A Modified Judet Approach to the Scapula

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Summary: Operative treatment of scapula fractures is uncommon, but is indicated for significantly displaced fractures or intra-articular fractures. This modified Judet approach for exposure of scapula fractures combines several important goals: 1) exposure of all bony elements of the scapula which have adequate bone stock for internal fixation; 2) minimal trauma to the rotator cuff musculature; and 3) protection of the major neurologic structures (suprascapular nerve superiorly and axillary nerve laterally). The main advantage of the exposure is limiting muscular dissection, which can potentially improve rehabilitation and limit morbidity of the operation.

Key Words: scapula, fracture, Judet, approach, fixation

Operative treatment of scapula fractures is uncommon,1 and there remains debate regarding the optimal treatment of these fractures.2 Many authors have concluded that operative indications include intra-articular fractures with greater than 5 mm of articular stepoff or instability.3–6 Additional indications have also included glenoid neck angulation of greater than 40°, greater than 1 to 2 cm of displacement, or disruption of the superior suspensory complex of the shoulder.5,7

One of the most common and practical surgical approaches to the scapula is the posterior (Judit) approach, which involves dissection of the infraspinatus muscle from the infraspinatus fossa to facilitate fracture reduction and fixation.3,8 The senior author has used the Judet approach to stabilize displaced scapula fractures, but felt that the dissection of the infraspinatus was unnecessarily damaging to the shoulder musculature. The vertical lateral scapular incision as described by Hardegger et al7 with intermuscular deep dissection was also used, but limited exposure of the scapular spine and medial border made visualization and reduction difficult in complex fractures. The senior author then began a using a combination of these approaches that allows wide exposure with minimal muscle disruption. We describe this as a modification to the Judet approach in which an extensile skin incision and atraumatic muscle dissection allows for reliable exposure of the medial and lateral borders of the scapula as well as the scapular spine. With this approach, reduction of a glenoid articular fracture can be verified with intraoperative fluoroscopy and/or direct visualization with reflection of the infraspinatus tendon. Direct reduction of the scapula body is feasible with complete exposure of most of the substantial bone of the scapula and minimal morbidity to the infraspinatus muscle.

APPROACH

This exposure combines several important goals: 1) exposure of the bony elements of the scapula that have adequate bone stock for internal fixation; 2) minimal trauma to the rotator cuff musculature; and 3) protection of the major neurologic structures (suprascapular nerve superiorly and axillary nerve laterally).

The patient is placed in a prone position with the ipsilateral arm draped free and a small bump under the anterior chest. The extensile skin incision as described by Judet is based on the subcutaneous border of the scapular spine and angled sharply at the superomedial angle of the scapula and follows the medial border inferiorly to the inferior angle. Sharp dissection to the fascia is performed. A large skin flap and associated subcutaneous fat is elevated off the fascia, exposing the infraspinatus, teres minor, teres major, and posterior deltoid muscles of the scapula (Figs. 1, 2). Scissor dissection with a curved Mayo in the areolar tissue plane facilitates this exposure better than electrocautery. Bleeding of fascial perforators is controlled with electrocautery. The skin flap then is extended laterally beyond the lateral scapular border. The superomedial border of the latissimus is encountered inferiorly. The plane between the posterior deltoid and the infraspinatus should be developed using blunt dissection. The fascia of the posterior deltoid is then dissected off of the spine of the scapula, releasing the origin of the posterior deltoid. The posterior deltoid origin with the overlying fascia is tagged and retracted superolaterally (Fig. 3). Laterally, the plane between the teres minor and infraspinatus is developed and allows exposure of the ascending branch of the circumflex scapular artery, which is ligated (Fig. 2).
it may be a source of rapid bleeding, and vascular clips should be readily available.

Careful retraction of the lateral portion of the teres minor and infraspinatus muscles allows exposure of the lateral border of the scapula (Figs. 3, 4). From this position, mobilization and reduction of the fragments may indirectly reduce a fracture of the glenoid surface and the glenoid neck. Mobilization, reduction, and fixation of these fractures can be difficult, especially if the fracture is approached 1 to 2 weeks after injury. Reduction can be facilitated by placement of K-wires or Schanz screws into the scapular lateral border, glenoid neck or scapular spine. These can be used to mobilize and manipulate the fracture to improve reduction. Reduction can be held with small pointed reduction forceps or by applying a small external fixator to the Schanz screws. Precontouring and fixing the plate to the intact lateral scapular border can also aid reduction by allowing clamping of the plate to the short glenoid neck segment of the fracture. Glenoid neck fractures are commonly reported to be medialized. It is the authors’ experience that reduction of glenoid neck fractures usually requires medialization of the scapular body rather than lateralization of the glenoid. The deforming forces of the infraspinatus, subscapularis, and teres minor muscles pull the body laterally and/or reduction of a glenoid neck fracture requires medialization of the inferior spike of the fracture, as the inferior aspect of the fracture has abducted away from the scapular body.

Buttress plating of the lateral border of the scapula with 2.7-mm or 3.5-mm reconstruction or DC plates and/or periar-
ticular screws may be applied from this exposure (Fig. 3). Some fracture patterns involve displacement of the scapular spine or medial border of the scapula, and these may be reduced directly with this exposure and stabilized with one-third tubular or reconstruction plates. Exposure of the medial spine may be done with minimal dissection and exposure only on the medial border of the scapula. Closure of the approach involves repairing the posterior deltoid back to the scapular spine through drill holes with nonabsorbable suture and layered closure of the skin flap.

**DISCUSSION**

Fractures of the scapula occur infrequently and are most commonly associated with high-energy trauma. The majority of scapula fractures can be treated nonoperatively.²,⁶,¹⁰ Ten percent to 44% of scapula fractures involve the glenoid and scapular neck.⁴,⁶,¹¹ Associated thoracic and vascular injuries are infrequent but should not be overlooked.

Debate remains regarding the best treatment of intra-articular and significantly displaced scapula fractures. Although some authors have reported good results following nonoperative treatment,⁶,⁸,¹⁰,¹² other authors have reported less than uniformly favorable outcomes.⁶,¹³ Goals of surgical management of these injuries should include prevention of degenerative joint disease, pain, and instability. Hardegger et al⁷ reported 79% good to excellent results at an average of 6.5 years with internal fixation of intra-articular fractures or fractures that had glenohumeral or neck instability. Hardegger et al⁷ and Kavanagh et al⁵ used a vertical incision from the acromion to the inferior scapular angle. However, the posterior deltoid cannot be freed or released from this approach and this could make visualization of a high glenoid neck or intra-articular fracture difficult. Additionally, one would not have access to the entire scapular spine and medial scapula for fixation of bony fractures. Other posterior approaches to the shoulder have been described for soft tissue or articular pathology.¹⁴–¹⁶ These approaches all include a vertical incision and then advocate either deltoid splitting,¹⁶ infraspinatus splitting,¹⁵ or deltoid retraction and splitting the infraspinatus and teres minor interval.¹⁵ These variations were all successful in treating intra-articular or soft tissue pathology and were documented as safe clinically or in cadaver studies.¹⁶–²⁰ These approaches are all similar to the vertical approach used by Hardegger et al in their series of internal fixation of scapula fractures.⁷ The problem with all these approaches is that they do not allow exposure and reduction of a fracture that involves the scapula spine or medial border. Required retraction of the posterior deltoid may also limit exposure of the joint, especially in a muscular patient.

Superior and posterior joint exposure can be limited in approaches that use a vertical lateral skin incision. Norwood et al avoid this problem with a horizontal incision along the scapular spine. This approach was reported in 42 patients with posterior instability or rotator cuff pathology.²¹ Deep dissection elevates the posterior deltoid off of the scapular spine and then allows joint exposure by superiorly dissecting the supraspinatus and infraspinatus inferiorly or posteriorly splitting the infraspinatus and teres minor interval. However, exposure and fixation of an inferior glenoid neck fracture or medial scapular body would be limited by this approach. Kligman and Roffman also describe a novel approach to intra-articular glenoid fractures using an incision along the scapular spine and dissection of the posterior deltoid with inferior retraction and intra-articular visualization with rotator cuff tendon incision and retraction.²² This approach also does not allow for exposure of the glenoid neck and scapular body.

A similar exposure to the modified Judet approach that allows exposure and fixation of all scapular fractures and minimal muscular dissection was described by Ebraheim et al after exploration in 20 cadaver dissections and utilization in 2 patients with scapular fractures.²³ Ebraheim et al’s approach utilizes a skin incision along the scapular spine and then a vertical extension at the lateral border of the scapula. A medially based fascia flap is raised to expose the scapular musculature. This approach essentially uses a “reverse Judet” skin incision.

However, the modified Judet approach described in this article utilizes the original Judet skin incision that is familiar to trauma and shoulder surgeons, limits muscle dissection by following muscular planes, allows complete joint exposure, and enables exposure/reduction/fixation for all scapular body or neck fractures.

The modified Judet approach and positioning does not address clavicle fractures that may be associated with “floating shoulders.” The need to operatively stabilize all “floating shoulders” has been questioned with anatomic dissections and clinical reports.⁹,¹⁰,²⁴ Some authors have reported internal fixations of only the clavicle in patients with combined scapular and clavicle fractures with good results.¹⁷,²² If internal fixation of a clavicle fracture is indicated, one would need to do this prior to (preferred) or after fixation of the scapula with the patient in a beach chair²⁵ or lateral position.¹⁸

The Judet approach has been the standard approach for the operative treatment of scapular fractures. The only modification of this approach is that the infraspinatus muscle is not dissected out of the scapular fossa. This modified approach has all the advantages of the classic approach with visualization of all fracture patterns and fracture lines as well as the ability to address intra-articular and glenoid fractures without the morbidity of the extensive dissection.

It is a safe dissection, as the suprascapular and axillary nerves are at minimal risk. Potential complications would be bleeding, seroma, or nerve injury. Excessive bleeding from the ascending branch of the circumflex scapular artery is usually present at the inferior edge of a glenoid neck fracture. If bleeding occurs, it can be controlled with vascular clips. A postoperative seroma can also develop due to the large subcutaneous
flap. Careful layered closure of the flap, drains left until minimal output is present, and a compressive dressing will help prevent this complication. The suprascapular and axillary nerves are protected by surrounding muscles, and visualization of them is not necessary.

In conclusion, these are uncommon injuries, and 10 patients have been treated with this exposure from June 2001 to September 2003. No patient had an intraoperative nerve or vascular injury. All have had union of their fracture and nearly full return of motion and strength. The authors believe this modified approach allows patients faster rehabilitation and greater long-term strength, especially with external rotation.

REFERENCES