

Rehabilitation protocol for undisplaced Colles' fractures following cast removal

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Colles' fracture is a relatively uncommon presentation to a chiropractic office. A case of a 74-year-old woman complaining of pain, loss of strength and diminished range of motion in her left wrist is presented. These complaints were the result of a slip and fall causing a Colles' fracture that occurred four weeks prior to presentation. Dynamometer and goniometric testing revealed significant losses of strength and range of motion when compared to the unaffected wrist. Initial therapy consisted of ice, wax bath application and gentle range of motion mobilizations for two weeks followed by entry into a supervised active rehabilitation program for a further three weeks. After thirteen visits, the patient demonstrated objective improvement in both range of motion and grip strength as well as subjective improvement in pain intensity. A rehabilitation protocol is proposed for clinicians with patients suffering from Colles' fractures. Appropriate management may begin passively and ultimately leads to a supervised active program for optimal results.
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KEY WORDS: fracture, wrist, rehabilitation.

Les cas fracture de Colles sont relativement peu fréquents en chiropratique. Voici l'histoire d'une femme de 74 ans qui se plaint de douleur, d'une diminution de la force de préhension et de l'amplitude des mouvements du poignet gauche à la suite d'une chute ayant causé une fracture de Colles quatre semaines auparavant. Les épreuves au dynamomètre et au goniomètre révèlent en effet une diminution importante de la force de préhension et de l'amplitude des mouvements du poignet gauche par rapport au poignet droit. La première phase de traitement a consisté en l'application de glace et de bains de cire et en la mobilisation de faible amplitude de l'articulation; cette première phase a duré deux semaines et a été suivie d'un programme supervisé de réadaptation active pendant trois autres semaines. Au bout de treize visites, on a noté une amélioration objective de la force de préhension et de l'amplitude des mouvements du poignet, et la patiente a fait état d'une diminution subjective de la douleur. Le présent article propose donc aux cliniciens un protocole de réadaptation pour les patients ayant subi une fracture de Colles. Le traitement peut commencer par des exercices passifs et finir par un programme supervisé d'exercices actifs pour l'obtention de résultats optimaux.
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MOTS CLÉS : fracture, poignet, réadaptation.

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Introduction

Colles' fracture is defined as a linear transverse fracture of the distal radius approximately 20–35 mm proximal to the articular surface with dorsal angulation of the distal fragment.¹ Females are predelected more than males for this type of injury and there is often a precedent history of osteoporosis.¹ Stable Colles' fractures present with minimal comminution. Unstable fractures are distinctly comminuted often with corresponding avulsions of the ulnar or radial styloid that have the potential to cause compression neuropathies, especially of the median nerve.¹ Other complications that have been reported include reflex sympathetic dystrophy and degenerative joint disease.¹

A case report of a 74-year-old female who presented one month post injury to her left wrist is described. A treatment protocol is presented to restore patients with this type of injury to their pre-accident activities.

Case report

A 74-year-old woman reported an acute onset of left wrist pain following a slip and fall on the ground and landing on an outstretched, extended hand. She was immediately taken to a hospital facility where a routine series of plain film radiographs revealed a non-communited Colles' fracture. Figure 1 displays the radiograph of a similar injury. She was placed in a plaster cast for 4 weeks at which time she was referred to the clinic for assessment and rehabilitation.

The patient complained of a persistent pain and loss of motion accompanied by moderate effusion of the left distal radius. The pain was reported to be worse upon waking in the morning and was marginally relieved by medication.

Goniometric evaluation of the left wrist revealed a loss of active range of motion in extension completely, in



Figure 1 PA, oblique and lateral radiographs of a typical Colles' fracture presentation.

flexion by 50° and in radial and ulnar deviation by 10° and 20° respectively. Dynamometer testing revealed a grip strength of 5 lbs in the left extremity and 35 lbs in the right extremity. Neurological testing of the cervical spine and upper extremity were unremarkable bilaterally. Active range of motion of the unaffected upper extremity joints were full and pain free bilaterally. Orthopaedic testing of the cervical spine, shoulder joints, elbow joints and for carpal tunnel syndrome were unremarkable. Palpatory evaluation revealed moderate atrophy of the left wrist extensor muscles with severe pain to mild pressure and moderate effusion 1 cm proximal to the left distal radius.

Initial treatment consisted of the application of ice to reduce swelling, followed by gentle, passive range of motion exercise to patient tolerance. Once the swelling had abated, application of heat using a paraffin wax bath was introduced to increase circulation and mobility. At this point she entered a supervised active program for a further three weeks. The program focused on increasing mobility and strength to the injured extremity.

At the end of the five week treatment period, swelling of the distal radius had reduced considerably and goniometric assessment of the active range of motion had improved by 25° in flexion, 50° in extension and 5° in both radial and ulnar deviation. Subjectively, the patient still reported a dull pain with wrist extension, however the severity was considerably reduced from initial presentation using a 10 point numerical rating scale.

Discussion

The literature surrounding conservative management of Colles' fractures reveals conflicting results. Dias et al.² report that early wrist mobilization resulted in rapid recovery of both strength and movement without adversely influencing the progression of residual deformity. Poorer prognoses were associated with the use of plaster casting over a crepe bandage and displacement of fracture lines. McAuliffe and colleagues³ report that early mobilization demonstrated distinct improvement in strength and pain, however there was no significant improvement in the final range of movement of the healed wrist. In their study of post-fracture weakness and diminished range of motion, Kaufman et al.⁴ reported significant recovery from a unique treatment regimen employing manipulation of the intercarpal and radiocarpal joints in flexion and extension.

Despite this variability in outcome, it is generally ac-

cepted that early rehabilitation of acute injuries can maintain mobility of the joint capsule and ligaments, prevents adherence of soft tissues, provides increased circulation to the healing bone and assists in the reduction of edema.⁵ The case report outlines a rehabilitation protocol utilized to improve range of motion and grip strength in an undisplaced, stable Colles' fracture.

Following presentation and evaluation, our patient began a treatment regimen that consisted initially of passive interventions designed to improve circulation and prevent immobilization adhesion formation. These treatments included application of an ice pack to reduce edema followed by application of a wax bath on the affected wrist. Gentle range of motion mobilizations were then introduced that could only be performed in flexion and extension to the patient's pain tolerance. The mobilizations performed were similar to those described by Collins.⁵ Three sets of 5 flexion/extension repetitions were performed on the affected wrist. In addition, the joint was mobilized in circumduction, ulnar flexion and radial flexion to the patient's level of tolerance.

Following six treatments in this fashion, the patient then entered a supervised active rehabilitation program. The program focused on restoring active range of motion and strength using a variety of different techniques. Table 1 outlines the stepwise progression of exercises employed in the program.

After nine visits under this regimen, the patient was re-evaluated to monitor progress. Range of motion was assessed using a goniometer and strength was measured using a grip dynamometer. Effusion and sensitivity to palpation was compared to the initial assessment findings. In addition, the patient was asked to subjectively rate her current status using a 10 point scale. She was then educated to perform the same active protocol at home at the same frequency and intensity. In addition she was encouraged to resume functional activities that involve the wrist and hand such as writing, cooking and sewing. These activities give the patient a tangible outcome measure beyond the clinical setting. In this way the patient is better able to grade their progression.

In this case presentation we have attempted to emphasize a transition from passive to active intervention as a means of functional progression. The clinician should not limit treatment solely to the site of injury but should endeavor to incorporate exercise routines that will address

Table 1
Rehabilitation protocol for Colles' Fracture

A) ISOMETRIC EXERCISE
1) Wrist flexors and extensors
B) ACTIVE RANGE OF MOTION EXERCISE
1) Assisted stretch to forearm flexors and extensor musculature and radial/ulnar deviation
2) Weight bearing wrist extension exercise (hands on the table with the patient leaning forward on them) to patient tolerance
3) Active stretch to shoulder girdle and rotator cuff musculature
4) Active stretch to elbow flexor and extensor musculature
C) INTRINSIC HAND MUSCLE EXERCISE
1) Thumb/digit opposition
2) Repetitive squeezing of theraputty
3) Repetitive towel wringing exercise
D) STRENGTHENING ROUTINE
1) Biceps curls with 1½ – 2 pound weights bilaterally
2) Shoulder abduction, flexion and extension reps with 2 pound weights bilaterally
3) Repetitive squeezing of rubber ball in affected wrist
4) Flexion and extension of wrist using 1½ pound weights increasing as tolerated
E) FUNCTIONAL ACTIVITIES
1) Patient is encouraged to resume pre-accident activities that involve the affected extremity (eg. writing, typing, cooking, etc.)

the joints and musculature both above and below the site of injury. A review of our protocol demonstrates that in addition to exercises for the wrist, routines were also developed for the finger intrinsics, elbow and shoulder. Patients who present post Colles' fracture tend to guard the entire upper extremity as a means of protecting the wrist. By introducing exercise for the entire limb, disuse atrophy and stiffness due to immobilization will be avoided.⁶ In addition, muscle balancing for strength and endurance in the entire upper/lower extremity will be attained.

As a patient progresses through their program, the clinician should be regularly monitoring patient progress and noting any changes in range of motion, strength, degree of effusion and level of pain and disability. Should the symptoms not abate or regress with intervention, the clinician should consider referral to an appropriate special-

ist for further investigation. The complications resulting from Colles' fractures have been well described in the literature.^{4,5,7,8} The reported sequelae include carpal tunnel syndrome, reflex sympathetic dystrophy, tenosynovitis of the extensor carpi ulnaris, avulsion of the ulnar styloid process and rupture of the triangular fibrocartilage, to name a few. The clinician should also be aware of the potential for malunion of the fractured fragments that is often the result of impaired circulation, inadequate early immobilization or excessive distraction of the wrist.¹

Once fracture healing has been attained, a common structural sequelae is the "dinner fork" deformity which radiographically demonstrates dorsal angulation of the distal articular radial surface, alteration of the pronator quadratus fat plane and a decrease in the radial length.¹

Noteworthy to the clinician are studies by Dias² and McAuliffe³ which indicate that early mobilization does not increase the magnitude or the rate of deterioration of the bony deformity. The radiographic results obtained indicated that there were no significant changes in the measurement of dorsal angulation, radial deviation and radial shortening when comparing those patients that received early mobilization from those that received prolonged immobilization. Given these findings, clinicians should therefore endeavor to begin an active protocol as quickly as possible.

Summary

Colles' fractures are transverse linear breaks in the distal radius, often accompanied by dorsal angulation of the ulna following a fall on an outstretched, extended wrist. A case of a 74-year-old woman who slipped and fell and suffered a Colles' fracture of the left wrist is presented. Therapy was initially passive consisting of ice application to decrease swelling and control pain, wax application to improve circulation and passive range of motion mobilizations to prevent adhesion formation. The patient then entered an active rehabilitation program to restore strength and range of motion to the injured and adjacent extremities. The protocol utilized is outlined along with suggestions for re-evaluation and a delineation of possible complications of such a fracture.

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References

- 1 Yochum T, Rowe L. Essentials of skeletal radiology. 2nd edition Vol. 1. Maryland: Williams & Wilkins, 1996; 664–665, 756–757.
- 2 Dias JJ, Wray CC, Jones JM, Gregg PJ. The value of early mobilization in the treatment of Colles' fractures. J Bone Joint Surg 1987; 69(3):463–467.
- 3 McAuliffe TB, Hilliar KM, Coates CJ, Grange WJ. Early mobilization of Colles' fractures. J Bone Joint Surg 1987; 69(5):727–730.
- 4 Kaufman Rod L, Bird Joel. Manipulative management of post-Colles' fracture weakness and diminished active range of motion. J Manipulative Physiol Ther 1999; 22(2):105–107.
- 5 Collins DC. Management and rehabilitation of distal radius fractures. Ortho Clin North America 1993; 24(2):36–77.
- 6 Liebensohn C. Rehabilitation of the spine – a practitioner's manual. Pennsylvania: Williams & Wilkins, 1996: 14–16.
- 7 Tsukazaki Tomoo, Iwasaki Katsuro. Ulnar wrist pain after Colles' fracture. Acta Orthop Scand 1993; 64(4):465–468.
- 8 Altissimi Maurizio, Antenucci Renato, Fiacca Claudio, Mancini Giovanni. Long-term results of conservative treatment of fractures of the distal radius. Clin Orth Rel Res 1986;206: 202–209.

