Finger Stiffness

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Abstract Background Finger stiffness varies substantially in patients with hand and upper extremity illness and can be notably more than expected for a given pathophysiology. In prior studies, pain intensity and magnitude of disability consistently correlate with coping strategies such as catastrophic thinking and kinesiophobia, which can be characterized as overprotectiveness. In this retrospective study we address the primary research question whether patients with finger stiffness are more often overprotective when the primary pathology is outside the hand (e.g. distal radius fracture) than when it is located within the hand. Methods In an orthopaedic hand surgery department 160 patients diagnosed with more finger stiffness than expected for a given pathophysiology or time point of recovery between December 2006 and September 2012 were analyzed to compare the proportion of patients characterized as overprotective for differences by site of pathology: (1) inside the hand, (2) outside the hand, and (3) psychiatric etiology (e.g. clenched fist). Results Among 160 subjects with more finger stiffness than expected, 132 (82 %) were characterized as overprotective including 88 of 108 (81 %) with pathology in the hand, 39 of 44 (89 %) with pathology outside the hand, and 5 of 8 (63 %) with psychiatric etiology. These differences were not significant. Conclusions Overprotectiveness is common in patients with more finger stiffness than expected regardless the site and type of primary pathology. It seems worthwhile to recognize and treat maladaptive coping strategies early during recovery to limit impairment, symptoms, and disability.

Keywords Finger stiffness · Pain catastrophizing · Kinesiophobia · Pain · Disability · Overprotectiveness

Introduction

Pain intensity and magnitude of disability can be notably more or less than expected based on identifiable pathophysiology in the hand and upper extremity [1]. For example, some patients recovering from fracture of the distal radius develop finger stiffness while others do not and this seems only partly related to the complexity of the fracture and associated soft-tissue injury [2].

Pain intensity and magnitude of disability consistently correlate with overprotectiveness (catastrophic thinking [3–12]; kinesiophobia [3, 13, 14, 8, 9]), low self-efficacy [10] (a sense that one can achieve one's goals); and symptoms of depression [3, 15, 11, 12] across the spectrum of hand and upper extremity illness. We had the impression that finger stiffness in the absence of pathophysiology such as osteoarthritis or burn contractures (i.e. more finger stiffness than expected for a given disease or point of recovery) was strongly related to an overprotective mindset. In other words, the patients most prone to stiffness are the ones that find it more counterintuitive that uncomfortable stretching exercises will regain motion and restore function to the hand.

We reviewed patients diagnosed with more stiffness than expected for a given pathophysiology or time point of recovery to address the primary research question whether patients with finger stiffness are more often overprotective when the primary pathology is outside the hand (e.g. distal radius fracture) than when it is located within the hand. We also addressed several secondary study questions addressing the differences in protectiveness based on traumatic vs. non-traumatic primary pathology, operative vs. non-operatively treated patients and prolonged (greater than 4 weeks)

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immobilization. The portions of comorbid major depression were looked at as well to assess differences based on site of primary pathology.

Materials and Methods

This retrospective single-surgeon cohort study was approved by our Institutional Review Board. We started with 190 patients that received the ICD-9 code 718.44 (Contracture of joint, hand) from a billing database that covers the period between December 2006 and September 2012. The ability to identify patients with more stiffness than expected was facilitated by the fact that this surgeon infrequently used this code for expected stiffness due to arthritis, Dupuytren disease, tendon injury, complex fractures, etc.

Four patients younger than 18 years were excluded from the study. Among the remaining 186 patients, 160 had more stiffness than expected, 3 were miscoded (i.e., they did not have finger stiffness), and 23 had a discrete non-capsular pathophysiology accounting for most of the stiffness (9 contractures due to nerve palsy or spasticity, 5 burn contractures, 3 Dupuytren contractures [not postoperative stiffness], 2 tendon ruptures, 2 compartment syndromes, 1 severe eczema, and 1 scleroderma).

Among the 160 patients with more stiffness than expected the following patient characteristics were obtained from the hospital electronic medical record (including information from all caregivers) in addition to demographic and injury/disease characteristics: (1) a diagnosis of major depressive disorder; (2) overprotectiveness (which this surgeon consistently notes in the record when it is present); (3) prolonged (greater than 4 weeks) immobilization. Overprotectiveness is documented when a patient avoids or limits use of the hand and stretching exercises because they have a sense that they are causing harm in spite of consistent and repeated reassurance from both the surgeon and the hand therapist that they are a healthy and important part of recovery.

Three main groups were formed based on the location of the primary diagnosis, to be used for analysis. These three groups were comprised respectively of diagnoses located in the hand, those outside the hand, and patients with psychiatric disorders causing stiffness (e.g. clenched fist syndrome). Within the hand and non-hand groups we separated trauma from non-trauma and operative from non-operative treated patients, resulting in a total of 9 subgroups. (Table 2).

Statistical Analysis

Group and subgroups frequencies and percentage were determined for the following variables: age, sex, overprotectiveness, a diagnosis of major depression, an initial visit more 3 months after onset/injury, and prolonged immobilization.

Pearson Chi-square analyses were performed to look for differences in overprotectiveness and depression between the 3 main groups (hand, non-hand, psychiatric).

Results

Descriptive Analysis

The mean age of the 160 qualifying patients was 51 years (SD =17 years; range 20–95 years) and 82 (51 %) were women. Forty-five patients (28 %) had a diagnosis of major depression in the medical record and the behavior of 132 patients (83 %) was considered to be overprotective. In the trauma subgroups 52 of 120 (43 %) patients had an interval of at least 3 months between the initial injury and the visit to the hand surgeon, 17 patients of 120 (14 %) had worn a cast or immobilizing splint for more than 4 weeks. (Table 1).

The most common diagnoses in the hand trauma pathology group were PIP sprains/dislocations and phalanx fractures. Finger stiffness from non-traumatic hand pathology was usually post-operative. The traumatic, non-hand stiffness was related to upper arm fractures, most commonly a fracture of the distal radius. The non-traumatic, non-hand stiffness was usually related to a peripheral mononeuropathy such as carpal tunnel syndrome. (Table 2).

Table 1 Patient details

n=160		
Parameter	Mean	Range
Age (y)	51	20 - 95
	Number	%
Sex		
Male	78	49
Female	82	51
Patient characteristics		
Diagnosis of depression		
Yes	45	28
No	115	72
Overprotective		
Yes	132	83
No	28	18
Illness characteristics		
>3 months between injury and presenting to hand surgeon		
Yes	56	35
No	104	65
>4 weeks cast or splint wear		
Yes	17	11
No	143	89

Table 2 Diagnoses

	<i>n</i> =160		Age	Gender		Overprotective n (%)	Depressed n (%)	> 3 months between injury and presenting to hand surgeon n (%)	> 4 weeks cast or splint wear n (%)	
	n	%		Mean	♂					♀
Hand located	108	68	49	59 (54 %)	50 (46 %)	88 (81 %)	27 (25 %)	45 (42 %)	6 (5.6 %)	
Trauma nonoperative	61	38	48	36 (59 %)	25 (41 %)	47 (77 %)	12 (20 %)	30 (49 %)	4 (6.6 %)	
PIP sprain/dislocation	34	21								
Phalanx fracture	12	7,5								
Finger laceration(s)	9	5,6								
Metacarpal fracture	4	2,5								
Hand laceration(s)	1	0,6								
Ha.nd contusion	1	0,6								
Trauma postoperative	24	15	44	15 (60 %)	10 (40 %)	19 (79 %)	5 (21 %)	12 (50 %)	1 (4.2 %)	
PIP Sprain/Dislocation	1	0,6								
Phalanx fracture	14	8,8								
Tendon laceration	5	3,1								
Extensor tendon repair	3	1,9								
FDP avulsion	1	0,6								
FDP repairs of LF, RF and SF	1	0,6								
Metacarpal fracture	3	1,9								
Hand lacerations	1	0,6								
Non trauma nonoperative	7	4,4	60	2 (29 %)	5 (71 %)	6 (86 %)	4 (57 %)	0 (0 %)	0 (0 %)	
Trigger finger(s)	3	1,9								
Nonspecific Pain	4	2,5								
Non trauma postoperative	16	10	60	6 (38 %)	10 (63 %)	16 (100 %)	6 (38 %)	3 (19 %)	1 (6.3 %)	
Dupuytren's contracture	5	3,1								
Trigger finger(s)	4	2,5								
Infection	4	2,5								
Animal bite	2	1,3								
Post operative	1	0,6								
Septic wrist	1	0,6								
Trapezometacarpal OA, s/p arthroplasty	1	0,6								
Enchondroma	1	0,6								
Ganglion Cyst	1	0,6								
Non hand located	44	28	61	17 (40 %)	26 (60 %)	39 (89 %)	12 (27 %)	10 (23 %)	11 (25 %)	
Trauma nonoperative	14	8,8	65	4 (29 %)	10 (71 %)	14 (100 %)	1 (7 %)	6 (43 %)	6 (43 %)	
Distal radius/ulna fracture	9	5,6								
Fracture proximal to distal radius	3	1,9								
Elbow dislocation	1	0,6								
Scaphoid fracture	1	0,6								
Trauma postoperative	21	13	57	8 (40 %)	12 (60 %)	17 (81 %)	6 (29 %)	4 (19 %)	5 (24 %)	
Distal radius/ulna fracture	13	8,1								
Fracture proximal to distal radius	8	5,0								
Non trauma nonoperative	7	4,4	64	4 (57 %)	3 (43 %)	7 (100 %)	3 (43 %)	0 (0 %)	0 (0 %)	
Median/ulnar neuropathy (CubTS, CTS, nonlocalizing)	7	4,4								
Non trauma postoperative	2	1,3	55	1 (50 %)	1 (50 %)	1 (50 %)	2 (100 %)	0 (0 %)	0 (0 %)	
Median/ulnar neuropathy (CTS, nonlocalizing)	2	1,3								
Psychiatric Disorders	8	5,0	65	2 (25 %)	6 (75 %)	5 (63 %)	6 (75 %)	1 (13 %)	0 (0 %)	
Clenched fist syndrome	7	4,4								
Secretan disorder	1	0,6								

Bivariate Analysis

There was no significant difference in overprotectiveness between patients with primary diagnoses located in the hand, primary diagnoses located outside the hand, and patients with psychiatric disorders ($p=.098$). There was a significant difference in comorbid major depression ($p=.010$) between the main 3 groups attributable to patients with a psychiatric etiology for their hand stiffness (7 clenched fist syndromes and 1 Secretan disorder). There was no significant difference in comorbid major depression ($p=.78$) between hand and non-hand primary pathology.

Discussion

Most patients with unexpected finger stiffness due to capsular contracture are overprotective, no matter the location or primary pathology. The prevalence of comorbid major depression is higher with 28 % (95 % CI, 22–36) than the average of 6.6 % (95 % CI, 5.9–7.3) for the population in the United States [16].

All research has limitations. First, the assessments of “more stiffness than expected” and “overprotective” are subjective and may be unreliable. On the other hand, we feel this is unlikely based on our knowledge of the scientific literature and discourse with other surgeons both formal and informal. The fact that the cohort consists of a single surgeon’s patients is a strength in that we know that protectiveness is always assessed and documented, but it may limit the generalizability of the study if the patients in this surgeon’s practice are different from the average patient with more finger stiffness than expected. In a retrospective study we have no measure of mood or mindset and must rely on the record documenting comorbid major depression. It is likely that many patients with this diagnosis did not have it documented in the record. In spite of these shortcomings we feel that this work provides a basis for future analysis of unexpected finger stiffness: stiffness that cannot be related to pathophysiology such as arthritis or injury. This study also supports the hypothesis that unexpected finger stiffness relates more to mindset and mood than to type and location of pathophysiology, although more study is needed.

Several studies document the independent negative effects of psychological traits forming overprotectiveness on pain and disability. For instance, decreases in kinesiophobia and pain catastrophizing during rehabilitation correlate with more improvement in pain and function during recovery from reconstruction of the anterior cruciate ligament [17]. In another study patients with greater catastrophic thinking exhibited less willingness to adopt a self-management approach to cope with pain [18].

Based on the data to date—including this study—it seems worthwhile to assess for maladaptive coping strategies and address them during the recovery process. There are both verbal and nonverbal clues that patients are feeling so protective that they may hinder their recovery. [19] There are also validated measures of hyper protectiveness including the Pain Catastrophizing Scale, the Pain Self-Efficacy Questionnaire, and PROMIS Pain Interference.[20] An approach to hand illness that accounts for the role of stress and coping strategies might limit disproportionate pain, disability, and recovery time compared to biomedical care alone (e.g. surgery, medication, splints, and exercises). Studies that address factors associated with unexpected finger stiffness prospective are merited and should address the psychological aspects of recovery.

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