

Has the ProFHER Trial Influenced the Practice Patterns of Orthopaedic Surgeons Treating Proximal Humerus Fractures in North America?

Ujash Sheth¹, Jimmy Tat, Michael Paterson², Deva Thiruchelvam, Diane Nam

¹Sunnybrook Health Sciences Centre, University of Toronto, ²ICES

INTRODUCTION:

The PROximal Fracture of the Humerus: Evaluation by Randomization (ProFHER) trial was published in the Journal of the American Medical Association (JAMA) in March of 2015 and found no difference in Oxford Shoulder Scores (OSS) between patients undergoing surgery (open reduction internal fixation [ORIF] OR hemiarthroplasty) and those treated without surgery at 2 years of follow up. However, the results of the study have been criticized due to the poor inclusion rate (250 of a possible 1250), potential selection bias (excluding those with “clear indications for surgery”), limited generalizability to 4-part proximal humerus fractures, and absence of reverse total shoulder arthroplasty (RTSA) as a treatment option in the surgical cohort. Although several studies have examined the impact of the ProFHER trial on the management of proximal humerus fractures in Europe, it remains unknown how the study findings have impacted orthopaedic surgeons practicing in North America.

METHODS:

Provincial health administrative databases in Ontario, Canada were used to identify patients 50 years of age and older with a proximal humerus fracture from April 2004 to March 2019. The proportion of proximal humerus fractures treated with and without surgery was calculated for each calendar quarter and year. A subgroup analysis was performed to evaluate the trends in utilization of reverse total shoulder arthroplasty as a treatment option for proximal humerus fractures during the study period. An interrupted time-series analysis was used to determine whether changes in the proportion of surgically and nonsurgically managed proximal humerus fractures were chronologically related to the publication of the ProFHER trial (first quarter, 2015). The time-series analysis for the surgical cohort was examined based on treatments included in the ProFHER study (i.e., ORIF and hemiarthroplasty) and those that weren't (RTSA).

RESULTS:

Among the 68,218 proximal humerus fractures that occurred during the study period, 89.2% of patients were treated nonsurgically, 9.2% underwent ORIF or hemiarthroplasty, and 1.6% of fractures were treated with RTSA. In the second quarter of 2004, the rate of ORIF and hemiarthroplasty was 9.1% and rising in Ontario, Canada. By the end of the study period, the rate was 7.9% and demonstrating a sharp downturn. Based on the results of the time-series analysis, there is evidence to suggest that the rate of ORIF and hemiarthroplasty as a treatment for proximal humerus fractures significantly decreased in Ontario, Canada immediately following publication of ProFHER trial ($P > 0.05$) as evidenced by a change in both the slope and intercept (step) (Figure 1). Similarly, the rate of nonsurgical management was noted to significantly increase in the period immediately after publication (Figure 2). This increase, however, was not sustained, in large part due to the greater use of RTSA for proximal humerus fractures. RTSA utilization was found to exponentially increase, both prior to and after the dissemination of the ProFHER trials results as demonstrated by the 350% increase in its use during the study period (Figure 3).

DISCUSSION AND CONCLUSION:

Despite the various criticisms of the ProFHER study, a significant change in practice was observed in the management of proximal humerus fractures in this large North American cohort. A significant decrease in ORIF and hemiarthroplasty was observed immediately following the publication of the ProFHER trial, while the rate of nonsurgical treatment significantly increased. A trend toward increased utilization of RTSA in the fracture setting was observed throughout the study period. The findings of the current study suggest that the results of the ProFHER trial may have influenced the practice patterns of orthopaedic surgeons in Ontario, Canada. However, our results also revealed that the ProFHER study may not be applicable to all patients with a proximal humerus fracture as evidenced by the exponential increase in RTSA utilization in this population. Further study is required to determine who would benefit from RTSA in the fracture setting.

