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Severe Hand Osteoarthritis Strongly Correlates With Major Joint Involvement and Surgical Intervention

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ABSTRACT

Background: The presence of hand osteoarthritis (OA) increases the risk for developing OA in other major joints. Although genetic predisposition has been implicated in its causation, its exact role has yet to be established. The association of hand OA with symptomatic and asymptomatic major joints has not been previously studied.

Methods: Hundred consecutive patients had a hand photo taken for visual documentation of the hand joints. Radiographs of hand and all major symptomatic joints were analyzed and classified using the Kellgren-Lawrence scale by 2 independent observers including an orthopedic radiologist.

Results: Severe hand OA was present in 91% of the patients. Radiographic analysis showed that the hip was involved in 88% of the patients, of whom 85.2% (75) were symptomatic and 14.7% (13) were asymptomatic. Hip arthroplasty was required by 62.5% (55) of symptomatic hip patients. Knee involvement was present in 37% of the patients; all were symptomatic and 81.1% (30) of these required knee arthroplasty. Bilateral surgery was performed in 33% (28) and “2 joint (hip and knee)” surgery was performed in 6% (5). Spine involvement was present in 72% of the patients. There was a significant correlation between hand radiographic findings of OA and hip ($r = 0.68$; $P = .03$), knee ($r = 0.58$; $P = .042$), and spine ($r = .39$; $P = .05$) involvement.

Conclusion: There was a significant correlation between severe hand OA and hip, knee, and spine involvement. Severity of Hand OA can have a predictive value on multiple joint involvement and risk of surgical intervention. This study emphasizes the need to investigate the genetic predisposition in causation of OA.

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Osteoarthritis (OA) is a prevalent disease that is well known for its functional, emotional, and economic burdens on society [1]. OA involvement is well known to occur in several major joints including the hip, knee, spine, and the hand [2,3]. Although OA is very prevalent, the complex etiology and progression of the condition is not fully understood. Despite mechanical factors have been implicated in its causation, several large genome studies have suggested that genetics may also play a significant role [4–8].

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Hand OA is a prevalent condition that typically presents asymptotically in the carpometacarpal, metacarpophalangeal, or distal and proximal interphalangeal joints [9]. To better understand OA progression, several cross-sectional studies assessed the relationship between hand OA and the progression of hip [10–12], knee [13–17], spine [18–20], and foot OA [21,22]. Some studies have reported that hand OA may be one of the predictive factors leading to total hip arthroplasty (THA) or total knee arthroplasty (TKA), suggesting that genetics may play a role in its causation [23–27]. Therefore, the authors hypothesize that severe hand OA may strongly correlate with other major joint involvement and the need for surgical intervention. However, to our knowledge, no studies have evaluated the severity of hand OA on its association with other major joint involvement.

Therefore, the objective of this prospective study was to assess the relationship between the severity of hand OA and other major

joint involvement. We also aimed to determine whether severe hand OA correlates with an increased risk for other major joint surgical intervention.

Materials and methods

After obtaining institutional review board approval, one hundred consecutive first-time patients who presented for orthopedic consultation for hip, knee, or back pain were recruited. All patients were identified by the 2 senior authors (ASR & CSR) as having OA in one or more major joints. Diagnosis of hip, knee, and spine OA was made on standard of care radiographs. Patients with the destructive pattern of an inflammatory arthropathy were not included [28,29]. Radiographs of the hip included a weight-bearing anteroposterior (AP) pelvis, false profile, and AP of the hip. Radiographs of the spine included a weight-bearing AP and lateral of the lumbosacral spine, and radiographs of the knee included an AP, lateral, and merchant. Diagnosis of shoulder or great toe arthritis was made from patient history.

After consent, all patients had a photo taken of their dominant hand with a Nikon Coolpix 100pj digital camera, which visually documented the proximal interphalangeal, distal interphalangeal, and carpometacarpal joints (Fig. 1). To evaluate the extent of hand OA, a posteroanterior (PA) radiograph taken of their dominant hand was taken and assessed for the presence of OA. Severity of OA was evaluated by the Kellgren-Lawrence (KL) classification by consensus opinion of 3 independent observers including the senior author (CSR), an orthopedic radiologist (EAB), and an orthopedic fellow, all of whom were blinded to all demographic and clinical data (Table 1) [30]. The minimum amount of OA present on the PA radiographs of the hand was defined as visible marginal osteophytes. Mild-to-moderate involvement was defined as KL grades 1 or 2, and severe hand OA was defined as KL grades 3 or 4 (Table 2).

Clinical evaluations were performed using a validated patient-administered questionnaire [31], which was modified to assess patient history of pain in the hands or other major joints, as well as to describe family history of arthritis (Fig. 2). Symptomatic joint involvement was defined as radiographic evidence of OA coupled with reported pain. Patients who reported pain were also asked to report the duration of pain. Patients were asked if there was any family history of arthritis which was defined as ≥ 2 members of a patient's immediate family who had major joint involvement. Patients were indicated for surgical intervention (ie, THA or TKA) as per the standard of care of the 2 senior surgeons (ASR & CSR), based on severity of pain and functional limitations. All patients indicated for surgery underwent preoperative blood workup (ie, erythrocyte sedimentation rate and C-reactive protein level) and a preoperative assessment by an independent internist, both of which were used to further rule out an inflammatory arthropathy.

Pearson correlation was used to evaluate the relationship between radiographic evidence of hand OA and other major joint involvement. All descriptive statistics were performed using SPSS 16.0 (SPSS, Inc, Chicago, IL) and are presented as means with standard deviations for continuous variables and frequencies with percentages for categorical variables. *P* values $< .05$ were considered significant.

Results

Demographics

The participants were composed of 57 females and 43 males with a mean age of 71.6 (± 11.4) years. The average body mass index (BMI) of the patients was 29 (± 6.67) kg/m². The average BMI of patients who underwent surgical intervention for hip or knee involvement was 27.8 (± 6.3) and 31.4 (6.5) kg/m², respectively



Fig. 1. Hand photo and radiograph showing the interphalangeal, distal interphalangeal, and carpometacarpal joints.

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