QuickDASH Score Is Associated With Treatment Choice in Patients With Trapeziometacarpal Arthrosis

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Abstract

Background: Trapeziometacarpal (TMC) arthrosis has a variety of treatment options, including nonoperative (eg, education, splint, injection) and operative management. Symptoms and limitations vary greatly among patients. The purpose of this study was to determine an association of symptoms and limitations, quantified using the Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score, with treatment choice in patients newly diagnosed with TMC arthrosis. We also addressed the association of the QuickDASH score with radiographic severity and sought factors associated with higher QuickDASH scores. **Methods:** As part of the routine new patient intake paperwork, all new patients completed a QuickDASH form. We included 81 new patients with newly diagnosed TMC arthrosis visiting the office of 1 of 5 orthopedic hand surgeons between March 1, 2015, and November 30, 2015. Eight patients were excluded because of incomplete QuickDASH forms. **Results:** Based on QuickDASH tertiles, patients with a low QuickDASH score were more likely to choose education alone than patients with intermediate and high QuickDASH scores; no patients in the lowest QuickDASH tertile chose injection or surgery. Patients who chose education alone also had a lower mean QuickDASH score than patients who chose splint or surgery. Radiographic severity and other patient-related factors were not associated with greater symptoms and limitations. **Conclusions:** More adaptive patients (lower QuickDASH) are less likely to choose injection or surgery, irrespective of disease severity. The psychosocial factors known to correlate with greater symptoms and limitations might lead patients to feel they have fewer options or to choose more interventional options than they would if they were more at ease. In other words, inadequate attention to psychosocial factors may increase the risk of misdiagnosis of patient preferences.

Keywords: disability, QuickDASH, radiographic severity, TMC arthrosis, treatment

Background

Trapeziometacarpal (TMC) arthrosis is highly prevalent with progressive age and a condition to which most patients adapt.^{4,8,22} There are a variety of treatment options, including nonoperative (eg, education, splint, injection) and operative management. Symptoms and limitations vary greatly among patients who seek help for TMC arthrosis.¹⁷ Symptoms have limited correspondence with radiographic severity or the presence of crepitation on examination.^{2,10,12,14,15} Variation in symptoms and limitations is determined largely by mindset and circumstances.^{1,5-7,9,19,25} Patients with greater symptoms and limitations may be more likely to choose treatments that involve risk, discomfort, or inconvenience.^{1,5-7,9,19,25}

The purpose of this study is to assess whether there is an association of symptoms and limitations, as determined by the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score, with treatment choice in patients

newly diagnosed with TMC arthrosis. We tested the null hypotheses that: (1) there is no difference in treatment choice at the initial visit (education, splint, injection, or surgery) between patients with low, intermediate, and high QuickDASH scores with newly diagnosed TMC arthrosis; (2) the mean QuickDASH score does not differ between patients choosing the 4 treatment options; and (3) among patients with radiographs, the mean QuickDASH score does not differ between mild, moderate, and severe radiographic severity. We also studied patient factors associated with higher QuickDASH scores.

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Methods

With institutional review board (IRB) approval, we used our electronic health record database to identify all new patients visiting the office of one of 5 orthopedic hand surgeons between March 1, 2015, and November 30, 2015. Inclusion criteria were adult patients newly diagnosed with TMC arthrosis. Because the *International Classification of Diseases, Ninth Revision, Clinical Modification* codes may not be sensitive enough to identify patients with TMC arthrosis, we chose to search for “arthrosis”—including common misspellings and synonyms—in the visit notes. All patient charts were manually reviewed to confirm the diagnosis. A total of 146 patients met these criteria. Sixty-five patients who had no or incomplete QuickDASH scores available in the medical record (because some surgeons did not start collecting and scanning the QuickDASH until recently) were excluded, which left a total of 81 patients for analysis.

Our primary outcome variable was treatment choice, which we classified as (1) education, (2) splint, (3) cortisone injection, and (4) surgery. One patient chose both splint and injection and was classified in the injection group.

Our main explanatory variable was upper extremity-specific symptoms and limitations quantified using the QuickDASH questionnaire,³ which patients completed as part of their routine new patient intake paperwork. This validated questionnaire consists of 11 items, answered on 5-point Likert scales. The QuickDASH scores were calculated using the equation: $[(\text{sum of } n \text{ responses}/n) - 1] \times 25$, giving a total score scaled from 0 (no disability) to 100 (most severe disability) with a score of 11 points reflecting the mean score for the general US population.^{3,13,16} QuickDASH scores were divided into patient tertiles (low, intermediate, and high) for our primary analysis and also used as a continuous variable. Scores were not calculated if more than 1 item on QuickDASH was missing.¹⁶

A subset of 50 patients (62%) had radiographs based on surgeon practice style (1 surgeon does not obtain radiographs at diagnosis, 2 do so often, and the remaining 2 do so routinely). Radiographic severity of TMC arthrosis was graded using the system of Sodha and colleagues²² as follows: grade 1, no or nearly no TMC arthrosis; grade 2, obvious TMC arthrosis but not severe; and grade 3, severe TMC arthrosis.^{4,22}

Sociodemographic variables included age, sex, race, marital status, insurance status (Medicaid, Medicare, private, self-pay, and unknown), and household income based on postal zip code analysis (\$1-\$38 999, \$39 000-\$62 999, and $\geq$ \$63 000). Zip codes were also used to calculate the distance from patients' home to the office (miles). In addition, we collected the following variables from the patient records: affected side and other hand and upper extremity condition.

Power Analysis

A post hoc power analysis demonstrated that 81 patients provided 80% statistical power to detect a significant difference with a 2-tailed alpha of 0.05 in mean QuickDASH score between the 4 treatment options with a medium effect size of 0.38. In addition, a subset of 50 patients provided 80% statistical power to detect a significant difference in mean QuickDASH score between mild, moderate, and severe radiographic severity with a medium effect size of 0.45. This means we had enough patients to detect a difference in mean QuickDASH score between the 4 treatment options and between the 3 grades of radiographic severity.

Statistical Analysis

Continuous data were presented as means with standard deviation and categorical data as frequencies with percentages. The Kruskal-Wallis test was used to compare the QuickDASH tertiles with the 4 treatment options. The Fisher exact test and 1-way analysis of variance (ANOVA) were used for categorical variables, and the unpaired Student *t* test was used for continuous variables. A 2-sided *P* value of $<.05$ was considered statistically significant.

Results

Considered in tertiles, patients with a low QuickDASH score (39%) were more likely to choose education alone than patients with intermediate (8%) and high (7%) QuickDASH scores ($P = .016$; Figure 1). No patients in the lowest QuickDASH tertile chose injection or surgery. The most symptomatic and limited patients were less likely (8%) than the intermediate patients (16%) to choose injection or surgery.

The mean QuickDASH score was also significantly different between patients choosing the 4 treatment options ($P = .0053$; Figure 2). Patients who chose education alone had a lower mean QuickDASH score (mean, 23; SD, 13) than patients who chose splint (mean, 44; SD, 22; $P < .001$) or surgery (mean, 52; SD, 12; $P = .0024$) as treatment option (Table 1).

Radiographic severity was not associated with greater symptoms and limitations: The mean (SD) QuickDASH scores were 35 (25), 43 (28), and 44 (21) for patients with mild, moderate, and severe TMC radiographic severity, respectively ($P = .53$; Figure 3).

There were no patient-related factors associated with higher QuickDASH scores (Table 2).

Discussion

If the level of symptoms and limitations is associated with treatment choice at the first visit—among patients who seek

Figure 1. QuickDASH tertiles and treatment choice.

Note. The QuickDASH tertiles were associated with treatment choice in patients with TMC arthrosis; $P = .016$. QuickDASH = Disabilities of the Arm, Shoulder, and Hand; TMC = trapeziometacarpal.

Figure 2. Mean QuickDASH score and treatment choice.

Note. The mean QuickDASH score was significantly different between patients choosing the 4 treatment options; $P = .0053$. QuickDASH = Disabilities of the Arm, Shoulder, and Hand.

medical attention for TMC arthrosis—measures such as the QuickDASH might reflect patient preconceptions regarding disease status and treatment, especially if QuickDASH scores do not correlate to radiographic disease severity. We found that patients with the lowest QuickDASH scores were often content with education and reassurance alone, the patients with intermediate scores were the most likely to choose surgery or injection, and the patients with high scores were slightly less likely to choose surgery or an injection.

We acknowledge some limitations to our study. The QuickDASH measures quantify symptoms and disability related typically to the upper extremity but not specifically TMC arthrosis. Patients might have had additional hand and arm conditions that affected their QuickDASH score, although none were brought to the attention of the doctor or

were recorded in their medical history. Second, only 3 patients chose surgery after the first visit, and 2 had already had surgery on their other thumb. A larger study of patients that excludes those who had prior surgery for thumb arthrosis might have different findings. Few patients chose surgery after just 1 visit, so a study addressing factors associated with a choice of surgery would need to be very large and might have a different strategy such as treatment choice within 1 year of the first visit. Third, radiographs were only available for a subset of patients (62%), although this hypothesis was confirmatory as the limited correspondence between measures of pathophysiology and measures of symptoms and limitations is established. Finally, this retrospective study design was more susceptible to data loss, bias, and confounding compared with a prospective study.

Table 1. QuickDASH Score per Treatment Option (n = 81).

Treatment option	Mean (SD)	Range ^a	P value	Multiple comparison ^b			
				Education	Splint	Injection	Surgery
Education	23 (13)	9-50	.0053	Education	—		
Splint	44 (22)	5-96		Splint	<.001	—	
Injection	47 (12)	34-70		Injection	.016	.81	—
Surgery	52 (12)	45-66		Surgery	.0024	.52	.72

Note. QuickDASH = Disabilities of the Arm, Shoulder, and Hand. Bold values are statistically significant P values (results).

^aRange of QuickDASH score per treatment option.

^bBonferroni correction of P value: 0.05/6 = .0083.

Figure 3. Radiographic severity and QuickDASH score.

Note. The mean QuickDASH score did not differ between mild, moderate, and severe radiographic severity of TMC arthrosis; $P = .53$. QuickDASH = Disabilities of the Arm, Shoulder, and Hand; TMC = trapeziometacarpal.

For example, we had to exclude 8 patients because of incomplete QuickDASH forms.

In our study, radiographic severity was not associated with QuickDASH scores, which is consistent with prior studies.^{2,8,10,12,14,15,17} A recent study showed no correlation between the Eaton-Littler radiographic stage and severity of symptoms and limitations as measured by QuickDASH.¹⁵ We used the Sodha grading system,²² which has adequate intraobserver and interobserver reliabilities (average kappa of 0.72 and 0.56, respectively)²² comparable with those recorded for the Eaton-Littler classification (average kappa of 0.66 for intraobserver reliability and 0.53 for interobserver reliability).¹⁸ If radiographic severity is not associated with QuickDASH scores, and given the strong evidence that disability correlates more with stress, distress, and ineffective coping strategies, scores are more likely to reflect adaptation and resilience. Prior studies demonstrate that a QuickDASH score greater than 55 is an indicator of an estimated diagnosis of major depression and that about 1 in 8

patients, presenting to a hand surgeon qualifies for a diagnosis of major depression.²¹ Consistent with prior studies, no patient factors were associated with higher QuickDASH scores.

If psychological factors dominate QuickDASH scores, and QuickDASH scores are associated with treatment selection, modification of these psychological factors may be able to influence treatment choices. Preference-sensitive hand conditions like TMC arthrosis are often treated primarily on the basis of symptom intensity and magnitude of limitations. A better understanding of their options, and help determining their true preferences after correction of any preconceptions, might help patients in optimal management of pain and disability associated with TMC arthrosis. On the face of it, one would think that people with higher QuickDASH scores might be the most likely to benefit from surgery. But what the evidence shows is that patients with higher QuickDASH scores might have other opportunities for improved health such as greater symptoms of depression

Table 2. Factors Associated With a High QuickDASH Score (n = 81).

Parameter	QuickDASH score		P value
	Low/intermediate (n = 54, 67%)	High (n = 27, 33%)	
Age, y, mean (SD)	63 (9.5)	64 (10)	.46
Distance, miles, home-clinic, mean (SD)	24 (29)	17 (16)	.22
Men, n (%)	19 (82)	4 (17)	.07
Race, n (%)			.26
White	47 (64)	26 (36)	
Non-white	7 (88)	1 (13)	
Marital status, n (%)			.10
Married	35 (74)	12 (26)	
Not married	19 (56)	15 (44)	
Household income, \$, n (%)			.42
<38 999	5 (50)	5 (50)	
39 999-62 999	30 (67)	15 (33)	
>63 000	19 (73)	7 (27)	
Insurance, n (%)			.41
Medicaid	7 (64)	4 (36)	
Medicare	15 (60)	10 (40)	
Private	29 (71)	12 (29)	
Self-pay	3 (100)	0 (0)	
Unknown	0 (0)	1 (100)	
Affected side, n (%)			.30
Left	11 (52)	10 (48)	
Right	18 (72)	7 (28)	
Both	25 (71)	10 (29)	
Other hand and upper extremity injury, n (%)			.10
Yes	10 (50)	10 (50)	
No	44 (72)	17 (28)	

Note. QuickDASH = Disabilities of the Arm, Shoulder, and Hand.

or less effective coping strategies. The reason this is important is that it may help explain dissatisfaction and continued illness after technically successful surgeries. If surgeons believe that surgery is the optimal way to improve symptoms and limitations and do not take advantage of the other opportunities, they might be surprised when some patients feel worse or are disappointed after technically successful surgery.

Studies of variation in treatment suggest that surgeon characteristics and preferences have a greater influence on treatment decisions than is merited for hand arthrosis and other conditions.^{11,23} Improving patient involvement in decision making by providing information at their level of health literacy, appropriate to their culture, and with balance and dispassion (using enhanced communication strategies and decision aids) is one useful approach, but more is probably needed. Our data raise concerns that patient misperceptions of TMC arthrosis may be discordant from a patient's overall health philosophy. It seems important to help patients become aware of this possibility prior to choosing surgery to limit the potential for an error in diagnosis of patient preferences.^{5,20}

Future studies should focus on decision aids,²⁴ which may help prepare patients to make more informed and satisfying decisions that match their preferences and values. A prospective study could include measures of psychological distress (eg, symptoms of depression) and effective coping strategies (eg, pain self-efficacy) to determine whether they are related to treatment choice.

Authors' Note

The work was performed at the Department of Orthopedic Surgery, Hand and Upper Extremity Service, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts.

Ethical Approval

The institutional review board of our institution approved this study under protocol #2009P001019/MGH

Statement of Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

The institutional review board granted a waiver of informed consent.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

- Allegrante JP, Marks R. Self-efficacy in management of osteoarthritis. *Rheum Dis Clin North Am*. 2003;29:747-768.
- Armstrong AL, Hunter JB, Davis TRC. The prevalence of degenerative arthritis of the base of the thumb in post-menopausal women. *J Hand Surg Am*. 1994;19:340-341.
- Beaton DE, Wright JG, Katz JN. Development of the QuickDASH: comparison of three item-reduction approaches. *J Bone Joint Surg Am*. 2005;87:1038-1046.
- Becker SJE, Briet JP, Hageman MGJS, Ring DC. Death, taxes, and trapeziometacarpal arthrosis. *Clin Orthop Relat Res*. 2013;471:3738-3744.
- Becker SJE, Makarawung DJS, Spit SA, King JD, Ring D. Disability in patients with trapeziometacarpal joint arthrosis: incidental versus presenting diagnosis. *J Hand Surg Am*. 2014;39:2009-2015.e8.
- Broderick JE, Junghaenel DU, Schneider S, Bruckenthal P, Keefe FJ. Treatment expectation for pain coping skills training: relationship to osteoarthritis patients' baseline psychosocial characteristics. *Clin J Pain*. 2011;27:315-322.
- Buckelew SP, Parker JC. Coping with arthritis pain. A review of the literature. *Arthritis Care Res*. 1989;2:136-145.
- Dahaghin S, Bierma-Zeinstra SMA, Ginai AZ, Pols HA, Hazes JM, Koes BW. Prevalence and pattern of radiographic hand osteoarthritis and association with pain and disability (the Rotterdam Study). *Ann Rheum Dis*. 2005;64:682-687.
- Das De S, Vranceanu A-M, Ring DC. Contribution of kinesiophobia and catastrophic thinking to upper-extremity-specific disability. *J Bone Joint Surg Am*. 2013;95:76-81.
- Eaton RG, Glickel SZ. Trapeziometacarpal osteoarthritis. Staging as a rationale for treatment. *Hand Clin*. 1987;3:455-471.
- Glickel SZ. Clinical assessment of the thumb trapeziometacarpal joint. *Hand Clin*. 2001;17:185-195.
- Glickel SZ, Kornstein AN, Eaton RG. Long-term follow-up of trapeziometacarpal arthroplasty with coexisting scaphotrapezial disease. *J Hand Surg Am*. 1992;17:612-620.
- Gummeson C, Ward MM, Atroshi I. The shortened disabilities of the arm, shoulder and hand questionnaire (QuickDASH): validity and reliability based on responses within the full-length DASH. *BMC Musculoskelet Disord*. 2006;7:44.
- Haara MM, Heliövaara M, Kröger H, et al. Osteoarthritis in the carpometacarpal joint of the thumb. Prevalence and associations with disability and mortality. *J Bone Joint Surg Am*. 2004;86-A:1452-1457.
- Hoffler CE, Matzon JL, Lutsky KF, et al. Radiographic stage does not correlate with symptom severity in thumb basilar joint osteoarthritis. *J Am Acad Orthop Surg*. 2015;23:778-782.
- Hudak PL, Amadio PC, Bombardier C. Development of an upper extremity outcome measure: the DASH (disabilities of the arm, shoulder and hand) [corrected]. The Upper Extremity Collaborative Group (UECG). *Am J Ind Med*. 1996;29:602-608.
- Hwang RW, Ring D. Pain and disability related to osteoarthritis of the trapeziometacarpal joint. *J Hand Microsurg*. 2011;3:63-5.
- Kubik NJ, Lubahn JD. Intrarater and interrater reliability of the Eaton classification of basal joint arthritis. *J Hand Surg Am*. 2002;27:882-885.
- Lozano-Calderon SA, Souer JS, Jupiter JB, Ring D. Psychological differences between patients that elect operative or nonoperative treatment for trapeziometacarpal joint arthrosis. *Hand (N Y)*. 2008;3:271-275.
- Menendez ME, Bot AGJ, Hageman MGJS, Neuhaus V, Mudgal CS, Ring D. Computerized adaptive testing of psychological factors: relation to upper-extremity disability. *J Bone Joint Surg Am*. 2013;95:e149.
- Molleman J, Janssen SJ, Overbeek CL, Ring D. A threshold disability score corresponds with an estimated diagnosis of clinical depression in patients with upper extremity disease. *Hand (N Y)*. 2015;10:168-172.
- Sodha S, Ring DC, Zurakowski D, et al. Prevalence of osteoarthritis of the trapeziometacarpal joint. *J Bone Joint Surg Am*. 2005;87:2614-2618.
- Spaans AJ, van Laarhoven CMM, Schuurman AH, van Minnen LP. Interobserver agreement of the Eaton-Littler classification system and treatment strategy of thumb carpometacarpal joint osteoarthritis. *J Hand Surg Am*. 2011;36:1467-1470.
- Stacey D, Légaré F, Col NF, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2014;1:CD001431.
- Vranceanu A-M, Barsky A, Ring D. Psychosocial aspects of disabling musculoskeletal pain. *J Bone Joint Surg Am*. 2009;91:2014-2018.