Journal of Hand Therapy 29 (2016) 314–319

Contents lists available at ScienceDirect

Journal of Hand Therapy

journal homepage: www.jhandtherapy.org

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Scientific/Clinical Article

Coaching of patients with an isolated minimally displaced fracture of the radial head immediately increases range of motion

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ARTICLE INFO

Article history:
Received 1 April 2015
Received in revised form
27 November 2015
Accepted 9 February 2016
Available online 18 February 2016

Keywords:
Disability
Fracture
Impairment
Radial head

ABSTRACT

Study Design: Prospective cohort.
Introduction: Elbow stiffness is the most common adverse event after isolated radial head fractures.
Purpose of the Study: To assess the effect of coaching on elbow motion during the same office visit in patients with such fractures.
Methods: We enrolled 49 adult patients with minimally displaced radial head fractures, within 14 days of injury. After diagnosis, we measured demographics, catastrophic thinking, health anxiety, symptoms of depression, upper extremity-specific symptoms and disability, pain, and elbow and wrist motion. The patient was taught to apply an effective stretch in spite of the pain to limit stiffness, and elbow motion was measured again.
Results: With the exception of radial deviation and pronation, motion measures improved slightly but significantly on average immediately after coaching. Elbow flexion improved from 79% (110° ± 22°) of the uninjured side to 88% (122° ± 18°) after coaching ($P < .001$); elbow extension improved from 71% (29° ± 14°) to 78% (22° ± 15°) ($P = .0012$).
Discussion: Instruction that stretching exercises are healthy even when painful resulted in immediate improvements in motion. Prospective studies comparing different strategies for coaching patients regarding painful stretches might help clarify the optimal approach.
Level of evidence: Therapeutic level 4.

Introduction

Elbow stiffness is the most common sequela of stable and isolated radial head and neck fractures.[1,2] Stretching exercises limit stiffness.[3] A previous study found that a negative attitude toward stretch pain during recovery from fracture of the radial head was associated with less elbow motion 1 month after injury.[4] That study did not account for the coaching the patient receives from the physician during the visit. During coaching, patients are informed that stiffness is the main risk of the injury, and they are taught how to stretch their arm to get it mobile again and to consider the pain associated with stretching as healthy.

Hand therapy embraces a holistic approach focussing on personal and environmental issues along with body functions and structures.[5,6] The normal human response to the pain of injury is to feel protective (I do not want to interfere with healing) and prepare for the worst (I am not sure I will be able to rely on my arm). Helping patients feel healthy with painful movement and stretches is an important part of the recovery process. In this study, we addressed the effect of coaching in addition to the effect of mindset on motion early during the recovery process.

Sources of funding: No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.
Disclosure: One of the authors (DR) certifies that he, or a member of his immediate family, has or may receive payments or benefits, during the study period from Wright Medical (USD less than 10,000) (Memphis, TN, USA); Skeletal Dynamics (USD less than 10,000) (Miami, FL, USA); Biomet (USD less than 10,000) (Warsaw, IN, USA); AO North America (USD less than 10,000) (Paoli, PA, USA); and AO International (USD less than 10,000) (Dubendorf, Switzerland). Other authors have nothing to disclose.
Institutional review board approval: This study was approved by the Massachusetts General Hospital Institutional Review Board: Protocol#: 2009P001019/MGH.
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http://dx.doi.org/10.1016/j.jht.2016.02.003

Purposes of the study

We studied whether patients with minimally displaced radial head fractures have better elbow motion immediately after coaching and reassurance that painful movement and stretching the elbow speeds recovery although painful.

Additionally, we assessed factors independently associated with elbow flexion and extension at enrollment, after coaching, and 1 month later.

Materials and methods

Study design

After institutional review board approval, we prospectively enrolled 49 consecutive adult patients with a minimally displaced radial head fracture between December 2009 and May 2014 for this prospective case series. Inclusion criteria were a stable, isolated, nonoperatively treated Broberg and Morrey-modified Mason type 1 or 2 radial head or neck fracture[7,8]; seen within 14 days of injury; in a patient with the cognitive and physical ability to do the stretching exercises. On average, patients were enrolled 5 (standard deviation [SD], ±2) days after injury. Their mean age was 45 ± 16 years (range, 23–80), and 67% (33) were women (Table 1). Thirty-eight patients (78%) were also evaluated 1 month after the initial visit, approximately 5 and 1/2 weeks after fracture (39 ± 12 days). The rate of loss to follow-up is not unusual for prospective research in a trauma population,[9] particularly for injuries with a good prognosis.[10] We compared responders and nonresponders and found that patients who did not respond to the follow-up had higher Disabilities of the Arm, Shoulder and Hand (DASH) scores (responder 51 ± 13 vs nonresponder 64 ± 15, $P = .013$) on average and less pronation (responder 84 ± 11 vs nonresponder 66 ± 35, $P = .01$); other variables did not differ (Appendix A).

Table 1
Patient variables at enrollment and at 1 month

Variables	Enrollment	Follow-up
Demographic variables		
Patients	49	38
Age (range), y	45 ± 16 (23–80)	46 ± 16 (23–80)
Women, *n* (%)	33 (67)	25 (66)
Smoking, *n* (%)	7 (14)	6 (16)
Pain condition, *n* (%)	12 (24)	8 (21)
Marital status, *n* (%)		
Single	21 (43)	16 (42)
Partner/married	19 (39)	15 (39)
Separated/widowed	9 (18)	7 (18)
Employed at time of fracture, *n* (%)	44 (90)	34 (89)
Years of education	16 ± 2.5	16 ± 2.7
Immobilization, *n* (%)		
None	12 (25)	11 (29)
Sling	28 (57)	20 (53)
Splint	3 (6.1)	3 (7.9)
Both	6 (12)	4 (11)
Psychological variables[a]		
Pain Catastrophizing Scale	18 ± 6.2	18 ± 5.3
Whiteley index	3.2 ± 2.6	3.3 ± 2.8
Center for Epidemiologic Studies Depression Scale	10 ± 6.8	11 ± 6.9
Patient Health Questionnaire	3.2 ± 3.1	3.1 ± 3.0
Other variables[a]		
Visual analog scale score for pain	5.1 ± 2.3	4.8 ± 2.2
Agreement: "no pain, no gain"	6.7 ± 2.7	6.8 ± 2.6
Disabilities of the Arm, Shoulder and Hand Questionnaire	54 ± 15	16 ± 15

[a] Enrollment includes 48 patients; continuous variables as mean ± standard deviation; discrete data as number (percentage).

After diagnosis of an isolated radial head fracture, the office visit was paused and informed consent was obtained. We then recorded age, sex, smoking, comorbid pain conditions (eg, fibromyalgia, migraine headache), marital status, employment, years of education, and type of immobilization. Patients completed the Pain Catastrophizing Scale, Whiteley index, Center for Epidemiologic Studies Depression Scale, Patient Health Questionnaire-9 measure of symptoms of depression, and DASH questionnaire, and rated their pain on an 11-point ordinal scale. A research fellow not involved with treatment measured wrist flexion and extension, ulnar and radial deviation of the wrist, pronation and supination, and elbow flexion and extension using handheld goniometer. When the office visit resumed, the surgeon taught the patient that stiffness was the main problem after this injury. The normal protective response to pain was acknowledged and normalized. The counterintuitive nature of stretching exercises in the early recovery period was also acknowledged. The importance of understanding that the damage is done and that the pain of elbow stretches is not causing more damage was emphasized. Patients were encouraged to find a prior experience where painful exercises made them healthier (eg, yoga, stretching before a run, recovery from an injury, or after workout pain). It was emphasized that stretching the elbow was more akin to these healthy types of pain. Patients were taught how to take an active role in stretching the arm by using the other arm or objects in the environment to produce a fulcrum for the stretch (eg, hanging a bucket with some water in it or placing the arm against one's thigh and pushing on the forearm to stretch in extension). After the coaching and at the conclusion of the office visit, we remeasured the range of motion. At the final evaluation, approximately 1 month later, we measured motion and DASH. We did not address adherence to the previously provided exercises.

Outcome measures

The Pain Catastrophizing Scale measures misinterpretation or overinterpretation of nociception (catastrophic thinking). Its 13 items are scored on a 4-point Likert scale, ranging from 1 "*not at all*" to 4 "*all the time*". A higher score indicating more pain catastrophizing, range 13-52 points.[11]

The Whiteley index assesses heightened illness concern and is scored on a 5-point Likert scale, range 1 "*not at all*" to 5 "*a great deal*". Its 14 questions result in a score between 14 and 70 (higher score indicates more disease illness concern).[12]

Symptoms of depression were measured using the Center for Epidemiologic Studies Depression Scale (20 items scored on a 4-point Likert scale ranging from 0 "*rarely*" to 3 "*most*;" total score between 0 and 60)[13] and the Patient Health Questionnaire-9 (9 questions scored a 4-point Likert scale, ranging from 0 "*not at all*" to 3 "*nearly every day*;" total score from 0 to 27).[14] On both scales, higher scores indicate more depressive symptoms.

Patients scored pain on an 11-point ordinal scale, ranging from 0 to 10, where 0 was "*no pain*" and 10 "*the worst pain ever.*"[15]

We used the DASH questionnaire to evaluate arm-specific symptoms and disability. It consists of 30 questions scored on 5-point Likert scales, ranging from 1 "*no problems/pain*" to 5 "*impossible*." Scores range between 0 and 100 points, a higher score indicating worse upper extremity-specific disability and pain.[16]

Statistical analysis

Continuous variables are described as mean ± SD, and discrete variables as proportions. Histograms were visually inspected for data distribution. Pre- and postcoaching range of motion measurements were compared by paired Student *t* test. Unrepeated continuous and discrete variables were compared by unpaired