Deferring Routine Wrist Radiography Does Not Affect Management of de Quervain Tendinopathy Patients

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Abstract

Background Obtaining wrist radiographs prior to surgeon evaluation may be wasteful for patients ultimately diagnosed with de Quervain tendinopathy (DQT).

Questions/Purpose Our primary question was whether radiographs directly influence treatment of patients presenting with DQT. A secondary question was whether radiographs influence the frequency of injection and surgical release between cohorts with and without radiographs evaluated within the same practice.

Patients and Methods Patients diagnosed with DQT by fellowship-trained hand surgeons at an urban academic medical center were identified retrospectively. Basic demographics and radiographic findings were tabulated. Clinical records were studied to determine whether radiographic findings corroborated history or physical examination findings, and whether management was directly influenced by radiographic findings. Frequencies of treatment with injection and surgery were separately tabulated and compared between cohorts with and without radiographs.

Results We included 181 patients (189 wrists), with no differences in demographics between the 58% (110 wrists) with and 42% (79 wrists) without radiographs. Fifty (45%) of imaged wrists demonstrated one or more abnormalities; however, even for the 13 (12%) with corroborating history and physical examination findings, wrist radiography did not directly influence a change in management for any patient in this series. No difference was observed in rates of injection or surgical release either upon initial presentation, or at most recent documented follow-up, between those with and without radiographs. No differences in frequency, types, or total number of additional simultaneous surgical procedures were observed for those treated surgically.

Conclusion Wrist radiography does not influence management of patients presenting DQT.

Level of Evidence This is a level III, diagnostic study.

Keywords

- de Quervain tendinopathy
- de Quervain treatment
- wrist radiographs
- radiography

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Establishing the diagnosis of de Quervain tendinopathy (DQT) in a cost-effective fashion holds promise for substantial savings to the health care system, and the practice of obtaining routine wrist radiographs for patients presenting with wrist pain may be wasteful for this patient population. History and clinical exam alone are often sufficient to establish a diagnosis of DQT, and practice patterns in which radiographs are obtained prior to surgeon evaluation of a patient presenting with wrist pain is likely a source of waste, as defined as a medical test or expenditure that does not affect patient management. Previous studies have established a low diagnostic utility of radiography for other common upper extremity conditions known to present with straightforward history and physical examination findings including trigger finger,¹ wrist ganglia,² carpal tunnel syndrome,³ and lateral epicondylitis.⁴

Specific to DQT, prior studies have evaluated the significance of de Quervain osseous findings including radial styloid calcifications, periosteal reaction, or osteopenia.^{5,6} However, it is unclear if radiographs are needed in the first place, as history and physical exam findings are straightforward for the practicing hand surgeon: a positive Finkelstein's test with focal tenderness over the first dorsal compartment, with absent tenderness of other radial-sided wrist and thumb structures, typically reveals the diagnosis.⁷ While orthopaedic and primary care literature exists promoting the use of wrist radiography,^{8,9} formal analysis of the utility of plain radiographs of the wrist for patients presenting with DQT has not previously been reported to our knowledge.

The purpose of this study is to evaluate the role of wrist radiography for patients presenting to an academic orthopaedic hand surgery practice with a diagnosis of DQT. Our primary question is whether wrist radiographs contribute diagnostic information that directly influences management of patients with DQT upon presentation to the hand surgeon. A secondary question is whether the frequency of treatment with injection and surgical release of the first dorsal compartment is similar between patient cohorts with and without radiographs within the same practice.

Patients and Methods

After obtaining Institutional Review Board approval for this retrospective cohort study (protocol #823534), we identified a list of patients with a diagnosis of DQT based on query of the electronic medical database for ICD-9 code 727.04. At our institution, all billing and coding entries are finalized by the attending hand surgeon for each patient encounter to maximize accuracy. All patients were evaluated by one of the orthopaedic fellowship-trained senior hand surgeons at our urban academic institution. To reduce potential bias imposed by varying treatment trends over time, we randomly selected and reviewed 181 patients (189 wrists) evaluated between August 2009 and May 2015. For each patient, clinical documentation associated with the initial hand surgeon clinic visit was reviewed. Basic demographic information was recorded including gender, handedness, hand involvement, pregnancy or postpartum status, worker's compensation

status, diabetes, hypothyroidism, and body mass index. In parallel with our institution's policy to obtain preoperative pregnancy testing on all female patients ≤ 55 years of age, we assumed those >55 years were nonpregnant. Patients <18 years of age and those with comorbid conditions known to cause inflammatory tenosynovitis (rheumatoid arthritis) were excluded. Patients with a known history of ipsilateral wrist or hand injuries including fracture or soft tissue laceration, those with prior ipsilateral wrist surgery, and those with a traumatic onset were excluded. Physical examination documentation was reviewed to corroborate the diagnosis of DQT—specifically, mention of tenderness over the first dorsal compartment or radial styloid and/or positive Finkelstein's testing were required for inclusion.

The number of patients with and without radiographic imaging of the wrist was recorded. Radiographic findings, as documented in the radiologist report and attending hand surgeon office note, were tabulated. Office notes were reviewed to determine whether reported radiographic abnormalities were incidental versus clinically pertinent (i.e., associated with corroborating history and physical examination findings). For patients with clinically pertinent radiographic findings, treatment information was recorded and reviewed to determine whether management was altered by the radiographic data. A change in management was defined as recommendation or administration of treatment in addition to those typical for DQT (thumb spica immobilization, oral anti-inflammatories, first dorsal compartment iontophoresis, corticosteroid injection, or surgical release) for pathology not detected and documented on the patient history and physical examination section of the office note. Treatment with corticosteroid injection and surgical release of the first dorsal compartment was tabulated for each patient separately for the initial visit, and cumulatively for the entire follow-up period, through review of all available clinic and operative notes. Similarly, for those undergoing surgical release, all additional simultaneous surgical procedures were tabulated.

Descriptive statistics were calculated to summarize patient demographics, radiographic findings, and treatment data. Chi-squared analysis was used to determine differences between groups for categorical data (Fisher's exact test was substituted for low-frequency events of ≤ 5 counts). The two-tailed Student's *t*-test was used to compare continuous data. A confidence level of $\alpha = 0.05$ was chosen. Post hoc power analysis revealed the ability to discern a 6% difference in the rate of surgical treatment between groups upon initial presentation with a β -error of 0.80 (requiring $n = 109$ wrists with radiographs, $n = 79$ without radiographs).

Results

A total of 181 patients (189 wrists) were included: 58% underwent wrist radiographic evaluation (106 patients, 110 wrists), and 42% did not (75 patients, 79 wrists). There were no statistically significant differences between cohorts with and without radiographs for any demographic factor under study (—Table 1).

Table 1 Overview of patient demographic factors

	All patients	With radiographs	Without radiographs	<i>p</i> -Value ^a
Number of patients	181	106 (59%)	75 (41%)	N/A
Number of wrists	189	110 (58%)	79 (42%)	N/A
Age (y; mean [SD])	49.6 (15.1)	49.7 (15.0)	49.2 (15.3)	0.76
Gender (female)	156 (86%)	95 (90%)	61 (81%)	
Hand dominance				
Right	93 (51%)	58 (55%)	35 (47%)	0.09
Left	11 (6.1%)	3 (2.8%)	8 (11%)	
Unknown	77 (43%)	45 (42%)	32 (43%)	
Hand involvement				
Dominant	55 (30%)	30 (28%)	25 (33%)	0.46
Nondominant	60 (33%)	39 (37%)	21 (28%)	
Unknown	66 (37%)	37 (35%)	29 (39%)	
Female pregnancy status				
Nonpregnant	89 (57%)	59 (62%)	30 (49%)	0.11
Pregnant	1 (0.06%)	0 (0.0%)	1 (1.6%)	
Postpartum	19 (12%)	8(8.4%)	11 (18%)	
Unknown	47 (30%)	28 (30%)	19 (31%)	
Worker's compensation	12 (6.6%)	7 (6.6%)	5 (6.7%)	0.99
BMI (mean [SD])	30.4 (8.1)	30.8 (7.7)	29.6 (8.9)	0.38
Diabetes	31 (17.1%)	18 (17.0%)	13 (17.3%)	0.95
Hypothyroidism	17 (9.4%)	11 (10.4%)	6 (8.0%)	0.59

Abbreviation: BMI, body mass index.

^aComparison of cohorts with and without radiographs.

Of those with radiographs, 59 wrists (54%) demonstrated no abnormality, whereas the remainder demonstrated one or more abnormalities (► **Table 2**). Of wrists with a radiographic abnormality, 13 (12% of all imaged wrists) were associated with a concordant history and physical examination and thus were deemed potentially clinically pertinent: 11 had thumb carpometacarpal arthritis with corresponding tenderness on physical examination and were treated with thumb spica immobilization and anti-inflammatories, one had a large wrist ganglion cyst that was evident on physical examination treated with aspiration in addition to spica splinting and anti-inflammatories, and one patient had a long-standing finger flexion contracture that was evident on physical examination and did not require additional treatment. None of the 24 patients younger than 35 years of age had a pertinent radiographic abnormality. Thirty-nine wrists (35% of imaged wrists) showed incidental findings that lacked clinical correlation, eight of which included radial styloid irregularities often seen in the setting of DQT.⁵ Specific to the first question posed by this study, of the 50 total observed radiographic abnormalities and 13 clinically correlated radiographic abnormalities, none resulted in a change in management.

There were no differences in the frequency of treatment with injection or surgery upon initial presentation, or cumulatively at the time of most recent follow-up (► **Table 3**). At the initial

visit, injections were administered to 35% of those with and without radiographs ($p = 0.90$). Surgical release was performed for 6% of those with radiographs versus 13% without ($p = 0.20$). When considering these treatments over the entire follow-up period, injections were administered in 53% of patients with radiographs versus 51% for those without radiographs ($p = 0.83$), and surgical release was performed in 17 versus 22%, respectively ($p = 0.46$). For patients undergoing surgical release during the cumulative follow-up period, there were no differences in frequency or types ($p = 0.24$) or total number ($p = 0.78$) of additional simultaneous procedures performed between cohorts with and without radiographs. Therefore, in regard to the secondary study question, we observed that the frequency of injection and surgical release were not influenced by the presence versus absence of wrist imaging.

Discussion

The motivation of this study was to evaluate the practice pattern of obtaining wrist radiographs prior to surgeon evaluation in the context of DQT. The primary purpose of this study was to evaluate the hypothesis that wrist radiography does not contribute diagnostic information that influences a change in management for patients presenting with DQT. We observed that management was not altered by

Table 2 Overview of radiographic findings

	Number of radiographic abnormalities	Number of pertinent radiographic findings with clinical correlation	Treatment performed to address the abnormality seen on radiographs	Was management changed by radiographs?
Radiographic abnormalities				
Arthrosis				
Thumb CMC joint	22	11	Thumb spica splinting ± NSAIDs	No (0/11) ^a
Finger IP joints (nonthumb)	3	0	–	–
Calcifications (soft tissue)	2	0	–	–
Cortical irregularity (nonradial styloid)	2	0	–	–
Cyst				
Carpal	3	0	–	–
Phalanx/metacarpal	1	0	–	–
Finger flexion contracture	1	1	None	No (0/1)
Known postoperative findings				
Trapeziectomy	1	0	–	–
Mass (radial wrist)	1	1	Ganglion cyst aspiration	No (0/1) ^b
Nonunion				
Ulnar styloid	2	0	–	–
Triquetrum avulsion	1	0	–	–
Osteopenia	1	0	–	–
Radial styloid irregularity ^c	8	0	–	–
Scapholunate widening	2	0	–	–
Total	50	13	–	0% (0/13)

^aIdentical first-line treatment recommended for thumb carpometacarpal arthritis and de Quervain tendinopathy.^bCyst obvious and documented on the visual inspection portion of physical examination.^cIncludes periosteal irregularity, flake calcifications, and soft tissue swelling.**Table 3** Overview of treatments performed

	All wrists	Wrists with radiographs	Wrists without radiographs	p-Value ^a
Injection				
Initial visit	66 (35%)	38 (35%)	28 (35%)	0.90
Cumulatively	94 (50%)	54 (53%)	40 (51%)	0.83
Surgical release				
Initial visit	17 (9.0%)	7 (6.4%)	10 (13%)	0.20
Cumulatively	36 (19%)	19 (17%)	17 (22%)	0.46
Simultaneous surgery				
Carpal tunnel release	8 (4.2%)	3 (2.7%)	5 (6.3%)	0.24
Cyst excision	2 (1.1%)	1 (1.0%)	1 (1.3%)	
Trigger release	3 (1.6%)	3 (2.7%)	0 (0.0%)	
Total additional surgeries	13 (6.9%)	7 (6.4%)	6 (7.6%)	0.78

^aComparison of cohorts with and without radiographs.

wrist radiographic findings for any of the 106 patients (110 wrists) included in the study. Additional management beyond typical treatments for DQT was not recommended even for the 13 wrists (12% of those with radiographs) with a clinically correlated radiographic abnormality, which most commonly (85%) was thumb carpometacarpal arthritis. The majority of patients undergoing radiographic imaging had normal studies (54%), and none of the 24 patients younger than 35 years of age had a clinically correlated radiographic abnormality. Therefore, we conclude that the practice of obtaining wrist radiographs, prior to surgeon evaluation, is a source of unnecessary medical costs for patients that ultimately are diagnosed with DQT.

To further investigate the role of wrist radiography, we performed a retrospective comparison of cohorts with and without radiographs to determine whether differences exist in the frequency of common de Quervain treatments (injection and surgical release of the first dorsal compartment) for patients evaluated within the same practice. We observed that injection and surgery were both performed at similar frequencies for those with and without radiographs. This held true upon initial presentation, when radiographs likely would have the greatest influence, as well as over the cumulative follow-up period. Due to the possibility that radiographic imaging may reveal additional pathology requiring treatment that was not evident by history and physical examination alone, we evaluated the types, rates, and total numbers of additional simultaneous surgeries that were performed for patients undergoing first dorsal compartment release. We observed no differences whether or not radiographs had been obtained. Therefore, we conclude that radiographs do not affect the likelihood of a patient undergoing common de Quervain treatments including injection and surgical release, and that imaging did not reveal any additional pathology requiring surgical or additional nonsurgical management.

Strengths of this study include the addition of a comparative group, which was not a component of other studies evaluating the role of radiography in the workup of other common upper extremity conditions.¹⁻⁴ This enabled us to compare frequencies of disease-specific treatments (injection or surgical release of the first dorsal compartment) between cohorts with and without radiographs, in addition to tabulating the radiographic findings and determining whether additional treatments were administered on the basis of imaging results for the single cohort with films.

This study has several limitations. Patients were selected retrospectively based on their ICD-9 code, which produces potential for selection bias. Despite similarities in demographics between the cohorts with and without radiographs, our nonrandomized study design may introduce confounding factors that could bias our results. The second limitation is our limited sample size of 110 imaged wrists. However, our sample size is equal to or more than that of other published studies drawing similar conclusions regarding the lack of efficacy of routine radiographic imaging,^{1,2} and our power analysis reveals the ability to discern a clinically significant difference in the rate of surgical release between groups with

and without radiographs (6%). Generalizability of our results may be limited by our exclusion criteria, as we did not study patients with a traumatic onset, prior surgery or injury to the wrist, or history of rheumatologic conditions. In addition, based on limitations in charting and documentation processes at our institution, we were unable to reliably determine the frequency in which other nonoperative DQT treatments were administered to our study population as a whole (thumb spica splinting, oral anti-inflammatories, iontophoresis). Therefore, we do not have evidence to conclude that these treatments were unaffected by wrist radiographic findings.

In summary, wrist radiography neither revealed findings that altered management for any patient within our series nor influenced the frequency in which injections or surgical releases were performed. For patients treated surgically, radiography did not reveal any pathology requiring additional surgical treatments. We conclude that the practice of obtaining routine wrist radiography prior to surgeon evaluation is wasteful in terms of health care costs and patient wait time, as those with DQT do not benefit from the resulting radiologic data and therefore are exposed to unnecessary radiation. We acknowledge that for a subset of DQT patients, history and physical exam findings may prompt the surgeon to obtain radiographs to evaluate for other common etiologies for radial-sided wrist pain including thumb carpometacarpal or scaphotrapezotrapezoidal arthritis. In rare cases in which tumoral calcinosis or bone tumors are considered, we would advocate for obtaining radiographs. Based on the findings of this study, we recommend that physical examination is performed prior to obtaining radiographs for patients presenting with radial-sided wrist pain.

Note

This study was performed at the Department of Orthopaedic Surgery, University of Pennsylvania, Penn Medicine University City, Philadelphia, PA. This nonexperimental study was approved by the University of Pennsylvania Institutional Review Board (protocol #823534).

Conflict of Interest

None.

References

1. Katzman BM, Steinberg DR, Bozentka DJ, Cain E, Caligiuri DA, Geller J. Utility of obtaining radiographs in patients with trigger finger. *Am J Orthop* 1999;28(12):703-705
2. Wong AS, Jebson PJ, Murray PM, Trigg SD. The use of routine wrist radiography is not useful in the evaluation of patients with a ganglion cyst of the wrist. *Hand (NY)* 2007;2(03):117-119
3. Bindra RR, Evanoff BA, Chough LY, Cole RJ, Chow JC, Gelberman RH. The use of routine wrist radiography in the evaluation of patients with carpal tunnel syndrome. *J Hand Surg Am* 1997;22(01):115-119
4. Pomerance J. Radiographic analysis of lateral epicondylitis. *J Shoulder Elbow Surg* 2002;11(02):156-157

- 5 Suresh SS, Zaki H, Ali A. Does radial styloid abnormality in de Quervain's disease affect the outcome of management? *Hand (NY)* 2010;5(04):374–377
- 6 Chien AJ, Jacobson JA, Martel W, Kabeto MU, Marcantonio DR. Focal radial styloid abnormality as a manifestation of de Quervain tenosynovitis. *Am J Roentgenol* 2001;177(06):1383–1386
- 7 Dawson C, Mudgal CS. Staged description of the Finkelstein test. *J Hand Surg Am* 2010;35(09):1513–1515
- 8 Ilyas AM, Ast M, Schaffer AA, Thoder J. De Quervain tenosynovitis of the wrist. *J Am Acad Orthop Surg* 2007;15(12):757–764
- 9 Shehab R, Mirabelli MH. Evaluation and diagnosis of wrist pain: a case-based approach. *Am Fam Physician* 2013;87(08):568–573