**Commentary & Perspective**

**Proximal Humeral Fractures: “Damned If You Operate, and Damned If You Don’t”**

Commentary on an article by C. Michael Robinson, FRCS(Tr&Orth), et al.: “Complications and Long-Term Outcomes of Open Reduction and Plate Fixation of Proximal Humeral Fractures”

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In this retrospective case series (Level IV), Robinson et al. evaluated the risk of complications and the long-term outcomes of protocol-driven open reduction and internal fixation (ORIF) of complex proximal humeral fractures in medically fit adult patients operated on by shoulder specialists. This is a timely study as 3 randomized controlled trials (Level I) demonstrated no significant difference between ORIF and nonoperative treatment of proximal humeral fractures, and currently the optimal management of these fractures is somewhat unclear based on the recent randomized controlled trials comparing nonoperative management with various other surgical modalities.

Pragmatic trials are designed to evaluate the effectiveness of interventions under real-life routine clinical practice conditions in order to maximize applicability and generalizability, whereas explanatory trials test whether an intervention works in optimal situations and therefore their findings cannot be broadly generalized. The PROFHER (PROximal Fracture of the Humerus Evaluation by Randomization) study is a pragmatic randomized controlled trial conducted in 33 centers with 66 surgeons (including senior residents). This increases its generalizability; however, with a median of 3 patients treated at each center it also raises a concern about consistency in treatment. The exclusion of patients with a “clear indication for surgery” such as severe soft-tissue compromise, multiple injuries (upper-limb fractures), pathological fracture (other than osteoporotic), and terminal illness has been a frequent criticism of the study as this can also be interpreted as a selection bias in favor of nonoperative treatment. However, the study’s goal is to focus on patients for whom the optimal management strategy is equivocal. For this reason, the PROFHER trial also excluded fracture-dislocations of the proximal part of the humerus. Additionally, although the majority (82.6%) of the surgical procedures were done with a locked plate, other surgical modalities were utilized. The average Oxford Shoulder Score (OSS) at 2 years was approximately 40 for both the surgical and the nonsurgical group in the PROFHER study. The surgical group had an 8.8% rate of medical complications during the perioperative period and an overall 24% rate of complications, resulting in 9% of the surgically treated patients having reoperations. The nonsurgical group had an overall 18% complication rate, resulting in a 9% reoperation rate. When these patients were followed for 5 years there was no difference between the surgical and nonoperative treatment groups in terms of the OSS or quality-of-life scores. Further cost-utility analysis was performed for the PROFHER trial patients, and the probability of surgery being cost-effective was found to be <10%.

The literature contains 2 more randomized controlled trials comparing the outcomes of nonoperative management with those of ORIF for proximal humeral fractures. Olerud et al. performed a Level-I study comparing ORIF with nonoperative management of displaced 3-part proximal humeral fractures in 60 patients with a mean age of 74 years and found no significant difference in Disabilities of the Arm, Shoulder and Hand (DASH) or Constant scores, range-of-motion values, or subjective quality-of-life scores between groups, although ORIF trended better clinically. There was a 30% reoperation rate in the surgical group compared with 3% in the nonoperative group. Fjalestad et al. also compared ORIF with nonoperative treatment, in a Level-I study of 50 patients over the age of 60, and found no difference in American Shoulder and Elbow Surgeons (ASES), Constant, or quality-of-life scores between groups during a 1-year follow-up period.

Although there is a lack of consensus among orthopaedic surgeons regarding how the classification systems in current use can guide decision-making (operative versus nonoperative treatment) and—if the decision is to operate—which operative modality should be used, the majority of orthopaedic surgeons would have been inclined to operate on the patient population in the study by Robinson et al. because they were medically fit adults with very complex proximal humeral fractures. Therefore, this study sheds light on which specific patient groups might benefit from surgery.

The major strength of this study, which makes it unique compared with prior literature, is the long-term outcome data (median, >10 years) presented with patient-reported outcome measures (OSS and QuickDASH). The overall complication rate related to surgery was 34%, and the reoperation rate was 23.9% (88 patients had a total of 106 surgical reinterventions). Although ADROM (arthrolysis, subacromial decompression, and implant removal) was the major type of repeat surgical intervention, it is
still another surgery with inherent risks that adds to the cost of care in today’s environment of value-based use of resources. In the long term, the OSS averaged 39 and QuickDASH score averaged 17.2. From these data, we can conclude that surgery for complex proximal humeral fractures leads to overall good long-term outcomes with high overall complication and reoperation rates.

Robinson et al. emphasize that their “exploratory” study is the antithesis of the “pragmatic” PROFHER trial, and they recommend the use of ORIF when done by shoulder specialists for medically fit patients with a severe proximal humeral fracture. Despite the OSS in their study being very similar to that in the PROFHER trial, Robinson et al. reported a higher complication rate (and the medical complications that are part of the complication rate in the PROFHER study are not reported in this study) as well as a higher reoperation rate, even though the operations were done by “the best hands,” because the study includes more complex proximal humeral fractures. Without conducting a randomized nonoperative arm of this study or a better knowledge of the natural history of complex fractures, it would not be appropriate to recommend surgery based on the results presented here given the available literature. However, these results help the surgeon and patient to understand potential outcomes and complications associated with ORIF for proximal humeral fractures.

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Disclosure: The author indicated that no external funding was received for any aspect of this work. On the Disclosure of Potential Conflicts of Interest form, which is provided with the online version of the article, the author checked “yes” to indicate that the author had a relevant financial relationship in the biomedical arena outside the submitted work (http://links.lww.com/JBJS/F576).

References