Hemiarthroplasty for Proximal Humerus Fracture in Young Patient

Patient Profile/History

The patient presents with a comminuted fracture of the proximal humerus with a head split fracture that was not a mendable open reduction and internal fixation.

The patient is a forty five year old male who presented to the emergency room with acute right shoulder pain. This occurred by a fall out of his pick-up truck. The patient presented with acute swelling, pain with any type of motion of the shoulder, and mar crepitus to palpation.

Radiographs revealed a head split fracture of the proximal humerus with head fragments in the axilla. A CT scan was performed confirming the comminution of the proximal humerus with a head split fragment deep in the patient’s axilla. In this case, the patient has lost the blood supply to the articular fragment, and open reduction internal fixation was not indicated. Because of the patient’s relatively young age, hemiarthroplasty was recommended.

Surgical Treatment

The patient was taken to the operating room for his comminuted fracture to the proximal humerus. A standard deltopectoral approach was utilized. The bicep was identified distally and traced proximally through the fracture site between the interval of the subscapularis and supraspinatus. This confirmed the humeral head was in multiple fragments with total loss of soft tissue attachment and no blood supply. The articular fragments of the humeral head were removed, and the greater and lesser tuberosities were maintained. The Integra® Titan™ press-fit hemiarthroplasty was selected. In this case, a relatively large distal stem is utilized with a small proximal body. The large stem allows for good press-fit distal fixation without cement, and the small body allows for better contact with the tuberosities for healing. The height of the stem and body were picked so that the head would be well-centered in the glenoid. In the Titan system, once the stem is selected, different body heights can be utilized to ideally position the head in the glenoid.

Sutures were placed in the proximal humerus prior to insertion of the stem and in the suture holes of the fracture body to secure the tuberosities. The stem was inserted, the head was placed, and then the tuberosities were sewn back to the proximal humerus shaft and to themselves with the previously placed sutures.
Pre-Op and Post-Op Radiograph/MRI/CT Images and Surgical Pictures

A postoperative radiograph showed excellent healing of the tuberosities back to the shaft and the humeral head well-centered in the glenoid. The patient has significant pain relief and a very functional range of motion.

Figure 1 – Anterior posterior radiograph of a comminuted fracture of the proximal humerus with a head split fragment displaced in the patient’s axillary fossa.

Figure 2 – Anterior posterior CT demonstrating the comminuted fracture of the proximal humerus with head split fragments displaced into the axillary fossa.

Figure 3 – Fluoroscopic view utilized to identify the correct height of the prosthesis. This is a size 12 stem with a short fracture body. By fluoroscopy, the head appears slightly inferiorly subluxed in relation to the glenoid.

Figure 4 – The advantage of the Integra Titan press-fit system is once the ideal stem size is selected, various height fracture bodies can be utilized to determine the correct height of the head into the glenoid.

Figure 5 – Fluoroscopic view showed the same stem, but now a long body has been placed which centralized the head into the glenoid.

Figure 6 – Post-operative anterior/posterior radiograph shows excellent position of the head into the glenoid. Note the bony callus formation around the greater tuberosities and good positioning of the greater tuberosity in relation to the head of the prosthesis.

Physician Conclusion

The Integra press-fit shoulder has a unique advantage over many other systems when treating fractures of the proximal humerus when hemiarthroplasty is indicated. In this case example, one can use a relatively large stem and a small body. A small body allows for better bony contact for the tuberosities to heal to themselves. In other systems, the bigger the stem utilized, the larger the metaphysis portion of the body, which decreases bony contact of the tuberosities. Utilizing a mismatch of a small body to a large stem, allows excellent press-fit fixation distally, avoids the use of cement which significantly decreases OR time, and allows the tuberosities to heal with better bony contact. Using a press-fit humeral component also decreases the chance the cement will creep between the tuberosities, thereby blocking bony union. Since there is no metaphysis, a well-fit distal stem provides immediate stability, compared to a proximal-stabilized stem. Determining proper humeral head height is much easier compared to other systems. Once the stem size is selected with a good fit proximal humeral stem diaphyseal fit, varying body heights can then be utilized to pick the ideal height of the final prosthesis. The humeral head is immediately well-centered in the glenoid fossa due to the diaphyseal press-fit compared to other systems with a smaller stem that has to be set with cement making determination of head height more difficult.