

Understanding Patient Preferences in Proximal Interphalangeal Joint Surgery for Osteoarthritis: A Conjoint Analysis

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Purpose We sought to compare preferences for arthroplasty versus arthrodesis among patients with proximal interphalangeal (PIP) joint osteoarthritis (OA) by quantifying the patient-assigned utility of each operation's attributes.

Methods We undertook a multistep process to identify relevant surgical attributes, including a literature review, surgeon survey, and pretest patient pilot test to build a set of discrete choice experiments. Patients with PIP joint osteoarthritis were identified using a single university electronic medical record and were recruited via electronic message or postcard. Participants completed a demographic survey and 11 discrete choice experiments designed using Sawtooth Software's Discover tool. Utility and importance scores were generated for each attribute.

Results Pretest analysis identified out-of-pocket cost, joint stiffness, need for future surgery, change in grip strength, and total recovery time as the most important surgical attributes. Initial response rate to the conjoint survey was 75% and survey completion rate was 61%. The study sample was predominantly white (91%) and female (72%), mean age 64.3 years (range, 34–90 years), and mean daily pain score was 4.32 (range, 0–10). Attribute importance scores demonstrated that joint stiffness (32%) and grip strength (29%) were most important to patients. Cost (17%) and need for future surgery (19%) were intermediate patient-preference drivers. Recovery time was the least important attribute (2%).

Conclusions In aggregate, patients prefer surgical attributes characteristic of arthroplasty (ability to preserve joint motion and grip strength) relative to those associated with arthrodesis (decreased need for reoperation, lower costs, and shorter reoperation times). (*J Hand Surg Am.* 2018; ■(■): ■–■. Copyright © 2018 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Economic/Decision Analysis III.

Key words Arthrodesis, arthroplasty, conjoint analysis, decision making, osteoarthritis.



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Received for publication October 11, 2017; accepted in revised form March 2, 2018.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/18/ ■ ■ -001\$36.00/0
<https://doi.org/10.1016/j.jhssa.2018.03.001>

SYMPTOMATIC HAND OSTEOARTHRITIS (OA) is a costly and debilitating disease for many Americans; 13 million United States adults have symptomatic or radiographic hand OA, and 1 in 1,000 people are newly diagnosed each year.^{1–5} This large and growing disease burden results in substantial personal and socioeconomic costs. Affected individuals report difficulty engaging in social activities, lower job productivity, and increased caregiver reliance; thus interventions that can reduce patients' pain or improve their function have great potential value.^{6–10} Currently, nonsteroidal anti-inflammatory medications remain the frontline treatment for most patients; however, individuals who develop persistent pain or deformity that limits their ability to perform activities of daily living may require surgery.^{11,12} Yet, for patients with proximal interphalangeal (PIP) joint arthritis, the procedure of choice is not always clear.

Historically, arthrodesis has constituted the primary surgical option for treating hand OA because it provides consistent pain relief and stability.¹³ However, patients' growing demands for joint mobility coupled with the success of prosthetic implants at the metacarpophalangeal joint has spurred interest in PIP joint arthroplasty.^{14–18} Because both operations provide good pain relief, surgeon preference and the importance of joint mobility versus stability in the affected finger largely drive operative choice.^{19,20} Little is known regarding how other factors that may affect patient experience, such as cost, complication rates, or recovery time, influence individuals' surgical preferences. Furthermore, because it is difficult to measure patient-reported outcomes accurately, surgeons often favor objective metrics such as arc of motion or grip strength to gauge results, which may not correlate to meaningful differences in patients' daily lives.^{21–24}

Conjoint analysis (CA) offers a novel way to integrate objective metrics and patient preference. A well-established technique in market economics, CA is a survey method that seeks to determine what elements of a given product are most valuable and what aspects people are willing to trade. Conjoint analysis rests on the theory that every product's value can be determined by adding the value of its component attributes.^{25–27} For example, when selecting a car, potential buyers might consider gas mileage, safety, cost, and aesthetics; however, these features are not equally desirable. By varying the value-level of each of these attributes (20 vs 30 miles per gallon; \$25,000 vs \$30,000) and then repeatedly shuffling the

combinations and asking subjects to choose between hypothetical cars A and B (discrete choice experiments), researchers can determine not only what participants value most, but at what point they are willing to make trade-offs. In this case, a buyer might select the car with the best gas mileage until the cost exceeds a certain threshold, at which time the car would also have to come with a better safety profile to win. [Figure 1](#) describes this process as a schematic.

This study seeks to leverage these principles to bridge the existing gap between known clinical outcomes and unknown patient preferences. Using a combination of surgeon-identified attributes and patient preferences, we created a series of discrete choice experiments to determine the patient-assigned utility of arthrodesis versus arthroplasty at the population level. The results of this study may provide an important foundation for surgeons discussing the relative benefits of each procedure, and thus facilitate patient-centered decision making.

MATERIALS AND METHODS

Participants

This was a cross-sectional study using an online, single-administration, adaptive choice-based survey. We searched the electronic medical record (Michart, Epic Systems, Verona, WI) using International Classification of Diseases, Ninth and 10th Revisions codes to identify all persons seen at our institution who had a hand OA diagnosis between January 1, 2015 and August 18, 2017 ([Appendix A](#), available on the *Journal's* Web site at www.jhandsurg.org). Participants were then primarily recruited through the electronic medical record's messaging system. An additional 110 patients who had not enabled this functionality received postcards inviting them to enroll through the study Web site. Because PIP joint OA often affects multiple fingers (meaning that patients may undergo multiple operations over time), we included patients who both had and had not undergone surgery. Owing to poor specificity in diagnosis codes, before formal enrollment, patients had to answer additional screening questions confirming that they had been diagnosed with OA at the PIP joint, and that they had no concomitant rheumatologic disorders ([Appendix B](#), available on the *Journal's* Web site at www.jhandsurg.org). Participants who did not meet these criteria, those aged less than 18, and those who could not speak English were excluded from the study.

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