The Use of Routine Wrist Radiography is Not Useful in the Evaluation of Patients with a Ganglion Cyst of the Wrist

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Abstract The purpose of this study was to evaluate the cost-effectiveness of routine wrist radiography in the evaluation of patients with a wrist ganglion. In the setting of a University-based hand surgery practice, 103 consecutive patients with a dorsal or volar wrist ganglion underwent posteroanterior, lateral, and oblique radiographs of the involved wrist. There were 24 men and 79 women with an average age of 34 years (range 4–67 years). A retrospective review of the medical records was performed. Abnormalities on plain radiographs were noted in only 13 patients (13%). Findings included six cases of thumb carpometacarpal joint arthritis and one case each of an enchondroma, congenital distal radioulnar joint (DRUJ) anomaly, DRUJ degenerative changes, intraosseous ganglion, carpal boss, radiocarpal arthritis, and thumb metacarpophalangeal joint osteoarthritis. In only one case (1%) did the findings alter the management. At our institution, the professional and technical charge for three views of the wrist is \$172. This confers a cost of \$17,716 per therapeutically significant finding in our series. We con-

clude that routinely performing wrist radiography is not cost-effective in the evaluation and treatment decision-making process in patients with a wrist ganglion.

Keywords Radiographs · Wrist · Ganglion · Cost-effective

Introduction

Current attention regarding increasing healthcare costs, coupled with the concerns over medicolegal liability, makes the delivery of efficient, thorough healthcare challenging. Previous studies have explored the appropriateness and cost-effectiveness of routine radiographic studies in the evaluation of common clinical problems [2], [9]. Bindra et al. [2] in a study evaluating the use of routine wrist radiography in the evaluation of patients with carpal tunnel syndrome (CTS) noted radiographic findings of therapeutic significance in only 2 of 447 wrists (0.4% of wrists, 0.6% of patients). The authors concluded that wrist radiographs should not be routinely performed in patients with CTS because of the “low yield of useful information.” Similarly, Pomerance [9] assessed the role of routine elbow radiography in the evaluation of patients with lateral epicondylitis. In only 2 of the 294 cases did the findings alter the management leading to the conclusion that routine use of radiographs was neither necessary nor cost-effective.

Ganglion cysts are the most common soft tissue tumor of the hand and wrist and they are a common cause for patient presentation [1]. The diagnosis is usually straightforward and is based upon a characteristic clinical history and physical examination findings [10]. However, while ganglions represent a benign tumorous process with no potential for malignant degeneration, there frequently is apprehension on the part of the patient and/or the physician

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regarding the possibility of malignancy. In addition, as physicians often feel compelled to practice “defensive medicine” in our increasingly litigious society, some may use preoperative radiographs to document preexisting findings before treatment [7]. Despite these concerns, there is little guidance in the literature with respect to the practice of routinely ordering plain radiographs as part of the evaluation of the patient with a wrist ganglion. Our hypothesis was that findings noted on plain radiographs of the wrist would not affect management and that routine radiography is not cost-effective in the evaluation and therapeutic decision-making process for patients with a wrist ganglion. Therefore, the purpose of this study was to analyze the therapeutic and economic ramifications of routinely ordering wrist radiographs in a consecutive series of patients who were referred with a dorsal or volar wrist ganglion.

Materials and Methods

The research protocol was approved by our Institutional Review Board. A retrospective review was performed of the clinical records of 103 consecutive patients in which there was a diagnosis of a wrist ganglion in a single surgeon practice (PJ) between July 2003 and February 2006. The review was performed by one of the authors, a senior orthopedic surgery resident, who was not involved in any of the patients’ care. All patients had been interviewed and examined by a fellowship-trained orthopedic hand surgery attending (PJ). Each patient was offered their choice of cyst aspiration, excision, or observation and splint immobilization.

A diagnosis of a wrist ganglion was made when the patient presented with a history of a variable-sized wrist mass characteristically located over the dorsal scapholunate or volar radiocarpal region. The size of the mass varied but typically increased with activity and diminished with rest or immobilization. On physical examination, the mass was typically soft or slightly firm and all were noted to transilluminate with direct light application.

Each patient had posteroanterior (PA), lateral, and oblique radiographic views of the wrist obtained using a standardized imaging protocol. All of the radiographs were interpreted independently by a University-based board-certified musculoskeletal radiologist. The radiologist’s report that was part of the patient’s medical record was reviewed to determine the presence of any abnormal radiographic findings, other than the presence of a soft tissue shadow. Abnormal findings were recorded and then further categorized as therapeutically significant if they altered the patient’s management (i.e., other than aspiration, excision, or splint immobilization).

Results

There were 24 men and 79 women with an average age at the time of presentation of 34 years (range 4–67 years). The ganglion had been present for an average of 27 months (range 1–216 months) (recorded for 80 patients) before presentation. The dominant limb was recorded for 94 of the 103 patients. The ganglion involved the dominant limb in 53 patients (56%) and the nondominant limb in 41 patients (44%). There were 61 dorsal and 42 volar wrist ganglions. The ganglion was associated with wrist pain in 44 patients and was painless in 59 patients. Two patients (both with a dorsal ganglion) underwent cyst aspiration whereas excision was performed in 39 patients (25 dorsal and 14 volar). The histopathology interpretation was available for all but three of the 39 cases and was consistent with a ganglion cyst in every case.

Of the 103 radiographic series reviewed, 90 (87%) showed no abnormalities. Thirteen abnormal findings in the remaining 13 patients (13%) were noted. No patient had more than one abnormal radiographic finding. The findings included six cases of thumb carpometacarpal (CMC) arthritis, and one case each of an enchondroma, congenital distal radioulnar joint (DRUJ) anomaly, DRUJ degenerative changes, intraosseous ganglion of the capitate, carpal bossing, radiocarpal arthritis, and thumb metacarpophalangeal joint osteoarthritis. In only one case (1.0%), that of a 57-year-old woman with advanced thumb CMC arthritis, did the findings on plain radiographs alter the treatment recommendations. Currently, the professional and technical charges for a wrist series (PA, lateral, and oblique views) at the senior authors (PJ) institution is \$172. Thus, the cost for each therapeutically significant finding in our series was \$17,716.

Discussion

The diagnosis of a wrist ganglion is usually not challenging and can be readily accomplished after a detailed clinical interview and appropriate physical examination. However, many physicians also routinely use radiography as part of their evaluation. Whereas financial gain may be a motivating factor for those who own their own radiography suite and charge for interpretation, concern regarding a missed diagnosis and the possibility of malignancy seems to influence the practice patterns of some. In addition, medico-legal concerns impact the practice patterns of many other clinicians. Whereas it is unclear when radiographs should be ordered and what findings may affect management, the role of MRI or ultrasound in the patient with an actual or suspected occult ganglion remains well supported [3], [8].

In previous studies evaluating the role and cost-effectiveness of routine radiographs in the evaluation of patients with CTS

or lateral epicondylitis, the authors noted that whereas radiographs provided some “explanatory findings,” they rarely alter the management strategy [2], [9]. Our study provides further evidence to support such a conclusion for yet another common musculoskeletal condition. There was only one case of a radiographic finding that subsequently influenced the treatment approach. In that case, the patient did indeed have a painful volar wrist ganglion. However, tenderness at the trapeziometacarpal articulation and degenerative changes on radiographic examination determined that the pain that she was experiencing could be attributed to an arthritic thumb CMC joint. For this reason, she was counseled that appropriate treatment should be directed toward her underlying arthritis with continued observation of the adjacent ganglion.

Despite a low therapeutic yield with routine radiographs of the wrist, 13 patients overall (13%) did have an abnormal finding. Whereas this may seem to be a significant percentage, most diagnoses could be made after the clinical interview and physical examination alone. Furthermore, conditions that were not apparent on physical examination, such as an asymptomatic enchondroma or a DRUJ anomaly, were not related to the wrist ganglion, were clinically irrelevant with respect to the patient’s reason for referral, and could only be deemed a coincidental finding.

Recently, the paradigm of “patient-centered care” has gained interest in orthopedics [6]. The importance of patient expectations and how they may alter clinical practice is also being realized. In a prospective randomized study, Deyo et al. [5] demonstrated a reduction in the use of radiographs and a change in patient expectations with a “brief education intervention.” Furthermore, they demonstrated that no “serious diagnoses” were missed and a similar outcome and satisfaction rate occurred with the group that had immediate radiographs compared to the group that received counseling and education with no use of radiographs unless they failed to improve clinically. Similarly, it is important to consider the patients’ perspective when they present with a wrist ganglion. In a recent study by Westbrook et al. [11] 28% of patients sought medical attention for their ganglion because of concerns for malignancy. The clinician should thus realize that a significant percentage of patients with a wrist ganglion may simply seek reassurance and not invasive measures such as aspiration or surgery. We noted a similar phenomenon in our patient population in which only 39 of the 103 patients ultimately elected to proceed with excision.

Increased attention to patient counseling and the development of clinical criterion may help reduce the utilization of routine radiographs, which appears to be costly and unjustified for several conditions. Deyo and Diehl [4] analyzed the relationship between selection criterion and the subsequent therapeutic yield of plain radiographs in the

evaluation of patients with low back pain. They found that the number of useful findings on plain radiographs was three times greater when x-rays were only ordered in those patients who met their selection criterion compared to those patients who did not. They also detected nearly all important findings, including a malignancy or fracture with this strategy.

In light of the findings of our study, our approach to the evaluation of the patient with a wrist ganglion has changed. We no longer routinely order wrist radiographs in the patient who has a classic clinical history and physical examination findings. We believe that not only is it not cost-effective but it unnecessarily exposes the majority of patients to radiation. We do, however, order them in patients with an atypical ganglion location or appearance, prior history of wrist trauma particularly if not previously evaluated or diagnosed, or significant wrist pain. We believe that confining the use of radiographs to such cases will increase the therapeutic yield and result in a more efficient clinical practice pattern. We conclude that the routine use of plain radiographs in the evaluation of patients with a wrist ganglion is not necessary and cannot be justified from a cost-effective management standpoint. A low prevalence of therapeutically significant findings is common with minimal impact on patient management.

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