

Vertebral artery dissection from neck flexion during paroxysmal coughing

Herr R, Call G, Banks D. *Ann Emerg Med* 1992; 21:88-91.

Vertebral artery dissection has a characteristic presentation that should be considered when symptoms are preceded by any trauma that causes neck movement. We present the case of a man with vertebral artery dissection following severe coughing that presented as a posteroinferior cerebellar artery territory stroke. The patient was anticoagulated, and his neurologic deficits were partially resolved. The mechanism and presentation of vertebral artery dissection are discussed with an emphasis on early detection. (Herr RD, Call G, Banks D: Vertebral artery dissection from neck flexion during paroxysmal coughing.)

Transcranial magnetic stimulation for detection of preclinical cervical spondylotic myelopathy

Travlos A, Pant B, Eisen A. *Arch Phys Med Rehab* 1992; 73:442-446.

Twenty-three patients, mean age 50.4 years, with cervical radiculopathy at C7 or more rostrally, were studied with electromyography, CT scans (in 16 cases) and transcranial magnetic stimulation. None had overt evidence of myelopathy. Motor evoked potentials (MEPs) were recorded from the hand muscles (C8/T1), and latency, amplitude, and the MEP/CMAP ratio and central motor delay between the hand motor cortex and the lower cervical spine were measured. One or more of these were abnormal in 15 of 23 cases (65%). The most common abnormality was a reduced MEP/CMAP ratio. The findings indicate that physiologic dysfunction of the spinal cord, caudal to a radiculopathy, frequently accompanies a radiculopathy and may antedate overt cervical spondylotic myelopathy. This may be valuable in directing more timely surgical intervention.

Medico-legal aspects of manipulatory treatment in Denmark

Dalgaard JB. *Manuelle Medizin* 1992; 30:30-34.

Three medico-legal systems are briefly outlined: the Central European (continental) system (connected with universities), British Coroner's system, and the American medical examiner's system. The structure and functions of the Danish (continental) system is described. It is based on three medico-legal university institutes, which work mainly with the state health officers and the police. This system will handle all fatal cases of medical complications, including any resulting from manipulation. Non-fatal cases are handled by the health officer, the Patient Complaint Council and the state health service. The differences between legal and civil responsibility is outlined and the old Roman concept of "culpa" is mentioned. In Denmark the Medico-legal Council will play an important role in both fatal and non-fatal cases of medical complications. Two fatal complications of manipulatory treatment are reported. One of these was in a 61-year-old man with prostatic metastases to the spine, who sustained a fracture of C-6 during manipulatory stretching by a physiotherapist. The second concerned a

6-week-old child manipulated by a chiropractor for alleged children's colic; a fatal hemorrhage ensued in the spinal cord and membranes. The court trials are reported.

Lumbar facet joint asymmetry

Cassidy JD, Loback D, Yong-Hing K, Tchang S. *Spine* 1992; 17(5):570-574.

A study of 136 patients with lumbar intervertebral disc herniation was undertaken to test the hypothesis that asymmetry of the facet joints is associated with the level, type, and side of herniation. Fifty cases of central herniation and 86 cases of lateral herniation, all at the L4-5 or L5-S1 levels, were studied by computed tomographic scans. Adjacent (nonherniated) levels were used as controls. The facet joint angles were measured at the L4-5 and L5-S1 levels of the control, central, and lateral herniated levels. The results showed a similar degree of facet joint asymmetry at all levels. In cases of lateral herniation, there was a significant difference in the facet angle between the herniated and nonherniated side at the L5-S1 level, but not the L4-5 level. The mean difference, however, was less than 3° and not considered to be clinically relevant. There was no difference in the distribution of the more coronally or sagittally facing facet joints with respect to the side of lateral herniation. These results do not support the hypothesis that facet asymmetry is associated with lumbar intervertebral disc herniation.

Transient global amnesia after cerebral angiography with iohexol

Juni J, Morera J, Laines J, Escudero J, Ferrer C, Sancho J. *Neuroradiology* 1992; 34:141-143.

We describe a patient without a previous history of migraine or epilepsy and with no known vascular risk factors, who suffered subarachnoid haemorrhage. During vertebral angiography using nonionic contrast medium (iohexol), spasm of the basilar artery was seen. The patient suffered transient global amnesia. Angiography 3 months later with the same contrast medium was normal and produced no further deficit. This case lends support to the supposed ischaemic aetiology of transient global amnesia; in patients without other evidence of cerebrovascular disease, arterial spasm may be responsible.

Trampolines revisited: a review of 114 pediatric recreational trampoline injuries

Woodward G, Furnival R, Schunk J. *Pediatrics* 1992; 89:849-854.

A search of the medical literature failed to reveal any articles that discuss pediatric injuries acquired on privately owned recreational trampolines. This study was undertaken to quantify and qualify pediatric injuries from recreational trampoline use. A group of 114 patients who presented to the Emergency Department at Primary Children's Medical Center in Salt Lake City, Utah, with injuries directly related to use of a trampoline are discussed. There was a 1.2:1

male-female ratio. The average age was 8.0 years. Forty-eight percent of the patients were injured on their family's trampoline, with the remainder injured on a friend's, neighbor's, relative's, or gymnasium's equipment. The majority of injuries involved group use of the trampoline and the youngest person in a group was most often the injured participant. Extremity injuries were seen in 55% of the patient and head or neck injuries in 37%. Seventy-five percent of the patients required radiographs, 23% hospitalization, and 17% operative intervention. The history of the trampoline and medical literature discussions concerning injuries and safety are reviewed.

The use of instant moire photographs to reduce exposure from scoliosis radiographs

Denton T, Randall F, Deinlein D. *Spine* 1992; 17(5):509-512.

A total of 258 patients with some degree of idiopathic scoliosis was monitored with both radiographs and moire photography to determine the degree of progression of spinal curvature. The use of polaroid photography to document moire patterns proved to be a rapid and useful process for placing an instant photographic record in patients charts while conducting routine physical examinations. Standardization of procedures for making and evaluating moire photographs reduced patient exposure to x-rays.

Scoliosis Research Society Multicenter spine fracture study

Gertzbein S. *Spine* 1992; 17(5):528-540.

This study consisted of 1,019 spinal fracture patients followed prospectively for 2 years. Sixty-four physicians from 12 countries participated. The purpose of the study was to determine: 1) the relationship between neurologic deficit and fracture type, level, and spinal canal compromise; 2) the neurologic outcome comparing surgical versus non-surgical treatment and anterior versus posterior surgery; and 3) the relationship of pain to both kyphotic deformity and to surgical and nonsurgical treatment. The main findings of this study are as follows: 1) seat belts reduced the incidence of severe neurologic injury; 2) there was a higher incidence of neurologic deficit with fracture - dislocations and a higher incidence of neurologically intact patients with compression and flexion - distraction injuries; 3) there was a greater incidence of complete neurologic deficits caused by fractures at the spinal cord level, and a diminished incidence at the cauda equina level; 4) for burst fractures there was a weakly positive relationship between canal compromise and neurologic deficit, including bladder function; 5) surgical intervention led to a greater percentage of improved neurologic function than nonoperative treatment, but the rate of improvement was not statistically different; 6) anterior surgery was not more effective than posterior surgery in improving the neurologic function when function was assessed using the Frankel or Motor Index scales, but it was statistically significant when compared to the Manabe scale; 7) in patients who deteriorated before surgery and underwent surgery, there was a greater improvement neurologically, particularly for anterior

surgery, compared to those patients treated nonoperatively or to the overall surgically treated group; 8) there was a statistically significant relationship between bladder function and fracture type, with an increased incidence of absent function seen with fracture - dislocations, of impaired function with burst fractures, and of intact bladder function with compression and flexion - distraction injuries; 9) anterior surgery was more beneficial in improving complete bladder impairment to partial impairment compared to posterior surgery; 10) a kyphotic deformity of greater than 30° at 2-year follow-up was associated with an increased incidence of significant back pain; 11) patients who had surgery complained less of severe pain than those who were treated without surgery.

Neurolysis of the greater occipital nerve in cervicogenic headache: a follow-up study

Bovin G, Fredriksen T, Stolt A, Sjaastad O. *Headache* 1992; 32:175-179.

Entrapment of the greater occipital nerve (GON) in its peripheral course has been thought to be of possible pathogenic significance in cervicogenic headache. We have performed a "liberation" operation ("neurolysis") of the nerve in the nuchal musculature, with special attention to the trapezius insertion, and the follow-up results in 50 patients are presented. The immediate effect of the operation was quite good, but the pain gradually recurred in the majority (46/50) of the patients. Eventually, all operated patients will probably have recurrence of pain episodes. Nevertheless, most patients claim that the overall disability is less after the operation, and 40% actually want to undergo a new, identical procedure. The justification for doing a second "liberation" operation is clearly less than for a first operation. In our opinion, this operation should not be performed in patients with cervicogenic headache in general. The present study shows that other therapeutic approaches should be searched for in cervicogenic headache.

Tension headache and the cervical spine - plain x-ray findings

Wöber-Bingöl C, Wöber C, Zeiler K, Heimberger K, Baumgartner C, Samec P, Wessely P. *Cephalgia* 1992; 12:152-154.

The aim of the present study was to investigate if there is any causal connection between plain x-ray findings of the cervical spine and tension headache. We evaluated the x-rays of the cervical spine of 243 patients, in 91 of which the diagnosis was "tension headache", in 102 "headache not fulfilling the criteria of tension headache" and in 50 "spondylogenic complaints without headache". We compared these three groups with regard to frequency and severity of radiologically assessable changes of the cervical spine and found that patients with tension headache had normal findings significantly more often and significantly less often functional or organic changes or both than patients of the other two groups. The radiologically assessable changes of the cervical spine are unlikely to have an essential role in the cause or mechanism of tension headache.

The bases of low back pain

Simmonds M, Kumar S. *Neuro-Orthopedics* 1992; 13:1-14.

The complexity of the spinal structures and of pain mechanisms collectively make the problem of low back pain enigmatic. Pain is often severe and tends to persist. This paper reviews the abundant multisegmental innervation patterns of the spine, prior to a discussion of recent findings on the neurophysiological mechanisms of nociception and the consequences of injury. The activity profiles of nociceptors and wide dynamic range (WDR) neurones undergo change, following injury, or in the presence of inflammation. Thresholds decrease and spontaneous discharge activity occurs. WDR neurones develop a nociceptive function. They respond to activity in large diameter A-mechanoreceptors which leads to allodynia. In addition, Class IV joint receptors which only fire in the presence of inflammation may serve to intensify pain. A high density of Na^+ channels in the dorsal root ganglion prevents a potential conduction block due to T-cell branching but facilitates spontaneous discharge activity especially following nerve injury. Finally, the degeneration of superficial dorsal horn neurones that occurs following nerve injury is more pronounced in the presence of persistent pain but a causal relationship has not been determined at this time.

Using the Kaminski model for evaluating philosophical thought

Donahue J. *J Manipulative Physiol Ther* 1992; 15:293-298.

A model is proposed for the evaluation of philosophical thought generated within the chiropractic profession. This model is patterned after the Kaminski et al. model used to evaluate chiropractic procedures and practices. Decisions about the knowledge status of a philosophical query are made by following a flow chart. These decisions are made based on the query items' ability to be adequately defined, philosophical plausibility and survival of philosophical "testing." The query is assigned a status as to its adequacy in terms of philosophical knowledge. The model is demonstrated using example queries. Its applications are examined and problems of implementation are discussed.

The natural history of sciatica: a prospective radiological study

Cowan NC, Bush K, Katz DE, Gishen P. *Clinical Radiology* 1992; 46:7-12.

This prospective study was set up to record the changes in the intervertebral disc accompanying resolution of sciatica following conservative treatment. Patients presenting with sciatica ($n = 165$) were examined by computed tomography (CT) of the lumbar spine. Disc lesions were classified into the following groups: herniation, sequestration, generalized bulge and focal bulge. Follow-up CT of the pathological disc was performed in 106 of the 165 patients after one year and identical anatomical sections were compared. All patients were initially treated conservatively by the injection of steroid and local anaesthetic at the intervertebral disc/nerve root interface. Of 84 cases of disc herniation

and sequestration 64 (76%) showed either complete or partial resolution on follow-up CT examination. Of 22 cases with either a generalized or focal bulge of the disc 18 (82%) were unchanged on follow-up. The classical disc herniation in a young patient is the type of disc lesion most likely to show greatest improvement at follow-up.

Fibrous dysplasia of the odontoid

Francaviglia N, Arcuri T, Levene A, Crockard HA. *Neuro-Orthopedics* 1992; 13:59-65.

Fibrous dysplasia of the cervical spine is rare. Among monostotic and polystotic forms, only 11 cases of the cervical spine involvement have been described; of these only two have been treated surgically. We describe a 56 year-old man who suffered from neck pain without a significant history of trauma. The patient was treated surgically by excision and bone grafting of the cavity. A review of fibrous dysplasia is presented, along with differential diagnoses and treatment options.

The effect of spinal manipulation on pain and prostaglandin levels in women with primary dysmenorrhea

Kokjohn K, Schmid DM, Triano JJ, Brennan PC. *J Manipulative Physiol Ther* 1992; 15:279-285.

Objective: The primary objectives of this study were to compare the effect of spinal manipulation vs. sham manipulation on a) circulating plasma levels of the prostaglandin F_{2a} metabolite, 15-keto-13, 14-dihydroprostaglandin (KDPGF $_{2a}$), b) perceived abdominal and back pain and c) perceived menstrual distress in women with primary dysmenorrhea.

Design: This randomized clinical pilot study investigated the outcome measures before and after either a spinal manipulation treatment (SMT) or a sham manipulation.

Setting: All subjects were treated at the National College Chiropractic clinic, a private chiropractic clinic in the suburban Chicago area.

Participants: Forty-five women with a history of primary dysmenorrhea were recruited from the local community. The volunteers ranged in age from 20-49 (mean age = 30.3 years), and were entered into the study between April 1990 and January 1991. Twenty-four were randomly assigned to the spinal manipulation group and 21 were assigned to the sham group.

Interventions: Subjects treated with spinal manipulation were placed in a side-lying position with the bottom leg straight and the top leg flexed at the knee and hip. They received a high-velocity, short lever, low-amplitude thrust to all clinically relevant vertebral levels within T10 and L5-S1 and the sacroiliac joints. In the sham manipulation, subjects were placed in a side-lying position with both hips and knees flexed. Their manipulation consisted of a similar thrust administered to the midline base of the sacrum.

Outcome measures: Perceived abdominal and back pain were measured with a visual analog scale, and menstrual distress was measured with the Menstrual Distress Questionnaire. Both were administered 15

min before and 60 min after treatment. Blood samples were collected by venipuncture for the determination of plasma levels of KDPGF_{2a} at the same times. The plasma was then assayed for KDPGF_{2a} by radioimmunoassay.

Results: Analysis of covariance and paired Student's *t* tests were used for the statistical evaluation. Immediately after treatment, the perception of pain and the level of menstrual distress were significantly reduced by SMT. This reduction was associated with a significant reduction in plasma levels of KDPGF_{2a} in the SMT group. A significant and similar reduction in plasma KDPGF_{2a} also occurred in the sham group, indicating that a placebo effect was associated with a single sham intervention.

Conclusions: This randomized pilot study suggests that SMT may be effective and safe nonpharmacological alternative for relieving the pain and distress of primary dysmenorrhea. However, the large change in KDPGF_{2a} observed in both treatment groups clearly indicates that further studies with more subjects, studied over a longer time frame, are needed to resolve the question of a placebo effect.

Conservative management of an L4-L5 left nuclear disc prolapse with a sequestered segment

Neault CC. *J Manipulative Physiol Ther* 1992; 15:318-322.

A case report is discussed in which a clinically diagnosed case of an L4-L5 nuclear prolapse with a sequestered fragment was verified by computerized axial tomography and magnetic resonance imaging at the initiation of the treatment period. It was treated with flexion-distraction manipulation, hot and cold fomentation, positive galvanism, a lumbosacral support, nutritional supplementation, abstinence from sitting and exercises. Four weeks after initiation of treatment, the patient was asymptomatic. Eight weeks after initiation of treatment, and 6 weeks after the original scan, magnetic resonance imaging verified a reduction in the size of the prolapse within the vertebral canal. An 11 month follow-up examination indicated the patient had no exacerbations of her condition and all objective findings were negative.

Effects of a functional knee brace on the biomechanics of running

Devita P, Hunter PB, Skelly WA.
Med Sci Sports Exerc 1992; 24(7):797-806.

The purpose of the study was to assess the biomechanical effects of a functional knee brace on joint moments of force and joint powers in the lower extremity during the stance phase of running in subjects with a previous ACL injury. Sagittal-plane film records and ground reaction force data were obtained from five previously injured subjects running with and without a functional knee brace and from five healthy subjects running without the brace. Inverse dynamics were performed on these data to obtain the moments of force and joint powers. The angular impulse in the extensor direction was assessed from each moment of force curve, and the work performed during selected portions of the stance phase was assessed from the joint power curves. ANOVA tech-

niques on these variables indicated no significant differences between the brace and no-brace conditions in the previously injured subjects. In comparison with the healthy runners, the previously injured subjects had, on average, 49% and 32% greater extensor angular impulse about the hip and ankle (both $P < 0.05$). In contrast, the healthy runners had, on average, 233% greater ($P < 0.05$) extensor angular impulse about the knee. The corresponding negative and positive work performed at the knee were 321% and 191% larger (both $P < 0.05$) in the healthy runners. The reduction in the extensor moment of force about the knee and the increase in the moments of force about the hip and ankle in the previously injured subjects reduced the stresses on the ACL and tibia while at the same time enabling them to run at the required speed.

Forces generated during spinal manipulative therapy of the cervical spine: a pilot study

Kawchuk GN, Herzog W, Hasler EM.
J Manipulative Physiol Ther 1992; 15:275-278.

Objective: To determine the forces imparted to the cervical spine using direct sampling methods during a clinical episode of spinal manipulative therapy.

Design: Quantitative study.

Setting: Human Performance Laboratory, University of Calgary.

Participants: Two doctor/patient pairs. Patients were selected by the treating chiropractors from their existing patient pools.

Intervention: SMT to the cervical spine (toggle method) on three separate occasions over a 2-week period. The clinical relevancy of the treatment was assessed via before and after measures of tissue compliance.

Main outcome measure: a) Forces during manipulation: preload and peak forces. b) Duration of applied forces.

Results: a) Mean peak force = 117.7 N (± 15.6 N). b) Mean duration of force = 101.7 msec (± 14.7 msec).

Conclusion: The forces obtained with direct sampling methods compare favorably to previous measurements obtained from indirect sampling techniques, yet the force duration times are smaller (faster) using the direct method.

Long-term evaluation of adolescents treated operatively for spondylolisthesis

Burkus JK, Lonstein JE, Winter RB, Denis F.
J Bone Joint Surg 1992; 74A(5):693-704.

The medical records and radiographs of forty-two adolescents (twenty-three male and nineteen female) who had had a posterolateral spinal arthrodesis for spondylolisthesis between 1950 and 1986 were reviewed to assess the long-term outcome of this form of treatment. The average age of the patients at the time of the operation was fourteen years (range, seven years and nine months to seventeen years and eleven months). The duration of the clinical and radiographic follow-up ranged from two years to twenty-seven years and seven months.

All patients had an *in situ* arthrodesis of the involved vertebrae.

Eighteen patients had no additional intervention, and twenty-four patients had reduction and application of a cast. Use of the cast led to a decrease in sagittal translation of more than 5 per cent in eighteen patients and a decrease in lumbosacral kyphosis (the slip angle) of more than 5 degrees in fourteen patients. Of the patients who did not have a cast, eight had an increase in sagittal translation of more than 5 per cent and ten had an increase in lumbosacral kyphosis of more than 5 degrees. There were no neurological problems at the time of the initial operation or after the reduction maneuver.

At the most recent clinical follow-up examination, thirty-eight patients had no complaints of low-back pain or any restriction of work-related or recreational activities. Persistent low-back pain and pain in the lower extremities limited the activities of the remaining four patients, two of whom had another operation to alleviate these symptoms.

Growth and menarcheal status of elite female gymnasts

Claessens AL, Malina RM, Lefevre J, Beunen G, Stijnen V, Maes H, Veer FM. *Med Sci Sports Exerc* 1992; 24(7):755-763.

The growth and maturity status of 201 elite female gymnasts was considered. The subjects were participants at the 24 World Championship Artistic Gymnastics in 1987. In addition to age at menarche, weight, stature, biacromial, and bicristal breadths, the sitting height/stature ratio, and the Health-Carter anthropometric somatotype of gymnasts 13-20 years of age were compared with reference data for a nationally representative sample of Flemish girls. Median age at menarche (probit analysis) in gymnasts is 15.6 ± 2.1 years compared with 13.2 years in Flemish girls. Anthropometric dimensions increase with age until about 16 years and then tend to plateau. In contrast to body size, there is little variation in somatotype with age. Compared with adolescent girls, elite gymnasts are considered shorter and lighter with narrower shoulders and hips, but the differences are more apparent after 17 years. Elite gymnasts do not differ from nonathletes in relative leg length, but they have proportionally broader shoulders relative to hips. Differences in somatotype occur primarily in endomorphy (especially lower in gymnasts) and to a lesser extent in mesomorphy (higher in gymnasts).

Ligaments traversing the intervertebral canals of the human lower lumbosacral spine

Giles LGF. *Neuro-Orthopedics* 1992; 13:25-38.

The ligaments traversing human L4-5 and L5-S1 intervertebral canals have been described by several authors as a result of gross dissection of the intervertebral canals (lateral canals), particularly of their lateral opening or exit zone, and these ligaments have been associated with low back pain as a result of grossly diminishing the space available to the emerging spinal nerve.

This historical study of human L4-5 and L5-S1 intervertebral canals describes the morphology and frequency of ligaments traversing the

mid- and exit zones of these intervertebral canals. The relationship of these ligaments to the neurovascular structures of these canals is described. In this study of 29 human L4-5 and L5-S1 intervertebral canals from 40 to 79 year-old male and female cadavers, no evidence of compression of large spinal nerves and blood vessels by ligaments traversing the intervertebral canal was found, but small nerves and blood vessels were found weaving through and between these ligaments and it is possible that such neurovascular structures could be compressed during some spinal movements.

