	Patients/ Conditions	Interventions	Main Outcome Measures	Follow-Up Period	Main Results/ Conclusions
Sawyer, JMPT 1999	A pilot study assessing the feasibility of conducting a full scale RCT investigating the efficacy of SMT for children with chronic otitis media with effusion.	Prospective, parallel-group, observer-blinded, randomized feasibility study	36	22 patients age 6 months to 6 years.	SMT or sham SMT	Parent diaries, presence or absence of effusion.	4 weeks	Recruitment is feasible. Parents are compliant with daily diaries and willing to participate in active and sham SMT. Objective outcomes involving tympanometry and otoscopy are extremely challenging and should be performed by validated examiners in future studies.
Sandell, JCM 2007	To investigate the effect of chiropractic treatment on hip joint extension ability and running velocity.	Prospective, randomized, controlled experimental pilot study	34	17 male middle distance runners age 17–20.	SMT and control	Hip extension and running velocity	Immediate or none	Treatment group showed significantly greater hip extension ability after chiropractic treatment than controls. Treatment group did not show a significant decrease in time for running 30 m after treatment.
Reed, JMPT 1994	To evaluate chiropractic management of primary nocturnal enuresis in children.	Controlled clinical trial for 10 weeks plus 2 weeks post of non-treatment	33	46 children (31 in treatment group and 15 in control group).	High velocity short lever SMT or sham SMT	Frequency of “wet” nights	2 weeks	Baseline treatment group had 9.1 nights/2 weeks wet. Post treatment group had 7.6 nights/2 weeks wet. Baseline control had 11.1 nights/2 weeks wet. Post treatment group had no change.
Straub, JMPT 2001	To determine the effect of chiropractic care on jet lag in athletes travelling from Finland to the USA and returning to Finland.	Randomized (blinded in the sham and active groups) in 3 groups	26	15 Finnish junior elite athletes, ranged 6–21 years (mean age 18.3 years).	Sham SMT, active SMT, control group (toggle/re-coil procedure)	Psychological assessment POMS, heart rate, sleep disturbances, jet lag evaluation.	5 day follow up after returning to Finland.	Chiropractic care does not reduce the effects of jet lag.
Lebouef, JMPT 1991	To observe the effect of SMT on nocturnal enuresis.	Prospective study	25	171 children aged 4–15 years (mean age 8.3).	SMT; 94% received upper cervical	Parental diaries, clinician assessment (hours crying, intensity, feeding, stools).	None but checked in at 1, 2 and 4 weeks.	85% better or stopped at 1 week. 95% better or stopped at 2 weeks. 97% better or stopped at 4 weeks.
Khorshid, JVSR 2006	To identify the difference in efficacy between upper cervical and full spine adjustment in autistic children.	Randomized clinical trial	23	14 autistic children	Atlas Orthogonal upper cervical adjustment or full spine adjustment.	Autism Treatment Evaluation Checklist (ATEC), leg length analysis & x-rays.	Immediate or non	Improvement of ATEC scores was seen in 6/7 children under upper cervical adjustment and in 5/7 children under full spine adjustment.

Table 2 (Concluded)

Reference	Objective	Trial Design	/50	Patients/ Conditions	Interventions	Main Outcome Measures	Follow-Up Period	Main Results/ Conclusions
Miller & Miller JMPT 2009	To describe the circumstances, clinical features, role, and results of chiropractic management of infants who were referred to a chiropractic clinic for failure to adequately feel at the breast.	Clinical case series	22	114 infants (12 weeks or younger) cases of hospital-diagnosed or lactation consultant diagnosed feeding problems that were treated with chiropractic therapy in addition to routine care and followed to short-term result.	Treatment aimed at releasing the area of tension, imbalance or pain producing tissue through routine low force chiropractic manual therapy.	Outcome after treatment was based on mother's rating of improvement in their infant's symptoms. This was a form of a 10-point numerical rating scale as well as discussion with the parents	Short term	Treatment was chiropractic therapy in addition to any support given elsewhere. All children showed some improvement with 78% being able to exclusively breastfeed after 2 to 5 treatments within a 2-week time period. Cooperative multidisciplinary care to support breastfeeding was demonstrated in this population. Chiropractic treatment may be a useful adjunct to routine care given by other professionals in cases of diagnosed breastfeeding problems with a biomechanical component.
Klougart, JMPT 1989	To observe the effect of regular PSMT on colicky infants.	Prospective uncontrolled study	21	316 infants age 2–52 weeks.	SMT at the discretion of the 73 Chiropractors involved	Parental diaries and clinician assessments performed after 1, 2 and 4 weeks post treatment.	A similar evaluation performed at the 14-day mark was performed at 4 weeks to estimate relapses.	SMT of the vertebral column in infants with colic constitutes effective treatment. Results show a satisfactory effect of the treatment in 94% of cases within 14 days from the start of treatment. Further studies must be designed in such a way that the number of sources of bias affecting the interpretation of results is reduced. This will more closely estimate a placebo effect.
Wiberg, JMPT 2010	To investigate if the outcomes of excessively crying infants treated with chiropractic care was associated with age and/or can be partially explained by age.	Retrospective evaluation	19	276 infants who fit the inclusion criteria.	Chiropractic manipulation as decided by the treating Chiropractor.	Parental reports were noted as improved uncertain, or non-recovered.	None or immediate follow up	Data matched the clinical experience of good treatment effect independent of the infant's age. Slightly older age and longer duration of treatment were found to explain covariables linked to crying infant's improvement.
Miller, JMPT 2008	To identify adverse effects of PSMT on children under the age of three years to evaluate risk of complications.	3 year retrospective study	18	697 children under the age of three years with colic and/or irritability due to biomechanical disorders likely resulting from birth trauma.	77% received full spine PSMT; others received cervical spine decompression, segmental SMT etc.	Parental perception of improvement, no change or worsening of symptoms.	Immediate or none	85% improved. 15% showed no change. ~1% had an adverse reaction (n = 7) and 3 of 7 were perceived to be regular side effects of PSMT.

a colicky infant for a therapeutic trial of 4–6 treatments, given its favorable risk/benefit ratio, providing other serious diagnostic possibilities have been ruled out.³⁵

Ernst conducted a systematic review of RCTs investigating the effectiveness of SMT on infantile colic [Au-

thors' note: it is highly unusual for only one author to conduct a systematic review due to the inescapable risk of investigator bias].³⁶ His review only found three^{22,25,28} of the six studies we reviewed here; nevertheless, Ernst concluded that the current evidence from RCTs does not

show that SMT is an effective treatment for infant colic.³⁶ A more recent systematic review of the literature by Perry, Hunt and Ernst³⁷ assessing the use of nutritional supplementation and other types of CAM therapy for infant colic discussed four RCTs involving the use of SMT; two of the studies were the ones previously reviewed by Ernst³⁶ [inexplicably, Perry, Hunt and Ernst³⁷ chose not to review the study by Browning²² in their review, although it was included in Ernst's³⁶ earlier review] and the other two studies were ones we did not select for our review since they did not meet our inclusion criteria. The study by Mercer and Nook we excluded from our review since it was not published in a peer-reviewed journal but rather was presented at a chiropractic conference.³⁸ We excluded the study by Hayden and Mullinger since the authors compared the use of cranial osteopathy to a no-treatment group.³⁹ This was incorrectly classified as a 'manipulation' study by Perry *et al*³⁷ since cranial osteopathy does not use the HVLA thrust that characterizes manipulation; rather, cranial osteopathy is an extremely low-force technique that uses approximately 5 g of pressure, an amount equal to the weight of a nickel placed on a person's eyelid⁴⁰. In any event, Perry *et al*³⁷ discussed the low methodological quality of these studies, with the exception of the study by Olafsdottir *et al*,²⁵ and concluded that there is no evidence of a clinical effect on colic using SMT, although they did conclude that there were some encouraging results from studies investigating the use of fennel, extract, mixed herbal tea, and sugar solutions.

The two studies that received the highest scores using the Sackett instrument both investigated the use of SMT on children with asthma.^{27,30} Bronfort *et al* conducted a practice-based clinical trial that monitored the effects of adding SMT to the optimum medical management 36 children with asthma were receiving.²⁷ Unlike the study by Balon *et al*³⁰ described below, Bronfort *et al*²⁷ considered both subjective and objective outcome measures as equally relevant. After three months of care, children receiving both SMT and optimal medical management reported increased improvements in their quality of life, even at one year follow up. No change in lung function was reported. This study was scored the highest in our review, scoring 48/50.

The study scoring second highest in terms of methodological design in this review was by Balon *et al*, which compared SMT versus sham SMT among 80 children

diagnosed with asthma.³⁰ Using peak expiratory flow as measured by spirometry as a primary outcome measure, the researchers reported there was no significant difference between the two groups. This study was scored 45/50. Ferrance and Miller have suggested that SMT may convey benefits to the thoracic spine biomechanics of children with asthma.³⁵ Even though there is no evidence that SMT improves lung function itself, Ferrance and Miller noted that the studies by Bronfort *et al*²⁷ and Balon³⁰ reported other important clinical outcomes include improvements in patients' quality of life as well as other subjective symptoms. It is noteworthy that in a systematic review of the literature pertaining to the use of chiropractic care for asthma, Kaminskyj *et al* concluded that SMT should be used as an adjunct to, rather than a replacement of, traditional medical management.⁴¹

Two clinical trials investigated the use of SMT for enuresis.^{26,31} One study involved the use of SMT targeted to the upper cervical spine²⁶ and the other study compared SMT to a sham treatment (activator set to "zero").³¹ Although both clinical trials reported children experienced improvement in terms of fewer "wet nights," both studies suffered from several methodological flaws (no description of blinding strategy or safeguards against contamination or co-interventions) and were scored 25/50 and 33/50 respectively.

In general, the clinical trials involving children or adolescents with jet lag²⁴ or otitis media²⁶ did not report any clinically meaningful improvements following SMT. However, another study investigating the effects of hip manipulation compared to a control group of adolescents age 17–20 years old did report favorable results attributable to SMT.²⁰ Compared to a control group, the adolescents who received SMT were found to have statistically significant improvements in hip extension immediately after the intervention; however, this group of subjects failed to demonstrate improvements in running time 30 minutes post-intervention. This study involved very few subjects (n = 17), no significant follow-up period, provided no information with respect to contamination or co-intervention and provided minimal information on blinding strategies.

A feasibility pilot study involving the use of spinal manipulation for six patients with adolescent idiopathic scoliosis was conducted by Rowe *et al*.²³ The outcome measures of this randomized, controlled clinical trial in-

cluded x-ray line marking (calculating the Cobb angle, the gold standard used to measure the magnitude of spinal curvature) as well as quality of life survey instruments. The researchers reported that a larger RCT was viable since chiropractors and orthopedic surgeons were easily recruited and worked cooperatively, and patient compliance and recruitment was good. SMT was safely used, with only two transient, self-limiting adverse reactions reported.²³

Khorshid *et al* conducted a very small randomized clinical trial comparing full spine HVLA-SMT to Upper Cervical adjustments (manipulation) among 14 children with autism.³³ The researchers reported both forms of manual therapy resulted in improvements in 6 of 7 children in the upper cervical care (UCC) group and 5 of 7 children in the SMT group as measured by the Autism Treatment Evaluation Checklist.³³ However, it was reported that the children in the UCC group had higher average improvements in their ATEC score, with one child in the UCC group reportedly no longer meeting the criteria to be considered autistic. Similar to the Browning *et al*²² study, it is unknown whether the positive benefits reported are due to differences between the interventions themselves or if they are attributable to the benefits of physical contact between the practitioner and the patient.

The effect of SMT among 114 infants identified as demonstrating 'suboptimal breastfeeding' was investigated in a prospective case series.³³ Based on the mothers' subjective reports of improvement in the ability to exclusively breastfeed (i.e. the infant did not require bottle feeding supplementation), as well as monitoring the infant's weight, Miller *et al*³³ reported 89 infants (78%) responded favorably to SMT.

Among adults,^{12,42-44} even among older adults,^{45,46} the body of knowledge investigating the clinical effectiveness of chiropractic care in general, and SMT in particular, for spinal pain has experienced exponential growth over the past decade. This notable accrual of peer-reviewed literature is observable not only in terms of the sheer numbers of studies being published but, upon further review, also in terms of improvements in their methodological designs. However, the same cannot be said for children and adolescents. The most startling finding from our review was that there was not a single clinical trial investigating the effectiveness of SMT for children or adolescents with back pain. This is especially puzzling since MSK

conditions were the most common presenting chief complaint to chiropractors for pediatric patients other than infants. This is disturbing since the occurrence of back pain in the pediatric population has been calculated to be roughly 20%, with the prevalence increasing with age and a prevalence higher among girls than boys.⁴⁷ That said, most cases of pediatric back pain are often non-specific and self-limiting and rarely require hospitalization, although many children with spinal pain report that it often interferes with their activities of daily living.⁴⁷

One reason for this paucity of literature may be that this group of patients is typically excluded by design from well-designed double-blinded controlled clinical trials. Other reasons may be difficulties in obtaining ethical review approval, limited funding opportunities for chiropractors and perhaps a relatively small number of researchers available to undertake rigorous clinical trials. However, since third party payors, governing bodies and other stakeholders are all encouraging healthcare providers to rely on researched evidence to guide their clinical decisions whenever possible, rather than only on their own clinical experiences (see commentaries),⁴⁸ this knowledge gap leaves the field practitioner in the unenviable position of finding him or herself unable to comply with the one of the fundamental tenets of evidence-based medicine.

This contradiction is especially problematic since the provision of chiropractic care for children is not without controversy, as witnessed by the 2002 Position Statement of the Canadian Paediatric Society (CPS).⁴⁹ The CPS provided a historical review of chiropractic, a discussion of chiropractic philosophies (principally relying on a study by Biggs *et al*)⁵⁰ and provided utilization rates of chiropractic services by children. The CPS also provided the issues surrounding the varying attitudes towards vaccinations within the chiropractic community. One of the areas of controversy discussed by the CPS was the advice given by some chiropractors to parents that the birthing process is itself a traumatic event requiring chiropractic treatment to realign an infant's spine and that, without this spinal realignment, many childhood illnesses may result. Lastly, the CPS noted that many chiropractors claim to treat a wide variety of non-NMS conditions for children in the absence of supportive clinical evidence, ranging from colic to asthma to otitis media.⁴⁹

No adverse effects were reported in any of the clinical trials reviewed. This echoes the recent conclusion reached

by Humphreys,⁵¹ which itself was an update of his early work.⁵² Humphreys reported that there are no reports of serious or catastrophic adverse effects in any clinical trials or systematic reviews found using pediatric manual therapy (pediatric MT), although he does note that there is insufficient research evidence in this field of study. Therefore, he contends, no accurate estimation of the rate of adverse effects of pediatric MT can be made.⁵¹

Limitations

There were several limitations in this review. It is possible that the inclusion criteria were too restrictive and that we erred when not including clinical trials investigating the use of osteopathic manipulation on conditions affecting children and adolescents. It is possible our search strategy failed to capture relevant articles suitable for this review, especially articles published in languages other than English.

More importantly, we may have mis-scored components of the clinical trials we reviewed. At times we were unable to identify the manner in which randomization was done, or how blinding of either subjects or treating practitioners was performed. In such instances, we tended to err on the side of caution and assign the lowest grade option available to us on the Sackett scale. Elsewhere, some studies were very vague with respect to how subject compliance to study protocols was monitored, and many studies failed to indicate how they ensured there was no contamination or co-interventions. For example, a number of studies stated patients were instructed to continue with their prescribed medications, but there was no indication whether or not parents were instructed not to change household routines (i.e. changes with sleeping routine for colicky infants) or not to introduce other forms of therapy (i.e. massage, use of heat) during the duration of the clinical trial.

Whether or not “crying time” should be scored as an “objective” or “subjective” outcome measure spawned considerable debate among the authors of this review. On the one hand, the amount of time an infant cries can be timed and documented; on the other hand, as intimated by Ferrance and Miller,³⁵ each bout of infant crying may be due to different causes, making the decision to ascribe each episode of crying to “colic” more subjective in nature. At the end of the day, we chose to consistently designate “crying time” as a subjective outcome measure.

Conclusion

We conducted a systematic review of 16 clinical trials investigating the use of SMT for pediatric health conditions. None of the 16 studies investigated the effectiveness of SMT for spinal pain among children or adolescents. Studies that monitored both subjective and objective outcome measures of relevance to both patients and parents tended to report the most favorable response to SMT, especially among children with asthma. Five of the six studies investigating the effectiveness of SMT for infantile colic reported favorable results, notwithstanding their methodological deficiencies and small sample size. Going forward, if shown to be a valid theory, studies investigating the effect of SMT on colic ought to better differentiate between subgroups of crying infants, monitor the effect of SMT on larger groups of infants and generally use more robust study methodologies, especially in terms of blinding allocation and avoiding co-interventions and contaminations of other external factors.

With respect to clinical trials investigating the use of SMT for children with asthma, future studies should focus more on daily activity outcome measures (reduction in use of medication), physical outcome measures (breathing ability) and subjective measures (ease of breathing, patient satisfaction) and less on physiological responses (lung function as measured by spirometry).

The findings from our review are comparable, although not identical, to the conclusions provided in the UK Evidence Report authored by Bronfort et al, who stated: “*In children, the evidence is inconclusive regarding the effectiveness for otitis media and enuresis, and is it not effective for infantile colic and asthma when compared to sham manipulation.*”^{12p3}

We can do no better than to parrot the conclusions reached by two very different groups of authors separated by a 10 year gap. The first group of authors, the Canadian Paediatric Society, stated in 2001: “*Chiropractic treatment for children and adolescents is not uncommon. Open and honest discussions with families using or planning to use chiropractic for their children will, hopefully, bring about a rationale use of this treatment in selected musculoskeletal conditions for which there is proof of efficacy, and enable parents to make informed choices about this form of therapy...[I]deally, collaborative evidence-based research into chiropractic care for diverse paediatric con-*

ditions should define those patients best suited for chiropractic therapy.”^{49p88}

The other group of authors, Ferrance and Miller, reached a similar conclusion in 2010: “*The efficacy of chiropractic care in the treatment for non-musculoskeletal disorders has yet to be definitely proven or disproven, with the burden of proof still resting upon the chiropractic profession.*”^{35p1} We hope that another decade will not pass before the chiropractic research community finally meets the challenges identified by these authors and fills in the glaring evidentiary gap of the use of SMT for pediatric health conditions of all kinds, especially spinal pain.

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Colin A. Greenshields, DC: the Canadian Memorial Chiropractic College's first graduate

Douglas M. Brown, DC*

This biographical study investigates the complex tribulations and impressive accomplishments of Dr. Colin Greenshields. Part I (the Formative Years) goes back to his ancestors in Great Britain and forward to his graduation from CMCC in 1948. Part II (the Professional Years) begins with the opening of Colin's office in St. Catharines, ON, and proceeds through his professional career and multiple leadership roles to his retirement in 1986.

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KEY WORDS: chiropractic, history, biography, Greenshields

La présente étude biographique se penche sur les tribulations complexes et les réalisations impressionnantes du Dr Colin Greenshields. La partie I (la formation) remonte à ses ancêtres en Grande-Bretagne jusqu'à son diplôme obtenu au CMCC en 1948. La partie II (l'expérience professionnelle) commence par l'ouverture du cabinet du Dr Colin à Ste Catharines en Ontario en passant par sa carrière professionnelle et par les multiples postes de dirigeant qu'il a occupés jusqu'à sa retraite en 1986.

(JCCA 2012; 56(2):142-155)

MOTS CLÉS : chiropratique, histoire, biographie, Greenshields

Beginnings (Part I: The Formative Years)

Colin's forbearers hailed from England and Scotland. His mother, Olive Bradford, traced her ancestry back to England in the 1400s. She was related to William Bradford who sailed to the "New World" on the Mayflower, anchoring in Provincetown Harbour, MA, December 21, 1620. Rev. Bradford authored the "Mayflower Compact," that attempted to establish a regulatory body "until a more official one could be drawn up in England."¹ Colin's father, James Stuart Greenshields, descended from Scottish relatives. His great, great grandfather was a cavalry captain, fighting Napoleon at the 1815 Battle of Waterloo.

Colin's parents and grand parents were both Canadian born. They originated in the Eastern Townships, where they had land grants and owned farms and stores. His father, known as Stuart, was born in Sherbrooke, Québec; his mother Olive, in Granby. Stuart attended high school

and Business College, in Bellville, ON, before starting to work, first in Eastern Township banks and then for the Imperial Bank of Canada in Toronto, where Stuart and Olive were married in 1912.

The newlyweds first home was a poultry farm at what was stop 32, Kingston Road, in Scarborough. During World War I, Stuart managed three branches of the Imperial Bank and trained with the Queens Own Rifles. In 1917 they sold the farm and ended up at 84 Pine Crescent, where Colin was born, July 19, 1920.

Itchy Feet

Stuart was being promoted frequently but a cousin lured him to California with tales of the vast riches purported to be found there. Arriving in Los Angeles, he quickly became a loan officer for the Pasadena National Bank. In 1926, Stuart moved his family to California by train,

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settled into a spacious property in Altadena, four miles north of Pasadena, and maintained his passion for birds by creating the Altadena Aviaries, a short distance away. Soon he was importing large quantities of rare birds from the Orient. His best customer was William Wrigley Jr., who acquired a wide variety of rare birds for Catalina Island, a property he was developing. The Aviaries introduced Colin to the world of work: cleaning out bird cages; conducting public tours; and collecting admission fees.

Surviving the Great Depression

In 1928 the real estate market collapsed in Los Angeles. The Pasadena Bank had issued mortgages at four times property values. The mortgages were worthless, the bank went belly-up and Stuart lost his job. To make matters worse, Stuart had invested heavily in bank stock which had double liability. The stock had no value but the government repossessed double its issued worth, seizing his home and aviary, leaving the Greenshields almost penniless.

Stuart got a job in Washington State as the manager of a chick hatchery and didn't come home for over a year. Olive and her two children moved to Glendale and took part-time work cleaning houses. This was difficult because she was developing severe migraine headaches. On Saturdays, Colin received 25¢ for cleaning a neighbour's home and used his wagon to collect old newspapers. It took him a month to save a garage-full, which he sold for \$10. In 1929 Stuart decided to return to Canada. He purchased an old Studebaker automobile for \$137, piled his family inside and began the arduous journey through the coastal mountain ranges to British Columbia (BC). Along the way the car required major repairs and when they finally arrived at the BC border, Stuart had to pay \$300 duty to bring his worn-out car into Canada (see Figure 1).

The family settled in Burnaby because it was the cheapest place to live and Stuart bought a JR Watkins Products route, peddling household items door-to-door. Women, fearful of robberies, were reluctant to open their doors, so Stuart had Olive accompany him and sell cosmetics. However, Olive's migraines were getting worse, many days she was unable to work, and they barely made a living. In the interim, Colin busied himself selling newspapers and by the time he left public school had saved enough money to attend business college.



Figure 1 1915 Studebaker

Stuart got tired paying rent and bought a house with almost nothing down, costing him \$35 a month, including taxes. Colin finished his business courses but there were no jobs so he stayed on and took senior accountancy, business and legal shorthand, qualifying him to do the work of a legal clerk. Finally, the college got him a job with York Knitting Mills, a company with factories in BC, Ontario and Québec. By age 19, Colin was in charge of a branch sales office, earning \$70 a month. Regrettably, his father had defaulted on their home and in 1940, when an opening came with Watkins Products for the distributorship of the Niagara Peninsula, Colin's parents and sister moved to St. Catharines. Fortunately, York Knitting Mills made room for Colin at their head office, in Toronto, where long, laborious hours got him promoted to a managerial position with the Hosiery Mills division.

Colin's Introduction to Chiropractic

In 1935, Colin had been thrown onto the road, striking his head and spine, as he was travelling 50 mph on the back of a friend's motorcycle. Although able to ride home, Colin began having trouble with one of his arms and consulted Frank Anderson, DC, his family's chiropractor in Vancouver. After a few adjustments his arm symptoms disappeared but Colin felt nervous and jittery for a year afterward.

In 1941, Colin was still with York Knitting Mills, using Cardex and Rolex systems. These were complex and needed a lot of concentration. He began getting headaches. These got progressively worse, affected his vision

and were not relieved by 25 daily Aspirin. New glasses, a variety of specialists and more medication were no help. Colin stopped working, lost his job and with no insurance was in physical and financial jeopardy. Colin's mother referred her son to Jack Mullin, DC, a Palmer graduate who had an office at 45 Richmond Street, in Toronto. Mullin x-rayed Colin's neck and declared it to be "in terrible condition."

Mullin began adjusting Colin using upper cervical recoil methods, but seeing no results started adjusting him multiple times, using different techniques such as rotaries and breaks. One wonderful day he finally got Colin's atlas to move. The crack could be heard all over the office and Colin's head became unbearably hot. His eyesight immediately began to improve. Within a week he was able to read a book and his head pain had subsided dramatically. Later Colin learned he had a very low occiput. Over the years a fusion had occurred between the atlas and occiput. Once this fusion was broken the adjustments began to hold. Within a month Colin was able to start a new job in accounting. Eighteen months later he returned to St. Catharines to spend Christmas with his family. He was helping his mother clean out a cabinet when he walloped the vertex of his skull, suffering a concussion which recreated all his symptoms and made it impossible for Colin to return to work. This time Mullin's adjustments would not hold.

Colin meets Benjamin Joshua Palmer

December 15, 1943, Mullin sent Colin to BJ Palmer's Private Referral Clinic, in Davenport, Iowa. He was supposed to be there for two weeks but remained six months. Colin paid \$125 for his initial two weeks and \$50 a week thereafter. During this time he received 11 adjustments. This was double the norm, since BJ averaged one adjustment of a patient in 28 days. Colin's adjustments were slow to hold but by the time he left the clinic, they had been stable for almost a month. Most of the time, Colin was adjusted by BJ and sometimes by Lyle W. Sherman, DC, a prominent PSC administrator.

The Referral Clinic was run so BJ could get through the maximum number of patients in the allotted time. This required 10 people to assist in retrieving files, taking neurocalometer (NCM) readings, moving patients from place to place and positioning them on appropriate tables. Five minutes after the adjustment another NCM test was done. If it showed a positive response the patient was placed on

a trolley, the head and neck stabilized, and wheeled off to a rest cot for two hours. BJ would see 50–60 patients in a little over an hour.

Colin Enrols at the PSC

On June 20, 1944, Colin returned home and decided to become a chiropractor. The question was, had he recovered enough to withstand the rigors of the 18 month course? The Palmer School operated 12 months a year without any breaks, so it could be completed in a year and a half. This was during World War II (WW II) and Colin had been rated 4F (medically unfit for military service), yet Selective Service would only grant him six month temporary exemptions to study in the USA. As well, the Ontario Board of Regents now required applicants for licensure under the 1925 Drugless Practitioners Act (DPA), to have four years of education in a National Chiropractic Association school such as the National College of Chiropractic in Chicago, IL. Colin was warned that if he attended Palmer, he would never be allowed to practice in Ontario, yet informed the Board in writing, he was entering the PSC anyway (see Figure 2).

There were 105 students in Colin's September 1943 Class. Colin didn't arrive until November, however subjects were taught in blocks of two months so students could catch up. Colin had no money and borrowed the \$500 tuition fee, payable in advance, for the 18 month course. Books and supplies were extra. His meagre funds were augmented by tutoring a blind classmate, who was sponsored by the State of New Jersey.

Classes ran from 8 am to 5 pm, five days a week. There were no breaks between semesters, no study weeks and no summer vacations. The only day off was Christmas. The load was heavy and Colin's headaches and eye problems started to return. At the end of August 1945, Colin went home and rested for two months before returning to finish his training. Because Colin had been a patient in BJ's Referral Clinic he was accepted for internship there, learning every aspect of how BJ operated from both perspectives. Average students only had training in the student clinic before proceeding to the adult clinic where they had to attract their own patients.

Punctuality

BJ Palmer's involvement with radio and television made him extremely time sensitive. From the early 1920s until

Figure 2 *Palmer West Hall, Davenport, IO*

the mid 1980s the Palmer Broadcasting System was one of the largest in North America.² Top executives at the National Broadcasting Corporation knew him as Colonel Palmer, the wizard of radio and television, not Dr. Palmer, the developer of chiropractic. BJ wrote the book, "Radio Salesmanship." In it Palmer declares radio should embrace rather than fear the emergence of television because these are mutually beneficial forms of communication and demonstrates that cutting words in radio commercials to a bare minimum is the best way to get messages across quickly and clearly. Ironically, when it came to chiropractic subjects, Colin found him to be extremely repetitious, explaining his "thots" in a variety of ways and quoting from voluminous papers.

BJ taught philosophy in the main auditorium from 8 to 10 am, every Wednesday that he was in town and the entire PSC schedule was geared to him. Because this was wartime, student enrolment was down to about 300 and comprised a lot of women. Many of Colin's classmates were subject to military call-up and had to contribute to the war effort by working for example, in munitions fac-

tories from 11 pm to 7:30 am. If students were late for any reason, "BJ was merciless." Timekeepers were on duty at the bottom of the stairs at 7:30 am. When the 8 am chimes rang, the timekeepers left and BJ started to speak. Late-comers were subjected to BJ's sarcasm, were not credited for those hours, and had to take extra classes to make them up before graduating.

The Palmer Research Clinic

Promptness extended to the Palmer clinics, particularly the Research Clinic. Because it was geared to scientific accuracy, Patients had to be adjusted the same time each day, under similar circumstances. The central diagnostic instrument was the Electroencephaloneuromentimograph (Timpograph), a complex device BJ's electrical engineers began developing in 1935. In Colin's time, two of these units were housed side-by-side in separate, shielded and grounded booths, encased in steel with mosquito-net copper wiring. No electricity or sound waves could penetrate the booths, but light and heat were filtered in through a screen. Unit #1, was powered with special, direct cur-

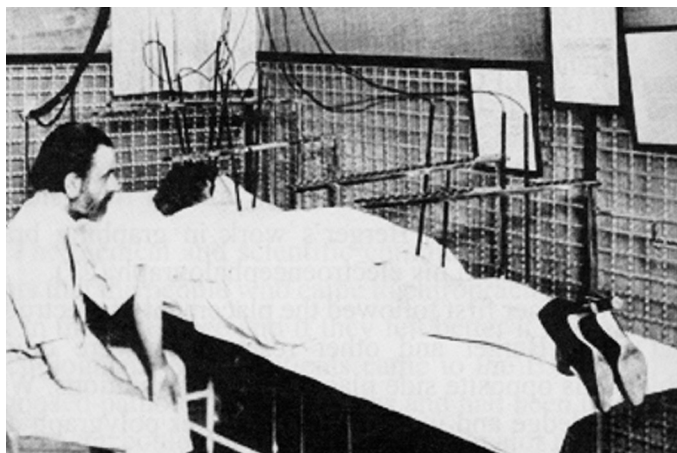


Figure 3 BJ analyzing a subject with his Timpograph

rent batteries. These were not available during the War, so it was not in use. Unit #2 was built in 1945. Powered by alternating current, it was easier to control, measuring brain waves down to 5-1 millionths of a volt, because BJ believed this was the range within which mental impulses flowed. This Timpograph had seven channels measuring and recording time, room temperature, body temperature, blood pressure, pulse, brain waves and electrical output down the spine. Data spewed out in three or four, 20 foot long graphs. Colin had no idea how to interpret the data and BJ never explained the process. Consistency and replication of procedures were major problems. The instrument was so sensitive the slightest vibration could invalidate its readings (see Figure 3).³

Lessons from BJ

Colin learned two important lessons from BJ Palmer. The first was that BJ's adjustments were incredibly fast. Nobody had his speed and probably nobody practiced his thrust as much as BJ, motivating Colin to hone this skill three to four hours a day. The second lesson was visualization. Before approaching a patient, BJ studied the x-rays thoroughly and had a clear mental picture of the subluxation and the direction of force needed to correct it. BJ's goal was to set the misalignment so the body could hold it in place and the vertebra would not need repeated adjusting (see Figure 4).

Colin Enrols at CMCC

In July 1946, Colin graduated from the PSC with an exem-

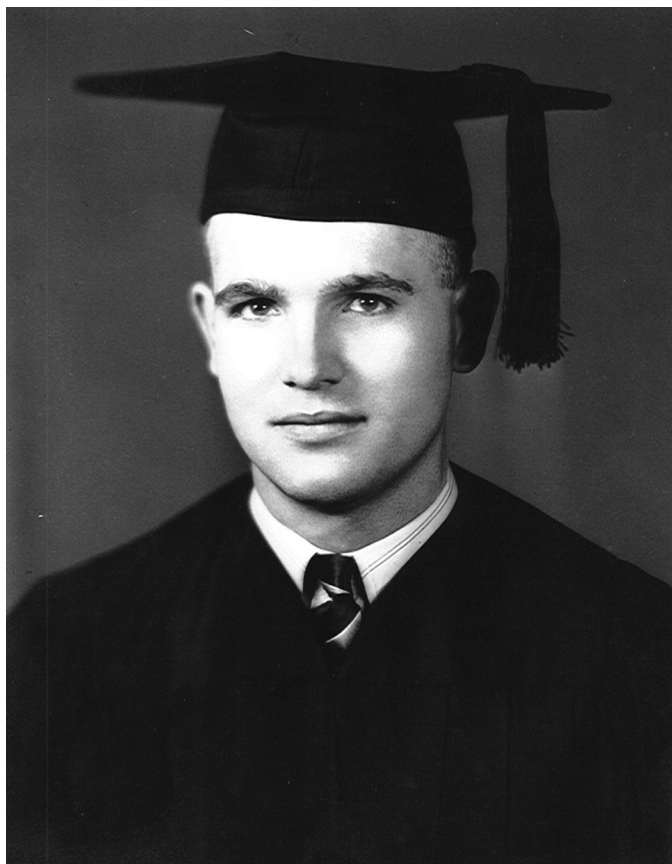


Figure 4 Colin graduates from Palmer July 1946

plary academic record He returned to St. Catharines, then proceeded on to Toronto to enter CMCC in September. Colin negotiated his program with John A. Henderson, DC (Robbins Chiropractic Institute, 1911), CMCC's first Registrar. Dr. Henderson lived on the second floor of what had been the Meadonia Hotel, at 252 Bloor Street West, and ran the College on a day to day basis. At PSC Colin's 18 month course was considered the equivalent of three years training. CMCC's four year, 36 month program, ran nine months a year. Henderson only gave Colin two years credit for his PSC studies and informed him that he would have to attend CMCC another two years to qualify for registration under the DPA. Colin requested the option of choosing his own subjects because he had already taken most of those offered at CMCC. Henderson agreed but stipulated Colin would have to keep track of every hour because he was not on any role calls. He also conceded Colin could graduate without taking any specific CMCC

tests. The Board of Regents exams would determine his fitness to practice.

Life at CMCC

In 1946 Colin obtained a room on the third floor dormitory of CMCC's original home. During the day, 227 students were crammed into small, overcrowded rooms where Colin "frequently had to stand or sit on a red-hot radiator."⁴ At night, he had to deal with "partying, monkey-business and loud music until the wee hours of the morning." The following year, Colin was relieved when a quiet little room became available on the second floor.

In the spring of 1947, Colin was granted permission to write the first six Board of Regents annual exams. This began the precedent of having CMCC students sit for the first half of their Board exams at the end of their second year. Returning to CMCC in September that year, Colin found that Dean Rudy O. Muller (Lincoln CC) had listed him as a lecturer on Palmer techniques for CMCC's first post graduate course, to be held one week before formal classes began. Although only 10 to 15 chiropractors attended, it demonstrated the College was broad based and helped generate support across Canada.

By 1947-48, Colin was teaching palpation, technique, instrumentation (such as the use of NCMs), pathology, bacteriology and physical diagnosis. Sometimes when faculty didn't show up, Colin would bravely fill the void. Once he lectured on BJ's "brain cell to tissue cell" concept and how a subluxation interfered with it through the complexities of things such as efferent and afferent pathways in the brain and spinal cord. Colin's talk closed to resounding applause.

Radiology

1947 saw the inauguration of an x-ray course at the College. Most students were WW II veterans. Some had extensive instruction and practical experience with radiation. When the neophyte teacher (a recent graduate of the Logan CC), realized he knew less about the subject than his class, he quit and Muller called upon Colin again. Wisely admitting he was not a specialist, Colin offered to give his pupils the benefits of his limited education in x-ray and invited them to share their knowledge.

At this juncture CMCC's first x-ray machine was installed. It was capable of taking open mouth cervical, lateral cervical, lateral lumbar and full spine AP films.

Colin appointed second year students Fredrick Clubine and Donald MacMillan to assist him in x-raying the entire student body. In order to obtain special rulers for marking x-rays that were graduated in centimetres from zero at the centre, in both directions, the College had to purchase 10,000 and they were sold for years in the supply centre.

Human Dissection

In early 1948 there were no human cadavers at CMCC and the anatomy instructors were teaching cat dissection. Colin wrote to the Board of Regents pointing out that the Board required the College to provide dissection, but did not specify human dissection and asking if it would accept mammalian dissection in place of human dissection. The Board agreed to Colin's proposal, providing CMCC met all other anatomy requirements. This allowed the Board of Regents to license the Class of 1949 but did not solve the problem for succeeding years.

Branch 450 (the Chiropractic Branch) of the Canadian Legion received its colours during CMCC's dedication ceremonies in 1947. Its president, Wilmer F. Trelford (CMCC 1950), used the Legion's influence via the WW II veterans at the College, to lobby for CMCC to obtain human cadavers. Colin does not know what effect this had but on April 6, 1950, CMCC became one of six institutions eligible to receive human bodies for dissection in Ontario. Accomplished through Orders-In-Council, approved by the cabinet of Premier Leslie Frost (PC), it did not require amending the Anatomy Act.⁵

Graduation

In May 1948, at the end of CMCC's academic term, Colin told Henderson it was his duty to graduate him. Henderson agreed but noted that Colin would have to wait until the first class graduated in 1949 to receive his diploma and then, it would be dated 1949 not 1948. Despite these irritations, Colin donated several hours a day to holding review sessions for students preparing to write the first half of their Board exams that month.

Colin wrote the second half of his final Ontario Board exams with ease, obtaining an average of over 94%, the highest marks ever recorded. Henderson asked Colin to rejoin CMCC's faculty in the fall, but without a contract. Colin offered to teach two days a week until they could find someone to replace him and had already taken steps

to open his own office in St. Catharines. In July 1947, Colin had purchased a home at 71 Pleasant Avenue, which he converted into an office, with living quarters at the back. Then, in January 1948, he bought a used Ferranti x-ray machine and paraphernalia that would allow him to take all cervical and chest x-rays plus fluoroscopes. Now all he needed was his license to practice.

Travels with Colin

The first three decades of Colin's life were interspersed with extensive journeys in and out of Canada and the United States. Residing in a variety of locations broadened his outlook and deepened his understanding of human nature. For Colin, these were exciting times, overflowing with opportunities to gain practical knowledge and inner growth.

From an early age Colin found satisfaction in work; whether it was menial labour, selling newspapers or managing garment factories, and his father gave him unforgettable lessons in the perils of financial investment and the advantages of thrift. Along the way, Colin became aware that the principles of salesmanship and interpersonal relationships are tied to the "Golden Rule." Colin's transformative experience was his personal discovery regarding the "wonders" of chiropractic and the realization that this profession was destined to be the conduit through which he would serve humanity.

Private Practice (Part II: The Professional Years)

In May 1948, Dr. Greenshields had completed his Board of Regents exams and was waiting for his license to practice. Colin's registration number arrived June 19 and he was off and running. His office at 71 Pleasant Avenue was just steps from the city's General Motors (GM) automotive plant and hundreds of employees passed by on their way to and from work. The first three months, Colin toiled without a break six days a week, handling emergencies on Sundays. In September, as promised, Colin returned to CMCC, to teach on Tuesdays and Thursdays, for the 1948–49 academic years (see Figure 5).

Shortly after Colin's fast start, GM went on strike, yet his practice continued to grow because employees on the picket lines were under stress and had more time to consult him. His patients also had less money to pay his modest fees. Colin assured them he was willing to continue their care and they could pay as little or as often as they



Figure 5 Colin's Office/Home, 71 Pleasant Ave, St. Catharines, ON

wished, once the strike was settled. His practice flourished because Colin concentrated on providing service, not collecting money, and patients responded in kind.

Although Colin specialized in upper cervical technique, he had been trained in full spine procedures at the Palmer School of Chiropractic (PSC). Therefore, he checked the whole spine, adjusting wherever he located nerve interference, which was occasionally found in the lumbo-sacral and sacro-iliac regions. In 1956, Colin purchased a rebuilt Ferranti machine from Robert G. Young (CMCC 1950). It had a 14" × 36" bucky on wheels, permitting him to take full spine x-rays at a tube distance of up to 84". Other than that, Colin's chiropractic protocols remained unchanged throughout his career.

Colin is a proponent of continuing education. As a new practitioner, he attended numerous seminars at PSC and in 1965 took some general philosophy courses in the evening at Brock University. In 1957 Colin started investigating how the mind influences the body, by enrolling in the Concept Therapy (CT) course in Rochester, NY.⁶ Later he travelled to other cities for advanced instruction and in 1963, he went to the CT Ranch in San Antonio, TX, to study under Thurman Fleet (Texas CC 1931).

In 1969, Colin was exposed to the Inner Peace Movement (IPM), which he finds a little broader than CT and embraces spiritual facets of human life.⁷ The educational

arm of IPM is the Americana Leadership College, owned by Dr. Francisco Coll.⁸ The religious arm is the Peace Community Church, in Washington, DC.⁹ Colin took courses there, did some teaching and after five years, was ordained as a minister of the Church.

During his practice years Colin had four associates. The most enduring was Robert Haig, who partnered with Colin upon graduating from CMCC in 1977. Dr. Haig has pleasant recollections of working with Dr. Greenshields. "Colin practiced in one room and I in another. I used motion palpation to determine where and how to adjust. Colin relied on neurocalometer readings and x-ray analysis. Colin is a kind, considerate gentleman and I had no difficulty getting along with him. We accepted that our practices were different and learned from each other." [Brown, Haig interview, Oct. 8, 2010]

In 1985 Bob Haig moved into his own office in the Glenridge Plaza and Colin reversed their roles by renting space from Bob. That September, Colin began cleaning out the massive collection of files he had stored in his basement, dating back to 1919. Over the next 25 years he shipped more than 40 cartons of documents and memorabilia to the CMCC Library. On December 31, 1986, Colin retired from practice.

The Niagara District Chiropractic Council

In 1950, chiropractors in the Niagara Peninsula organized the Niagara District Chiropractic Council (NDCC). Its founding executive consisted of George Marquis (National CC), President, Colin Greenshields, Vice-President and Ora Biggar, Treasurer. They held monthly meetings and provided a lot of current information to their 30 to 40 members. They also sponsored social events, public relations, and professional seminars.

In 1951 the Council hosted a lecture in the St. Catharines Royal Canadian Legion Hall. Chiropractors paid 50¢ each for tickets, distributing them without charge to their patients. Rudy Muller, CMCC's Dean, delivered a "stirring talk" to over 300 people, followed by introductions of the doctors who were present. The event, advertised in the St. Catharines "Standard" newspaper, received a favourable write-up the following day.

Medical doctors had been purchasing specially designated vehicle license plates for years before Harold W.R. Beasley (CMCC 1949) decided this would be a good way to promote our profession. Although the Ontario Ministry

of Transportation chose not to manufacture special plates for chiropractors, Dr. Beasley and Colin convinced the Ministry to reserve a number of DC plates, when these letters appeared in a specific jurisdiction. In 1953 the first plate, "DC 1" was issued to Harry Yates (Toronto CC 1920), then President of the Ontario Chiropractic Association (OCA), residing in Ottawa.

In 1968 the NDCC members volunteered to reduce Yellow Page advertising to the bare essentials and contribute the money saved to a fund for publishing chiropractic health columns in the St. Catharines Standard. Colin and Hal Beasley met twice a week to write articles on general subjects such as posture, spinal pain and headaches. For the first 26 issues they were published once a week, then reduced to once every two weeks, before the project died due to lack of sustained support by the membership (see Figure 6).

The Canadian Council of Chiropractic Roentgenology

The CCCR was initiated in 1952. Its original directors were Donald MacMillan (CMCC 1949), President, Colin Greenshields, Vice-President, William Sundy (CMCC 1949), Secretary, and Wilmer (Bill) Trelford (CMCC 1950), Treasurer. Members, received monthly bulletins, written by Colin and Dr. MacMillan and annual educational gatherings which developed into the largest conventions in Canada.

The first x-ray symposium was held in the City of Hamilton, ON, in the spring of 1952, followed by Niagara Falls, Windsor and Ottawa before moving to Northern Ontario summer resorts. Eventually, Verne Thompson (CMCC 1954) switched the locations to exotic spots in the Caribbean and Europe. Most of the early keynote speakers, including Joseph Janse (National CC 1937), Earl Rich (Lincoln CC 1942) and F.H. Baier (Logan CC), came from American colleges. They were ably assisted by CMCC faculty; Don MacMillan, Colin Greenshields and Rudy Muller (Lincoln 1937), who had CCCR Diplomate status, recognized by the Canadian Chiropractic Association (CCA).¹⁰

A prime objective was to get chiropractic x-rays accepted by the Worker's Compensation Board (WCB). The CCCR, with input from the OCA, prepared a brief. December 17, 1952, Colin, Don MacMillan and the OCA's WCB liaison, James W. Ellison (National CC 1941), held



Figure 6 *Harold Beasley*

a meeting with the WCB that produced a change in their regulations. "On and after May 1, 1953, the WCB Board will accept medical type diagnostic x-rays from Doctors of Chiropractic under the same conditions and schedule of fees as it does from a Medical Doctor...this does not cover full spine films, postural or structural studies ... It covers good quality films of the immediate area of injury only, to be submitted together with a written report of findings."¹¹ Chiropractors began sending x-rays to the WCB and in a couple of months their Board requested a second meeting with our representatives because many of these films and reports were unacceptable. Our profession was told to meet the standards or lose the right to submit films to the WCB. Fortunately we chose to meet the standards.

In the late 1950s, radiation protection in facilities with x-ray installations became a hot political issue and the CCCR stepped in to safeguard the Ontario profession. Aware that the Federal Government had a monitoring service, the CCCR offered its members a one month free trial of film badges, to determine the safety of technicians and staff, plus a control badge for the darkroom. At the end of the month, the badges were sent to Ottawa for evaluation. This was a quality service which would eventually become mandatory.

The CCCR's supply centre opened in Toronto in 1958. Called the Canadian Chiropractic Supply Division (CCSD), it provided chiropractors with x-ray and office supplies. It prospered and soon moved to Kitchener. In the 1960s the College started its own supply centre and bookstore. By 1970, the two had joined hands, with CMCC receiving the profits from both organizations. This was an unhappy marriage ending in divorce, although another joint CCCR/CMCC venture, the establishment of a Canadian Fellowship program in Chiropractic Roentgenology, blossomed and survived.

The CCCR served us well for 40 years and was assimilated by the CCA in 1992.

The Drugless Practitioners Act

Prior to 1925 there was no effective regulation of chiropractic in Ontario. In 1925, umbrella legislation was passed under the Drugless Practitioners Act (DPA), and a Board of Regents was appointed by the Lieutenant Governor in Council, with jurisdiction over chiropractors, osteopaths, drugless therapists, masseurs and chiropodists.¹² In 1944 the DPA was revised and major and minor categories created. Chiropractors, osteopaths and drugless therapists were in the major category and each had two members. Masseurs and Physiotherapists had one member between them.

In 1952 chiropractors got new legislation when the Ontario Government removed the Board of Regents from the DPA and installed separate boards for the various drugless disciplines. This gave chiropractors their first independent regulatory board but the five members of the Board of Directors of Chiropractic (BDC) remained political appointments, the DPA regulations were unchanged, and the chiropractors resented having little control over their destiny.¹³ At their 1952 annual meeting, this dissatisfaction erupted, causing the OCA to appoint a Legislation Com-

mittee to investigate all matters pertaining to obtaining a satisfactory act. Hal Beasley was chair and Colin his assistant.

During 1954–57, Hal and Colin met over 200 times, developing a bound, 129 page report containing a complete review of all chiropractic legislation in North America, and recommendations for a new act in Ontario. “In August 1957 the OCA held an all-day meeting in Toronto ... Beasley and Greenshields spent the day presenting the full report in detail, discussing the facts, the reasonings and the recommendations.”¹² This document formed the basis for subsequent representations. In 1957 the BDC instructed “Drs. Beasley and Greenshields to draft a new chiropractic act, with regulations, and present it to the Minister of Health.”¹² “The Minister declined to meet with the Board to discuss any new legislation and the proposal seemed to drop out of sight. However, the subject would surface unexpectedly later, but we had no way of knowing where or when.”¹⁴

In 1974 the political climate changed when the first six parts of the Health Disciplines Act (HDA), covering dentistry, medicine, nursing and optometry were passed into law. The Ministry of Health (MOH) struck a committee to make recommendations for professions not yet included; specifically chiropractors, optometrists, chiropodists and osteopaths. In 1975 a Chiropractic Liaison group consisting of BDC, OCA and CMCC representatives, was established to meet with senior MOH officials to discuss the chiropractic part of the Act. Negotiations were difficult, complex and protracted. The Regulated Health Professions Act (RHPA) containing the new Chiropractic Act, did not receive Royal Assent until November 25, 1991.¹⁵ On December 31, 1993 the RHPA was proclaimed and the College of Chiropractors of Ontario (CCO), which replaced the BDC, held its first meeting March 26, 1994 (see Figure 7).¹²

December 1991, the OCA celebrated the new Chiropractic Act and paid tribute to some of those who played major roles in winning this battle. Eight CMCC graduates received special acclaim. They were: Robert Wingfield, Lloyd MacDougall, Helen Beasley, (Harold's widow), Colin Greenshields, Donald Sutherland, Leo Rosenberg, Frederick Barnes and Lloyd Taylor.

Colin and the CMCC Board of Management

In the spring of 1957, Colin reluctantly joined the Col-



Figure 7 Dec '91, Wingfield, MacDougall, Greenshields, Sutherland, Rosenberg, Barnes & Taylor, celebrate the RHPA receiving Royal Assent

lege Board. Frederick Clubine (CMCC 1949) was Chairman of the Board and President of CMCC. Herbert Lee (National CC 1941), was Secretary-Treasurer, and A. Earl Homewood (Western States CC 1942), Academic and Administrative Dean. Colin remembers pressing issues to be “student unrest, an ill-prepared and poorly paid faculty, financial difficulties, inadequate facilities and, disillusioned, non-supportive field practitioners.” Colin made numerous motions to rectify certain matters but was always outvoted. By March 1958, when he replaced Dr. Clubine as Board Chair, “nothing had been done” to address these problems.

Colin's first move was to convince the Board to appoint Harold Beasley as Director of Education; in effect thwarting Homewood's authority. “Homewood objected strenuously but agreed to respect the Board's directives.” Although busy with the BDC, Beasley came to the College once or twice a week, gently guiding the faculty. By December 1958, Beasley and Homewood were interacting amicably, “the faculty was punctual, attendance records accurate, lectures up to expected standards and course outlines available for every subject.” Beasley considered his job complete and resigned his post in March 1959.

Colin's second goal was to handle CMCC's need to expand its physical facilities. One idea was to add floors to the buildings on Bloor Street. This was not feasible

due to structural limitations of the Henderson Building and the Meadonia Hotel. Another thought was to sell the Bloor Street property and move elsewhere; "something we could not afford." Finally Colin contacted Commercial Leaseholds Ltd. of Hamilton. This company was constructing commercial and industrial buildings and leasing them out. It made a rough offer to take over and dismantle the property on Bloor Street and construct an office building of about eight floors. The ground floor would house a bank or insurance company with offices located on the floors above and the top floors reserved for CMCC. The College would lease the facilities for 20 years at which time all these assets would be returned to CMCC, debt free. The entire CCA Board dealt with this scheme at its annual meeting, March 1959, "where it decided that the profession was in no position to venture this far out, and the idea died." Between August 1957 and February 1959, the College purchased three homes on Prince Arthur Avenue, which backed onto its existing property. By April 1959, CMCC had devised elaborate plans for developing its holdings. These comprised: building a physical education plant abutting the Henderson Building; and replacing the Meadonia Hotel with a high rise office building. "On April 30, 1959, the College was advised that the City was expropriating a strip of land 82 ft wide running east and west through the central portion of its property ..." ¹⁶ This dashed all hopes of expansion for eight years (see Figure 8).

Colin was re-elected to the CMCC Board in March 1959 and announced that he was not running for Chair or President. Instead, he recommended that Homewood be nominated for both positions. This controversial proposition was ratified by the Board and accepted by Homewood with the proviso that Colin would stand for Vice-President and serve alongside him. Colin believed Homewood was "capable of doing the job," and making him President, Chair and Dean, would eliminate "much of the present friction."

Colin stepped down from the CMCC Board at the end of 1959. Dr. Homewood resigned from the College in August 1961 but returned in the summer of 1966 to raise funds. "Between December 1966 and April 1977, he sold \$250,000 in debentures bearing interest at 7% per annum, to the chiropractic profession across Canada. This money was used to help pay off a \$500,000 mortgage at 12% interest." ¹⁷



Figure 8 Proposed new CMCC Bloor St. facility, c. 1960

OHIP

June 1961 the Canadian Government established the Royal Commission on Health Services, headed by Chief Justice Emmett Hall, of the Superior Court of Saskatchewan. That summer, the Commission held organizational meetings in Ottawa to establish ground rules for its activities and invited members of the health professions to appear before it, expressing their opinions and desires. Harold Beasley and Colin were the only chiropractors who attended, delivering preliminary information on behalf of the BDC, stating chiropractors were willing to cooperate and wished to be part of any national plan. These introductory meetings were followed by hearings in the capitals of each province across Canada. Harold and Colin prepared a brief for the BDC and another all encompassing document for the Canadian profession. Dr. Sutherland was largely responsible for the CCA and OCA briefs, while each of the other provinces drafted their own. Harold and Colin also represented the BDC at final rebuttal sessions in Ottawa.

In 1964 the Ontario Medical Services Insurance Committee conducted an Inquiry under the chairmanship of Dr. J.G. Hagey, President of the University of Waterloo. While similar to the Hall Commission, it tried to keep the investigation within provincial guidelines. Hal and Colin presented and defended a suitable brief at one of the hearings.

Figure 9 Colin's 80th birthday – Son Christopher on his right & Duncan on his left



1969–70, chiropractors began a letter writing campaign for inclusion in OHSIP (now OHIP). Niagara region doctors had their patients sign petitions and write letters to their members of Parliament. In St. Catharines, they collected over 2,000 signatures. Colin took them to Robert Welch, MPP, the Deputy Premier of Ontario, who looked at the list and was surprised to find his father's name there. Colin feels that Robert Welch had as much to do with our entry into OHIP, July 1, 1970, as Tom Wells, MPP, and prominent chiropractors like Lloyd MacDougall and Lloyd Taylor. "In other words, it was a team effort."

CMCC Accreditation

In 1978 the CCA formed and sponsored an independent accrediting agency called the Council on Chiropractic Education (Canada) Inc.¹⁸ Thomas D. Maxwell (CMCC 1955), President of CCE (C), appointed Colin to its evaluation team in 1979 and the following year he and Leonard J. Faye (CMCC 1960), were sent for training to California, as observers on the CCE USA inspection

team that was examining the Los Angeles College of Chiropractic.

Colin was the only Canadian member of the visitation team that examined CMCC for CCE(C) November 16-18, 1981. The team's report acknowledged that "This college has developed creditable programs with successful graduates practicing throughout the world – in spite of almost overwhelming obstacles," while cautioning that, "a great need exists to complete improvements now underway, as well as those planned."¹⁹ CMCC obtained Recognized Candidate for Accreditation Status in March 1982, but did not achieve full Accredited Status from the CCE(C) Commission on Accreditation, until November 22, 1986. Colin had resigned from CCE(C) in January 1985.

Retirement

Colin left the CMCC Board in 1959 and private practice in 1986, yet his thoughts and deeds remain intimately tied to his profession and this College. For example, in the 1970s Colin was pleased to provide the CMCC student body with a complimentary, two day, "Weekend with the

Figure 10 Anchor Pointe Retirement Home, St. Catharines, ON



Palmer's" seminar, which was well attended and gratefully received. Twenty years later (September 16, 1997) Colin was still helping. That day he delivered a two hour lecture on the research of BJ Palmer and its current applications.²⁰

In 1996, Colin celebrated his 50th anniversary as a chiropractor. At a luncheon in the Palmer Mansion of the PCC, he accepted a medal, for "50 Years of Service to Chiropractic and Humanity." Colin responded with gracious remarks about his education at Palmer and CMCC, noting that when he first attended CMCC in 1946, "innate was a dirty word that I dared not mention."²¹ During his career Colin received a dozen awards including the prestigious OCA Chiropractor of the Year and Life Memberships in CMCC, the CCA and the NDCS (see Figure 9).

September 2000, Colin's sons, Duncan and Christopher, organized his belated 80th birthday party. One hundred and seventy-five colleagues, friends and patients attended this celebration in the Niagara Suites Hotel, Thorold, ON. One highlight of the event was the announcement of an Annual CMCC Colin A. Greenshields Award. This bur-

sary, presented in Colin's name, goes "to a student in financial need, who has completed Year I and demonstrates a high degree of commitment to the chiropractic profession and a dedication to the needs of others."

Colin himself fits these criteria, particularly in regard to CMCC, where he has been a dues paying member since 1948, and a generous contributor to the College's fund raising ventures, including the Capital Campaign, to pay for our Leslie Street campus.

In 2000, Colin's eyesight started to deteriorate and he had to stop driving. In 2002 he moved to the Anchor Pointe Residence in St. Catharines, where he celebrated his 91st birthday on July 19, 2011. Dr. Greenshields is now legally blind and sees only shadows, yet his step is firm, his hearing acute, his memory remarkable and his spirits high (see Figure 10).

Acknowledgement

This paper was made possible through the cooperation and participation of Dr. Colin Greenshields and his two

sons, Duncan and Christopher. Much of the information comes from a series of interviews with Dr. Greenshields, conducted by the author from January 11 through February 11, 2010.

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Therapeutic Electrophysical Agents, Evidence Behind Practice. Second Edition.

Alain-Yvan Belanger

Lippincott Williams & Williams, Baltimore, Maryland, 2010

Hardcover, 504 pages \$76.90 (CDN)

ISBN: 0-7817-7001-7

Despite the widespread use of therapeutic modalities, many studies have cited the paucity of quality research supporting their use. This text uses an evidence-based approach to guide the practitioner's use of these agents illustrating how to integrate research into practice. The new textbook format – though less portable than the previous pocket-size edition – allows for more information and photographs to be included. It is a well-organized reference text designed to be used in an educational setting with clear learning objectives outlined at the beginning of each chapter and critical thinking questions at the end.

The first part reviews how tissue injury, the healing process and pain modulation dictate the selection of therapeutic agents. The second part clearly outlines the physiological effects of each modality, describing the indications, treatment parameters, contraindications and risk factors. Each modality is afforded a separate chapter with case studies utilized to walk the reader through an evidence-based approach to resolution of a clinical problem. The final part of the text consists of practical guidelines including information on purchasing units, avoidance of complications and maintenance of devices.

While it may be argued that a text that is research-dependent is outdated soon after publication, this book is nonetheless a valuable reference tool. It presents the strength of evidence and justification for usage of each modality and illustrates how this information should be combined with experience to facilitate clinical decision-making.

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Netter's Sports Medicine

Eds – Christopher C Madden, Margot Putukian,

Craig C. Young, Eric McCarty

© 2010 by Saunders, an imprint of Elsevier Inc., 800pp.,

CAN \$125.00, Hardcover

ISBN: 978-1-4160-4922-7

This book is based on the book “The Team Physician's Handbook,” but includes more appropriate best practice suggestions based on more recent research and advances in treatment strategies. Geared towards the sport clinician, Netter's Sports Medicine deals with the roles, ethics and responsibilities when dealing with a sports team.

The most unique feature of this book is found in Section VIII, which has chapters to separate specific sports. Current research and statistics are reported about the incidence and type of injuries, commonly involved in each sport. At the end of each chapter, a list is featured of recommended readings for further education about that particular sport. This section is an outstanding source of information for the sport clinician, wanting to know the basic premise, and biomechanics for different sports.

Being a book in the Netter Collection, this textbook includes many of the famous illustrations and anatomical diagrams from Dr. Frank Netter, which are well known in the rehabilitation world. Various radiographic photographs are also plentiful in this textbook, allowing the reader to gain a further understanding of specific injuries.

This book could be used as a quick reference guide to any athletic situation, however it could be argued that the book contains too much information is is difficult to locate the information necessary. The book is very meticulously organized though, using colour coding, a detailed index and thorough headings throughout the text. The reader is guaranteed to learn something new each time this book is opened.

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Conservative Management of Sports Injuries.
Second Edition.

Edited by Thomas E. Hyde, Marianne S. Gengenbach
Jones and Bartlett Publishers, Sudbury,
Massachusetts, 2007
Lippincott Williams & Williams, Baltimore,
Maryland, 2010
Hardcover, 1173 pages \$170.50 (CDN)
ISBN: 0-7637-3252-4

This text is a review of sports injuries and their management using conservative methods. It is edited, and authored by numerous contributors, primarily chiropractors. It is divided into four sections beginning with a review of the basic concepts of sports injuries and rehabilitation. I particularly enjoyed reading about the role of joint manipulation and soft-tissue techniques; topics which are all too often omitted from similar texts. The second section takes a systems approach to sports injuries explaining the relevant anatomy, mechanics of injuries, evaluation of injuries and rehabilitation approaches. The third section outlines the special considerations that should be afforded to the female, young, senior and extreme athlete. The final section consists of chapters on diagnostic imaging, nutrition and performance-enhancing drugs.

The text is designed around a site-specific approach to sports injuries drawing upon the expertise of its multiple contributors. While this format is largely effective, it is at times detrimental to the organization of the text. For example, separate chapters on conservative rehabilitation of injuries, manipulation and diagnostic imaging would have been better integrated into the main body of the text. Also, rather than listing all the conservative treatment options available to the practitioner, every injury or system could have included recommendations on how each method could be applied to it.

Despite these minor limitations, this is a well-referenced review of sports injuries and their management. Both sports chiropractors and those treating “weekend-warriors” will find many practical applications to the information contained within it.

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The Science and Clinical Application of Manual Therapy
Hollis H. King, Wilfred Janig, Michael M. Patterson,
editors
Churchill Livingston Elsevier publication, 2011
ISBN: 978-0-7020-3387-2

This hard-cover publication is based on the International Research Symposium on ‘Somato-Visceral Interaction and Autonomic Mechanism of Manual Therapy’ held in 2008 in Fort Worth, Texas. The text then covers the current state of knowledge of the effects of somatic stimulation of manual therapy on visceral and autonomic functions at all levels of the neuraxis.

The editors brought together an impressive cadre of clinicians and scientist from the fields of osteopathic medicine, chiropractic, massage therapy, physical therapy as well as scientists from laboratories around the world. Reading the list of contributors inspires one to read what the latest scientific evidence is in somato-visceral interactions.

The book is divided into four sections, and chapters within each section cover a wide range of exciting and up to date research results and clinical pearl on management strategies. This is an invaluable text for all students and practitioners of manual therapies as it provides the prevailing theories on how manual therapies influence the physiological interactions of health and various disorders. Furthermore, it provides directions in the search for the scientific underpinnings of the obvious clinical successes of the various forms of manual therapies.

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Movement: Functional Movement Systems: Screening, Assessment, and Corrective Strategies
Gray Cook
On Target Publications, Santa Cruz, California, U.S.A.
2010
Hardcover, 407pp, Regular Price \$68.98 (Canadian)
ISBN: 978-1-931046-72-5

Movement describes a system of screening, assessment and correction that is applicable to the entire field of health and fitness professionals. The first section discusses why movement screens are necessary and outlines problems with the current diagnostic systems used within musculoskeletal care. Great care is given to describing when movement screening is appropriate and when it should be modified or omitted completely. The second section details the Functional Movement Screen (FMS) and the Selective Functional Movement Assessment (SFMA). Common mistakes are discussed and instruction is given on seamless integration into daily practice. Both systems are accompanied by clear pictures, a companion website and an appendix full of resources. The final section delves into managing the results of the FMS and SFMA with corrective exercise. However, this is not a 'cookbook recipe' and only the principles and methods of corrective exercise are detailed. *Movement* is often repetitive, is selectively referenced. Overall, *Movement* is an excellent education on the basic tenets of human movement as well as a description of how to screen and correct dysfunctional patterns. A must read for those who have learned the basics of physical examination and rehabilitation protocols and are looking to take their clinical skills to the next level.

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CMCC Sport Science Resident

Assessment and Treatment of Muscle Imbalance: The Janda Approach
Page P, Frank C, Lardner R
Human Kinetics, Windsor, Ontario, Canada 2009
Hardcover, 314pp, Regular Price \$67.33 (Canadian)
ISBN: 978-0-7360-7400-1

A resource describing the theories and practices of the late Dr. Vladimir Janda was lacking until three of his disciples came together to fill this void and provide a look at the man who helped develop the ideas of muscle imbalance and sensorimotor training. The descriptions of physical examination and treatment provide cursory overviews of many tests and treatment techniques that are not detailed enough for new students of manual therapy to fully grasp, but work as an overview for more experienced practitioners. Janda's own movement pattern examinations are included, but the authors do a poor job of describing their execution and implementation. Diagrams, illustrations and charts are used extensively to help summarize key information in a succinct manner. The text is well referenced, but they are all in-text, and many sections include more references than information. The authors have done a commendable job of summarizing Dr. Janda's work into an accessible, easy to read text. It is most useful for students who have basic practical and theoretical background knowledge in manual therapy, and practitioners looking for more information on Janda's theories. Overall, it is a good evidence-based look into the mind of one of the most well-respected physical therapists of our time.

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Essential Radiology for Sports Medicine

P Robinson (Ed.), 1st Edition, 2010, 256pp, CAN \$250.00, Hardcover, New York, New York, Springer, ISBN: 978-1-4419-5972-0.

Essential Radiology for Sports Medicine provides an in depth understanding of advanced imaging as it pertains to the musculoskeletal system for sports practitioners. While this text is intended for the radiologist, sports clinician, or respective residents it is an exceptional resource for any sports practitioner aiming to improve their ability at interpreting special imaging in the athletic population.

The text consists of eleven chapters including topics such as knee, hip, pelvis, ankle and foot injuries, osseous stress injuries, shoulder, elbow, hand, and wrist injuries, postoperative imaging in sports medicine, muscle injury and complications, sports-related disorders of the spine and sacrum, and ultrasound-guided sports intervention. Internationally recognized musculoskeletal experts have contributed to this text. It contains 387 images, 24 in colour, with emphasis on MRI, CT, and Ultrasound, permitting easy comprehension of material. Each chapter is well supported by up to date research and referenced appropriately.

Although costly, this text exceeds my expectation as a concise guide to advanced imaging due to significant detail. I recommend Essential Radiology for Sports Medicine for any sports practitioner interested in understanding the anatomy, pathological processes, and advanced imaging related to sports injury formation and to any sports practitioner interested in enhancing their complete understanding of advanced imaging.

Michelle A. Laframboise, BKin (Hons), DC

Clinical Sports Nutrition 4th Ed.

*Louise Burke, Vicki Deakin
McGraw Hill, North Ryde Australia
735pp
144.95 CAD
ISBN: 9780070277205*

The fourth edition of Clinical Sports Nutrition is written by Louise Burke, the head of the department of Sports Nutrition for the Australian Institute of Sport, and by Vicki Deakin, senior lecturer and head of Nutrition and Dietetics at the University of Canberra. Contributions have also been made by leading sports dieticians, physicians, and academics. The text is written for students interested in a career in sports nutrition, as well as professionals in sports nutrition and medicine.

New additions to the fourth edition include chapters on exercise and the immune system, antioxidants and the athlete, food services for athletes and nutrition for travel. Updated position statements by the ACSM and IOC have been included. No information on nutrition and athletic injuries is provided.

The text is written in language that is very readable for anyone with a background in the subject matter and does an excellent job of summarizing the raw science without burdening the reader with too much detail. Where further detail may be warranted, references are provided for the reader to guide them to appropriate literature to delve deeper into a given topic.

The main strengths of this text are its readability and the wide range of topics within sports nutrition that it covers. Future editions should include information regarding nutrition for the injured athlete and more visually appealing images.

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Re: Clinical effectiveness of the activator adjusting instrument in the management of musculoskeletal disorders: a systematic review of the literature. JCCA 2012; 56(1):49–57.

To the Editor:

We read with great interest, the systematic review by Huggins et al.¹ in the previous issue of the JCCA. In their review, the authors conclude that there is benefit to the use of the Activator Adjusting Instrument (AAI) for patients with spinal pain and trigger points. Unfortunately, we feel that this conclusion holds little value to the reader, as the authors do not provide the context within which use of the AAI is beneficial. We assert that a clinical tool, such as the AAI, may not be of much benefit unless its action is directed with the correct clinical intent. As such, clinical outcomes could differ greatly depending on whether or not the AAI was used purely for instrument-assisted adjusting (i.e., the use of an activator to impart a chiropractic adjustment), or used as part of Activator Methods Chiropractic Technique (AMCT), a technique system that involves a group of specialized diagnostic procedures while assessing patient leg length in the prone position. The lack of context provided in their conclusion is surprising, as in their introduction, the authors do an excellent job of differentiating these notably different approaches to use of the AAI.

The authors correctly note in their introduction that it is difficult to make a distinction in the existing social-science literature between instrument-assisted adjusting and AMCT. In fact, they cite the 2005 National Board of Chiropractic Examiner's Job Analysis, which reported that 51% of American chiropractors have used 'activator', but which failed to distinguish the approach with which the 'activator' was used.² Furthermore, it has often been reported in peer-reviewed studies that over 1/3 of North American chiropractors use 'activator' on a regular basis^{3,4}, however, none of these studies made a distinction between use of an 'activator' for instrument-assisted adjusting vs. the use of AMCT. Although the authors of this review¹ have uncovered this flaw in the existing social-science literature, they too have neglected to adequately make this distinction in the conclusions of their own clinical-outcome-based systematic review. The authors mention both AAI and AMCT in their statement of objectives,

but then seem to present a discussion with regard only to instrument-assisted adjusting and a conclusion that presumably blends the outcomes from studies using these two diverse approaches. Eight clinical studies that used the AAI are included in their review, but the authors neglect to differentiate which investigated instrument-assisted adjusting vs. those that investigated AMCT. In fact, the authors do not differentiate in any way, their findings with respect to the clinical efficacy of AAI for AMCT vs. AAI for instrument-assisted adjusting. Thus, we ask, was any clinical research found that investigated the use of AAI with AMCT for the treatment of any condition? Or, does the existing research only support the use of the AAI as a tool for instrument-assisted adjusting, in the absence of AMCT protocols?

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To the Editor in reply:

Thank you for the opportunity to reply to the Letter to the Editor by Puhl and Reinhart. As we read it, the authors have two main areas of concern with respect to our article that reviewed the clinical effectiveness of the activator adjusting instrument (AAI).¹ These concerns can be distilled down to: (i) lack of discussion of the 'clinical intent' of the use of the AAI and; (ii) lack of discussion of the clinical effectiveness of Activator Methods Chiropractic Technique (AMCT) versus use of AAI.

With respect to the first issue, we assert the clinical intent of the practitioner was irrelevant. Nelson et al² have opined that what differentiates the chiropractic profession from other professions is that chiropractors focus on the beliefs or values of the practitioner; elsewhere, Coopers-stein and Gleberzon³ have suggested this is synonymous with differences in worldviews. Examples of differing clinical intents or worldviews include subluxation-based, functional-based, structural-based, pain-based, wellness-based and tonal-based. For the purposes of our study, however, the ideology of the practitioner was of no concern to us. This is because we were focusing on the clinical *effectiveness* of AAI treatments, not the purported 'philosophical' benefits envisioned by the operator.

It is possible that we misinterpreted this concern, and Puhl and Reinhart are referring to the determination of the clinical target by the practitioner. If so, perhaps a reiteration of our study's conclusion is in order. Of the 8 clinical trials we reviewed that met our inclusion criteria, the only clinical intent of the practitioners that concerned us was whether or not clinically meaningful results were achieved for various diagnosed conditions when either an AAI was used or when its use was compared to the use of another treatment method. The main outcomes measured by the investigators of these 8 clinical trials range from pain to range of motion to general disability. Overall, use of the AAI resulted in similarly beneficial results when used by itself or when compared to other therapies among patient with acute or chronic low back or sacro-iliac joint pain, dysfunction of the TMJ or trigger points of the trapezius muscle.

Moreover, it was not our concern if the practitioner used the AAI at the site of pain or if it was used at a site distant from it. Our concern was reviewing the literature with respect to clinical effectiveness achieved using the

AAI, regardless of how the clinical target was determined. This is not unlike many clinical trials investigating the effectiveness of interventions such as spinal manipulative therapy (SMT) for spinal pain. Typically, therapists in those kinds of studies are allowed to deliver SMT in whatever manner they choose (perhaps the only restriction is to have the patient positioned prone or side-lying) and the practitioner is often entitled to identify the site of care using whatever method they use in private practice (static palpation, motion palpation, joint play and so on). In these types of studies, the focus of investigation is the method of treatment for spinal pain, not how the site of care was determined nor the clinical intent the practitioner hoped to achieve by the intervention.

Along that train of thought, with respect to the concern that we did not differentiate the clinical effectiveness between AAI and AMCT, again we assert this was not necessary for the purpose our study. The purpose of the study was to review clinical trials that used the AAI. At times, these clinical trials were conducted by practitioners who substituted manual adjusting using the AAI and at other times the clinical trials were conducted by practitioners incorporating the diagnostic protocols of AMCT, which involve the isolation, stress and pressure tests to identify the putative 'pelvic deficient leg.'⁴ It was not our concern how the chiropractor identified the clinical target. It was our concern that they used the AAI as the method of treatment. It is for this reason we discussed that some of the clinical trials involved AMCT, since that is the only technique system that advocates the exclusive use of the AAI; however, AMCT, as a technique system, was not itself the focus of our study.

Looked at another way, our study concerned itself with the treatment side of the clinical encounter, not the diagnostic side. In order to accomplish this goal, it was necessary to search both the AAI and AMCT literature. Our study did not explore the validity or reliability of the diagnostic tests used by AMCT and it would have therefore been inappropriate – and gone beyond our dataset – to comment on them.

That said, we can inform Puhl and Reinhart that a study that assessed the reliability and validity of all diagnostic inputs used by chiropractors (including the diagnostic tests of AMCT) used to identify the site of care has recently been completed by a team of investigators. This manuscript is being prepared for journal submission and

one of the authors of that study (Gleberzon) anticipates publication of it by the end of 2012.

Respectfully submitted,

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Ana Lubric Boras, BA, DC

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