

Modified Gerwin Surgical Technique for Pediatric Proximal Humerus Osteochondroma: A Case Report

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Abstract

Introduction: The anterior and anterolateral approaches to the humerus describe splitting brachialis longitudinally, assuming its fibres run parallel to the shaft. A recent anatomic study has demonstrated the predictability of the position of the axillary nerve as it crosses the anterior deltoid raphe, which allows it to be isolated and protected, and dissection can be extended distally. In addition, no accessory motor branches to the anterior head of the deltoid cross the raphe, so extending an incision through the raphe after protecting the main motor branch of the axillary does not place the innervation to the anterior deltoid at risk. This the Modified Gerwin Approach allows exposure of the proximal humerus and indirect reduction of the fracture, with subsequent locking plate fixation, adhering to the principles of biological fixation.

Methods: Surgical Technique: Patient positioning: Supine or beach-chair position. Incision: Anterolateral incision (3-6 cm) between the deltoid and biceps muscles. Dissection: Interval between deltoid and biceps muscles developed. Retraction: Deltoid muscle retracted posteriorly; biceps muscle retracted anteriorly. Humerus exposure: Radial nerve and profunda brachii artery identified and protected. Procedure-specific steps: Perform fracture fixation, tumor resection, infection management, or neurological procedure.

Results: Advantages: Minimal muscle damage. Excellent visualization of proximal humerus. Reduced risk of radial nerve injury. Easy conversion to deltopectoral approach. Potential Complications: Radial nerve injury. Axillary artery damage. Infection. Fracture or hardware failure. Muscle weakness or atrophy.

Conclusions: Improved anatomical understanding: The Modified Gerwin Approach surgical exposure to the proximal humerus provides the largest humeral exposure with the greatest visibility of landmarks relative to the most widely utilized standard approaches. Minimal muscle damage with excellent visualization of proximal humerus and reduced risk of radial nerve injury and Easy conversion to deltopectoral approaches demonstrates satisfactory outcomes using this approach.

Keywords: Modified; Gerwin; Proximal; Humerus; Osteochondroma.

Introduction

The deltopectoral surgical approach is most frequently used and requires significant muscle retraction and soft tissue stripping to expose the lateral humeral neck. This may contribute to avascular necrosis and fixation failure. Lateral approaches have been limited to 5 cm distal to the acromion because of the course of the anterior branch of the axillary nerve [1]. A recent anatomic study has demonstrated the predictability of the position of the axillary nerve as it crosses the anterior deltoid raphe,

which allows it to be isolated and protected, and dissection can be extended distally. In addition, no accessory motor branches to the anterior head of the deltoid cross the raphe, so extending an incision through the raphe after protecting the main motor branch of the axillary does not place the innervation to the anterior deltoid at risk [2]. This the Modified Gerwin Approach allows exposure of the proximal humerus and indirect reduction of the fracture, with subsequent locking plate fixation, adhering to the principles of biological fixation [3].

Adequate exposure of the proximal humerus is necessary to address atypical or complex proximal humerus fractures and orthopedic tumors. Surgical management may be difficult through existing approaches due to their limited nature and the delicate neurovascular anatomy of the shoulder. The Modified Gerwin Approach, a previously described extensile approach, can be incorporated into the surgeon's armamentarium as an alternative exposure to the proximal humerus [4].

The objective of this study was to quantify and compare the humeral exposure achieved through the Modified Gerwin Approach with the standard direct lateral deltoid-splitting, anterolateral acromial, and deltopectoral approaches in terms of surface area and exposure of key anatomic landmarks.

Indications the Modified Gerwin Approach

Proximal humerus fractures (e.g., two-part, three-part, four-part), Humeral head fractures and Proximal humerus non-unions or malunions also in Tumor resections and Shoulder arthroplasty [5].

Methods

After identifying landmarks, exposure area of exposed humerus was quantified using digital images in Surgical Technique.

- Patient positioning: Beach-chair or supine position with arm abduction.
- Incision: Anterolateral incision (5-7 cm) between deltoid and biceps muscles (Figure 1).
- Dissection: Interval between deltoid and biceps developed (Figure 2).
- Retraction: Deltoid muscle retracted posteriorly; biceps muscle retracted anteriorly (Figure 3).
- Proximal humerus exposure: Radial nerve and axillary artery identified and protected (Figure 4).
- Procedure-specific steps: Perform fracture reduction, fixation, or tumor resection close wound in layers (Figure 5) [6].

Results

The Modified Gerwin Approach yielded an average exposure area of 6 cm². Comparison of the exposure area for the deltoid lift against each of the other approaches yielded statistical significance ($P < .01$). The exposure provided was 2-folds greater than that of the next most extensive approach.



Figure 1: Showing clinical photo of pediatric upper limbs incision.



Figure 2: Showing clinical photo of pediatric upper limbs Anterolateral incision (3-6 cm) between the deltoid and biceps muscles.



Figure 3: Showing clinical photo of pediatric upper limbs. Deltoid muscle retracted posteriorly; biceps muscle retracted anteriorly. Humerus exposure.



Figure 4: Showing clinical photo of pediatric upper limbs. Radial nerve and profunda brachii artery identified and protected .and excision of tumor.



Figure 5: Showing clinical photo of pediatric upper limbs after closing wound in layer and drainage inserted.

Clinical remarks; Left proximal swelling/ 3 months
 Specimen; excisional biopsy
 Macroscopic findings; receive bone and bone with tissue, bone measure 1X1.5X0.5cm, bone with tissue measure 1.5X1.5X0.5cm
 Microscopic findings: Sections show benign bone tumor made of trabecular core bone forming stalk and capped with cartilage. No atypia seen.
 Interpretation: Osteochondroma (exostosis)
 Pathologist;

Figure 6: Showing clinical result of tumor resection.

All anatomic landmarks were directly visible through the Modified Gerwin Approach as compared with the remaining approaches, through which only 1 landmark was directly visualized and only 2 of the 3 remaining were palpable through the approach and finally clinical pathology result with complete excision Figure [6].

Conclusion

The Modified Gerwin Approach surgical exposure to the proximal humerus provides the largest humeral exposure with the greatest visibility of landmarks relative to the most widely utilized standard approaches advantages minimal muscle damage, Excellent visualization of proximal humerus, Reduced risk of radial nerve injury and Easy conversion to deltopectoral approach [7].

Declarations

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report.

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