Exposures of the Shoulder and Upper Humerus

Harry Hoyen, MD[a,*], Rick Papendrea, MD[b]

KEYWORDS

• Anterior exposure • Anterolateral exposure • Posterior exposure • Extensile Judet exposure • Deltopectoral • Axillary nerve • Radial nerve

KEY POINTS

- The standard exposure to the shoulder and upper humerus is through a deltopectoral approach.
- Strategies for mobilization of the deltoid and exposure of the axillary nerve are important for wider exposure of the proximal humerus.
- Extensile approaches enable exposure of the whole humerus.

INTRODUCTION

The surgical approaches to the shoulder and upper humerus are essential for the trauma and reconstructive surgeon. The ability to perform a facile exposure to the upper arm will pay dividends in arthroplasty and fracture stabilization procedures. Owing to the intricate relationship between the vital neurovascular structures, muscle envelope, and necessary osseous exposure; minimally invasive procedures are not utilized or as necessary as with the lower limb.

The basic principles for exposure depend on the primary placement of the fixation. Although this article does not discuss in great detail primary arthroplasty procedures, in complex trauma, hemiarthroplasty, and reverse arthroplasty for proximal humerus fractures may be necessary. Thus, the choice of exposure in fractures that require an intraoperative decision between arthroplasty and fixation is vitally important.

In general terms, fixation is located along the lateral part of the upper humerus, with distal fixation in the posterior region. In the shoulder region, the approach is through a traditional anterior exposure or anterolateral approach. Fig. 1 shows the different approaches to the shoulder.

Although this article has some overlap with the fixation technique article for the humerus (see the discussion by Capo, Criner, and Shamian, also in this issue), this can be used as a guide to determine which fracture patterns are amendable to each exposure type. The tips for exposure are described with the advantages and disadvantages highlighted. The majority of these approaches are through predictable internervous planes.

ANTERIOR SHOULDER EXPOSURE

Deltopectoral

The traditional anterior shoulder exposure or the workhorse for arthroplasty and fixation has been the deltopectoral exposure. The incision is center of the deltoid–pectoral interval, which is typically over the coracoid. The swelling in the shoulder after trauma can make it difficult to identify the

[a] Department of Orthopaedic Surgery, MetroHealth Medical Center, Case Western Reserve University, 2500 Metrohealth Drive, Cleveland, OH 44109, USA; [b] Department of Orthopaedic Surgery, Medical College of Wisconsin, Papendrea Orthopaedic Associates of Wisconsin, S.C. 1111 Delafield Street, Suite 120, Waukesha, WI 53188, USA

* Corresponding author.

E-mail address: hhoyen@metrohealth.org

Hand Clin 30 (2014) 391–399

http://dx.doi.org/10.1016/j.hcl.2014.08.003

0749-0712/14/$ – see front matter

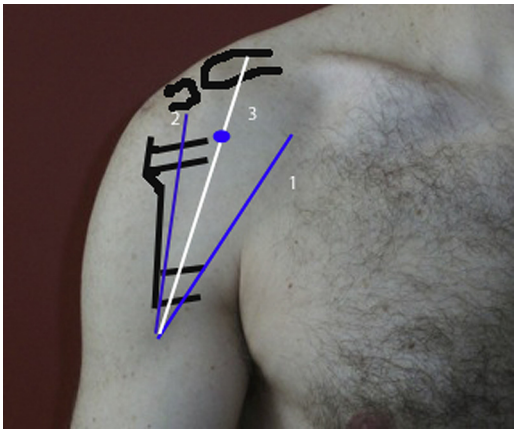

Fig. 1. Anterior skin landmarks with depiction of lateral plate fixation. (1) Actual interval between the deltoid and pectoralis muscles. (2) Interval between the anterior and middle portions of the deltoid. (3) Incision for the deltopectoral approach.

Fig. 3. The skin incision: superficial deltopectoral interval.

medial aspect of the deltoid, thus keeping the exposure toward the more palpable coracoid (Fig. 2).

Whether it is the anterior exposure to the glenohumeral joint for arthroplasty or the lateral aspect of the proximal humerus, the deltoid shrouds the exposure (Figs. 3 and 4). There are several strategies for mobilizing the deltoid. The distal aspect of the deltoid and the anterior aspect of its tendinous insertion can be mobilized to permit lateral retraction of the deltoid. There are multiple perforating vessels at the anterior deltoid insertion that require bovie electrocautery. The deltoid insertion is quite encompassing around the posterior aspect of the humerus and the anterior fibers and periosteum can be elevated without concern of proximal migration of the muscle. This enables the entire anterior muscle tendon unit to be mobilized laterally.

Fig. 2. With a displaced proximal humerus shaft fracture, the displacement of the deltoid can make incision planning more difficult.

The clavipectoral fascia is cleared to identify the rotator cuff interval and subacromial space. There is a definitive, palpable separation between the supraspinatus and subscapularis. If the surgeon cannot identify the rotator interval, the biceps tendon in the bicipital groove can be followed proximal to the distal edge of the anterior supraspinatus fibers. These fibers are very stout, but slightly posterior and medial dissection will lead to the interval (Fig. 5A).

As the biceps exits the groove distally, the inferior border of the subscapularis can be palpated. This will lead to proximal humerus calcar and the axillary nerve as it courses beneath the inferior capsule. Although the calcar cannot be directly visualized, the reduction cannot be palpated through this exposure. The axillary nerve can be palpated underneath the conjoined tendon. It is in very close proximity and courses just beneath the glenohumeral joint capsule.

The axillary nerve can also be found laterally as it is arborizing within the deltoid. Another important fracture landmark is that the nerve is often found at the distal spike of the greater tuberosity fragment. It is helpful to mobilize the nerve from this spike and the humerus. This is important for later fracture reduction, because this distal spike can often be anatomically reduced. This move will