



The factors influencing the decision making of operative treatment for proximal humeral fractures

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Background: The factors influencing the decision making of operative treatment for fractures of the proximal humerus are debated. We hypothesized that there is no difference in treatment recommendations between surgeons shown radiographs alone and those shown radiographs and patient information. Secondly, we addressed (1) factors associated with a recommendation for operative treatment, (2) factors associated with recommendation for arthroplasty, (3) concordance with the recommendations of the treating surgeons, and (4) factors affecting the inter-rater reliability of treatment recommendations.

Methods: A total of 238 surgeons of the Science of Variation Group rated 40 radiographs of patients with proximal humerus fractures. Participants were randomized to receive information about the patient and mechanism of injury. The response variables included the choice of treatment (operative vs nonoperative) and the percentage of matches with the actual treatment.

Results: Participants who received patient information recommended operative treatment less than those who received no information. The patient information that had the greatest influence on treatment recommendations included age (55%) and fracture mechanism (32%). The only other factor associated with a recommendation for operative treatment was region of practice. There was no significant difference between participants who were and were not provided with information regarding agreement with the actual treatment (operative vs nonoperative) provided by the treating surgeon.

Conclusion: Patient information—older age in particular—is associated with a higher likelihood of recommending nonoperative treatment than radiographs alone. Clinical information did not improve agreement of the Science of Variation Group with the actual treatment or the generally poor interobserver agreement on treatment recommendations.

The Massachusetts General Hospital Institutional Research Board approved this study (IRB No.: 2009P001019).

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The role of operative treatment for fractures of the proximal humerus is debated. Surgery is considered for approximately 1 in 5 patients, but there is no consensus on which fractures benefit from surgery or which procedure to perform.⁷ The data to date are limited and inconclusive.^{7,9} A recent Cochrane review found no statistically significant difference between operative and nonoperative treatment regarding patient-reported functional scores and EuroQoL results at 1 year from 3 randomized control trials with a total of 153 participants.⁷ However, compared to nonoperative treatment, operative treatment had superior EuroQoL scores at 2 years of follow-up in 2 randomized control trials with a total of 101 participants.⁷

Among a small group of surgeons at 2 level 1 trauma centers, Okike et al¹¹ identified younger age, operative treatment of other musculoskeletal injuries, Arbeitsgemeinschaft für Osteosynthesefragen (AO) classification, translation-type displacement, associated glenohumeral dislocation, and surgeon subspecialty (upper extremity specialists were more likely to operate than traumatologists) as factors associated with operative intervention. The use of arthroplasty rather than internal fixation was associated with a higher Charlson score and more severe Neer and AO classifications.^{4,10,11} Many of these factors relate to the radiographic appearance of the fracture, whereas some relate to patient or surgeon factors.

We were curious about the factors that influence agreement between surgeons on treatment recommendations and the factors that lead a surgeon to recommend operative treatment and type of surgery (ie, fixation vs arthroplasty). We used the Science of Variation Group (SVOG), an international Web-based collaborative of practicing surgeons, to test the primary null hypothesis that there is no difference in treatment recommendations regarding operative vs nonoperative treatment between surgeons shown radiographs alone and those shown radiographs and patient information such as age, sex, hand dominance, and fracture mechanism. Secondly, we addressed (1) factors associated with a recommendation for operative treatment, (2) factors associated with recommendation for arthroplasty, (3) concordance with the recommendations of the treating surgeons, and (4) factors affecting inter-rater reliability of treatment recommendations.

Materials and methods

We asked the surgeons of the SOVG to complete a survey regarding the recommendation of operative or nonoperative

Table 1 Demographics of the participating surgeons

Parameters	Participants with radiographs (N = 228)	
	With additional information No. (%)	Without additional information No. (%)
Sex		
Men	122 (52)	101 (42)
Women	8 (3.2)	7 (2.8)
Location of practice		
Asia	9 (3.6)	2 (0.8)
Australia	4 (1.6)	2 (0.8)
Canada	7 (2.8)	4 (1.6)
Europe	40 (17)	27 (12)
United Kingdom	5 (2.0)	0
United States of America	59 (24)	62 (25)
Other	12 (4.8)	11 (4.4)
Years in practice		
0-5	41 (18)	40 (17)
6-10	29 (12)	18 (7.3)
11-20	34 (15)	33 (13)
21-30	26 (11)	17 (6.9)
Supervise trainees		
Yes	119 (50)	95 (39)
No	11 (5.6)	13 (5.6)
Fractures per year		
0-5	11 (4.8)	14 (5.6)
6-10	32 (13)	23 (9.7)
11-20	41 (17)	34 (14)
>20	50 (21)	37 (15)
Specialization		
General orthopedics	7 (2.8)	6 (2.4)
Orthopedic traumatology	58 (24)	35 (14)
Shoulder and elbow	27 (11)	27 (11)
Hand and wrist	32 (15)	39 (16)
Other	6 (2.4)	1 (0.4)

treatment for a series of proximal humeral fractures. The SOVG is an international collaboration of fully trained surgeon observers that studies variation in the definition, interpretation, classification, and treatment of human illness. Collaborative authorship, scientific curiosity, and camaraderie are the only incentives for participation.

Participating members viewed the radiographs of 20 fractures of the proximal humerus treated operatively and 20 treated nonoperatively. These were the radiographs used by the surgeon caring for the patient and were not standardized. Participants were randomized to receive information about the patient, including sex, age, American Society of Anesthesiologists (ASA)

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