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CORR Insights®: Is Arthroscopic Technique Superior to Open Reduction Internal Fixation in the Treatment of Isolated Displaced Greater Tuberosity Fractures?

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Where Are We Now?

During the past two decades, important advancements have been made in the understanding and treatment of displaced greater tuberosity fractures of the proximal humerus. Because the rotator cuff attaches to the greater tuberosity, malunions can lead to severe weakness and loss of function. We now understand that displacement of greater than 5 mm can lead to

impingement and limitations in range of motion if allowed to heal in a malunited position [3], as opposed to the previously accepted displacement of 10 mm. Initial descriptions of open reduction and internal fixation (ORIF) utilizing suture technique and bone tunnels [2] demonstrated reliable results but often lead to overreduction of the greater tuberosity. Several technologic innovations since that time have improved the surgeon's ability to

obtain and maintain an anatomic reduction more reliably including suture anchors [6] and the proximal humeral locking plate utilized in this comparison series. But interobserver reliability in the description of proximal humerus fractures still remains a problem [5] and displaced greater tuberosities can be seen as an isolated injury or in combination with impacted proximal humeral fractures. A failure to differentiate these two fracture patterns can confound a surgeon's thinking and his/her ability to evaluate the results of various treatment options. These fractures are rare enough that a large series to evaluate the results of treatment is difficult to compile.

Liao and colleagues present a large series of patients comparing an arthroscopic and an open technique for the management of displaced greater tuberosity fractures. This is a retrospective controlled series, which compares two specific techniques: One utilizing a double-row suture bridge technique with suture anchors

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arthroscopically, and a second with ORIF utilizing a proximal humeral locking plate via the deltopectoral approach. Both techniques are effective resulting in consistent healing with either method and with few complications.

Where Do We Need To Go?

The current study demonstrates that there is an increasing role for arthroscopic approaches to this type of fracture. There are, however, other open techniques including a double-row suture bridge technique performed open via a superior deltoid splitting approach which can be utilized for this fracture effectively [6]. This technique is effective for isolated greater tuberosity fractures, but may not be as beneficial in fractures which also involve the surgical or anatomic neck of the humerus because this approach does not allow access for more distal fixation necessary to stabilize the humeral neck. The surgeon must therefore be able to reliably identify the difference between these fracture variations preoperatively. Percutaneous pinning techniques for this fracture have shown to be reliable in a few centers [4], although this technique is extremely demanding. Further investigation of these open techniques in comparison with arthroscopy

certainly is called for. The arthroscopic technique presented in this current series was highly effective in less-displaced fractures with smaller fragments. The arthroscopic technique, however, continues to be relatively demanding and is not an option for all surgeons.

How Do We Get There?

Improvements in our understanding and management of displaced greater tuberosity fractures will depend on improved interobserver reliability in the classification of fractures. CT scan, especially with three-dimensional reconstruction, may be a valuable tool in improving our ability to classify fractures adequately and improve the validity of comparison series such as this [1]. We can improve upon arthroscopic techniques so that fractures with even larger fragments, and with greater displacements, can be adequately managed arthroscopically. This will require a fine-tuning of the surgical technique and possibly an improvement in surgical devices to assist the surgeon in obtaining adequate reduction and fixation of these larger and more widely displaced fragments of greater tuberosity. The current study emphasizes the benefits of arthroscopic techniques with excellent healing rates, improved ROM, and

decreased need for revision surgery. As this fracture is relatively rare, multicenter studies may be critical to our ability to generate series of adequate size to generate enough power to evaluate treatment results. These studies can evaluate other open techniques not just limited the proximal humeral plating and help determine the indications for open versus arthroscopic treatment of these fractures in the future.

References

1. Bernstein J, Adler LM, Blank JE, Dalsey RM, Williams GR, Iannotti JP. Evaluation of the neer classification of proximal humeral fractures with computerized tomographic scans and plain radiographs. *J Bone Joint Surg Am.* 1996;78:1371–1375.
2. Flatow EL, Cuomo F, Maday MG, Miller SR, McIlveen SJ, Bigliani LU. Open reduction and internal fixation of two-part displaced fractures of the greater tuberosity of the proximal part of the humerus. *J Bone Joint Surg Am.* 1991;73:1213–1218.
3. Green A, Izzi J Jr. Isolated fractures of the greater tuberosity of the proximal humerus. *J Shoulder Elbow Surg.* 2003;12:641–649.
4. Keener JD, Parsons BO, Flatow EL, Rogers K, Williams GR, Galatz LM. Outcomes after percutaneous reduction and fixation of proximal humeral fractures. *J Shoulder Elbow Surg.* 2007;16:330–338.

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5. Sidor ML, Zuckerman JD, Lyon T, Koval K, Schoenberg N. Classification of proximal humerus fractures: The contribution of the scapular lateral and axillary radiographs. *J Shoulder Elbow Surg.* 1994;3:24–27.
6. Song HS, Williams GR Jr. Arthroscopic reduction and fixation with suture-bridge technique for displaced or comminuted greater tuberosity fractures. *Arthroscopy.* 2008;24:956–960.