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Case Study

NEW TECHNIQUE OF GLENOHUMERAL JOINT DISSECTION

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ABSTRACT

Objectives: Glenohumeral is a ball and socket type of synovial joint which permits a wide range of movement. During the typical shoulder joint dissection, we are unable to see the intracapsular view of shoulder joint. **Methods**: A dissection technique that was performed in Sharir Rachana Dept. of NIA, Jaipur, which exposes the glenohumeral joint's internal capsule, the glenoid labrum, the proximal insertion of the long head of the biceps tendon, and the surfaces of the joint while protecting the posterior aspect of the capsule and the surrounding muscles and tendons that support the joint. **Results**: This new dissection method allowed the preservation of glenohumeral joint structures and provides a better understanding of its intracapsular view and related structures. **Conclusion**: The glenohumeral joint can be dissected using this new technique, by which we can prevent the damage to the structures that surround it and enabling visualization of its intracapsular view.

INTRODUCTION

Shoulder joint is formed by articulation of glenoid cavity of scapula and head of the humerus. If we go through its structure, it is a week joint. Glenoid cavity is very small to hold the head of the humerus in place. But because of this arrangement shoulder joint permits great mobility. The important factors behind the shoulder joint stability are – Musculotendinous or Rotator cuff and Glenoidal labrum, coracoacromial arch etc.[1]

Musculotendinous cuff of the shoulder is a fibrous sheath formed by the four flattened tendons which blend with the capsule of the shoulder joint and strengthen it. It compresses the head of the humerus against the glenoid cavity of the scapula. The muscles which form the cuff arise from the scapula and are inserted into lesser and greater tubercles of humerus to provide stability. They are the subscapularis, supraspinatus, infraspinatus and teres minor. These all work as stabilizers of the glenohumeral joint and also plays an important role in functions of shoulder joint.

The glenohumeral joint is by far the most commonly dislocated joint of the body, accounting for up to 45% of dislocations. Anterior dislocation accounts for 96% of cases. Posterior dislocation is the second most common direction of dislocation, accounting for 2% to 4% of cases.[2] In most of the glenohumeral injuries there is involvement of rotator cuff muscle, Glenoid labrum, joint ligament and capsule.[3] Rotator cuff conditions are the most common source of shoulder pain for primary care office visits.[4]

A wide spectrum intracapsular pathology exists, including sub-acromial bursitis, rotator cuff tendinitis, shoulder impingement, and rotator cuff tears. Rotator cuff injury runs the full spectrum from injury to tendinopathy to partial tears, and finally complete tears. Age plays a significant role. Injuries ranged from 9.7% in those 20 years and younger increasing to 62% in patients 80 years and older (whether or not symptoms were present).[5] 65% of all interactions between patients and doctors involving the shoulder may be due to rotator cuff problems. Feeney et al.[6] showed a positive correlation between rotator cuff injuries and articular cartilage deterioration at the glenohumeral joint. The integrity

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of the joint capsule is usually compromised when the rotator cuff is injured.[7]

A new dissection approach is required to enable a comparison of the integrity of internal joint components to exterior structures like the rotator cuff muscles. This is because there is a positive link between rotator cuff disease and articular cartilage injury. We can investigate various shoulder dysfunctions on cadaver.

When we follow the traditional dissection technique, it doesn't allow us to appreciate the internal structures of shoulder joint while maintaining the surrounding musculature and other structures. So, we can't see the relationship between the joint and its surrounding structures because of the destruction of joint capsule and removal of surrounding muscles.

In traditional dissection techniques we approach to joint after the reflection of its overlying muscle. When we follow these dissection protocols, we can't visualize the entire glenohumeral joint because these methods require to release the rotator cuff attachments and its other surrounding structures. So, we can't re-examine the relationships of rotator cuff to internal joint morphology. infraspinatus, teres minor and supraspinatus muscles are then cut and the muscles are reflected medially.

So, a new dissection approach is required to visualize the internal glenohumeral joint structures while maintaining its surrounding structures.

This new dissection approach allows us to visualize the glenoid labrum, the tendon of the long head of the biceps brachii muscle, and the articular surfaces of the glenohumeral joint while maintaining surrounding supportive structures such as the distal tendons of the rotator cuff muscles and anterior and posterior aspects of the glenohumeral joint capsule.

MATERIALS AND METHODS

The shoulders of one embalmed cadaver were dissected as follows. Using conventional dissection methods, the subcutaneous tissues of the pectoral girdle, axilla, superficial back, and arm were removed and cleaned. The deltoid, pectoralis major, trapezius, biceps brachii, and triceps brachii muscles were cleaned and identified following the removal of these tissues. After identification the deltoid and pectoralis major muscles were reflected from their distal attachments.

After that superficial muscle of back – trapezius is reflected from its medial side to visualize the supraspinatus muscle. Arm is placed in lateral rotation and subscapularis muscle is exposed.

To visualize the capsule of shoulder joint and the tendons of the rotator cuff muscles, the deltoid muscle is reflected from its proximal attachment. After that the rotator cuff muscle is cleaned.

After placing the humerus in lateral rotation, the tendon of the long head of the biceps brachii muscle was identified in the bicipital groove.

A circular incision was made in the middle of the arm. The biceps brachii and coracobrachialis (muscle of anterior compartment) were cut through this incision.

In the frontal plane, in line with the shaft of the humerus, a longitudinal saw cut was made using electric bone saw through the proximal third of the bone just anterior to supraspinatus tendon.

The greater tubercle, which is located laterally, was utilized as the starting point for the longitudinal saw cut, which was then extended distally along the antero-lateral surface of the humerus shaft. **(Figure 1).**

A second saw incision was made transversely through the middle one third of the humerus shaft. **(Figure 1).**

Because of these two cuts, the upper half of the humerus is bisected. **(Figure 2)**

The two saw cuts caused the proximal half of the humerus to be divided into portions that could be separated to reveal the internal aspect of glenohumeral joint. **(Figure 3).**

Small incisions were made to the superior and inferior parts of the glenohumeral joint capsule, some neurovascular structures were removed.

So, this was the dissection protocol for shoulder joint to visualize its internal aspects.

DISCUSSION

In this new dissection technique, we removed the soft tissues from pectoral girdle and superficial back region, then rotator cuff muscles are identified. Generally, in other dissection protocols the rotator cuff muscles were removed and with this some part of joint capsule was also cut. But in this new dissection technique the rotator cuff muscle and joint capsule was not removed during the dissection. Humerus was bisected by the longitudinal and transverse incisions. It allows us to visualize the internal structure of glenohumeral joint and its relationship with surrounding structures with maintained integrity of rotator cuff muscle and joint capsule. And we can also replace it into its original position to examine its surrounding structures so that we can see the relation between joint capsule and surrounding structures. In this new dissection technique, we had bisected the humerus so that we can maintain the integrity of the anterior and posterior aspects of the glenohumeral joint capsule. Bisected humerus can be reflected within the joint capsule without any damage to joint capsule

and glenohumeral ligaments. In this way the anterior and posterior aspect of glenohumeral joint capsule is preserved which allows us to visualize the glenohumeral joint space. This dissection strategy gives the observer a clear and comprehensive image of the internal joint capsule and its relationship with the surrounding musculature.

CONCLUSION

The main aim in creating this dissection approach was to examine the components of the glenohumeral joint capsule while maintaining the rotator cuff muscle attachments. The dissection method described here is different from more conventional methods for dissecting the glenohumeral joint. In clinical classes, this method could help students better understand the internal joint capsule's components and how they relate to the glenohumeral joint's function.

Glenohumeral joint dissection: A new protocol Philip A. Fabrizio, Danielle Topping, Kathleen Wolfe the Springfield Clinic, 800 N. 1st Street, Springfield, IL 62702, USA.

REFERENCES

1. BD Chaurasia'S Human Anatomy, 8th Edition, volume 1, joints of upper limb chapter 10, shoulder joint, p. no.158.
2. Khatri K, Arora H, Chaudhary S, Goyal D. Meta-Analysis of Randomized Controlled Trials Involving Anterior Shoulder Instability. Open Orthop J. 2018; 12: 411-418. [PMC free article] [PubMed]
3. Allen GM. The diagnosis and management of shoulder pain. J Ultrason. 2018; 18(74): 234-239. [PMC free article] [PubMed]
4. Robinson TW, Corlette J, Collins CL, Comstock RD. Shoulder injuries among high school athletes, 2005/2006-2011/2012. Pediatrics 2007; 133:2 72–9.
5. White JJE, Titchener AG, Fakis A, Tambe AA, Hubbard RB, Clark DI. An epidemiological study of rotator cuff pathology using The Health Improvement database. Bone Joint J 2014; 96–B: 350–3.
6. Bureau of Labor Statistics. 2012. US Department of Labor. Survey of occupational in-juries and illnesses in cooperation with participating state agencies. Percent distribution of nonfatal occupational injuries and illnesses involving days away from work by selected injury or illness characteristics and number of days away from work (Table R6). [Internet] [Cited 107 Apr 1]. Available from: http://www.bls.gov/iif/oshwc/osh/os/osh06_b2.pdf
7. Leclerc A, Chastang JF, Niedhammer I, Landre MF, Roquelaure Y, Study Group on Repetitive Work. Incidence of shoulder pain and repetitive work. Occup Environ Med 2004; 61: 39–44
8. Rosenfeld SB, Schroeder K, Watkins-Castillo SI. The Economic Burden of Musculoskeletal Disease in Children and Adolescents in the United States. J Pediatr Orthop. 2018 Apr; 38(4): e230-e236. [PubMed]
9. Todd May, Gus M. Garmel. Rotator Cuff Injury.In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan. 2023 Jun 26. [PubMed]
10. Feeney MS, O'Dowd J, Kay EW, Colville J. Glenohumeral articular cartilage changes in rotator cuff Disease. J Shoulder Elbow Surg 2003; 12: 20–3.
11. Keith L. Moore, Arthur F. Dalley, Anne M.R. Agur , Moore Clinical Oriented Anatomy, 7th Edition, chapter 6 , upper limb, P. No. 814.

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Figure 1 :- Photograph showing the Anterolateral view of shoulder and the longitudinal and transverse saw cuts. **Black Arrows :** longitudinal saw cut **White arrows :** Transverse saw cut. **D** – Deltoid, **HH**- head of humerus, **CP**- coracoid Process, **LHB-** long head of biceps brachii, **SHB** – Short head of biceps brachii.

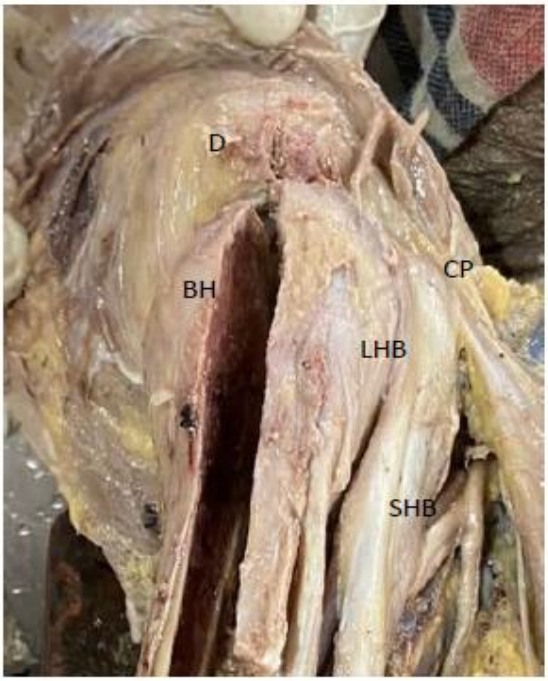

Figure 2 :- Photograph showing the Bisected Humerus. **D** – Deltoid, **BH**- Bisected humerus, **CP**- coracoid Process, **LHB-** long head of biceps brachii, **SHB** – Short head of biceps brachii.

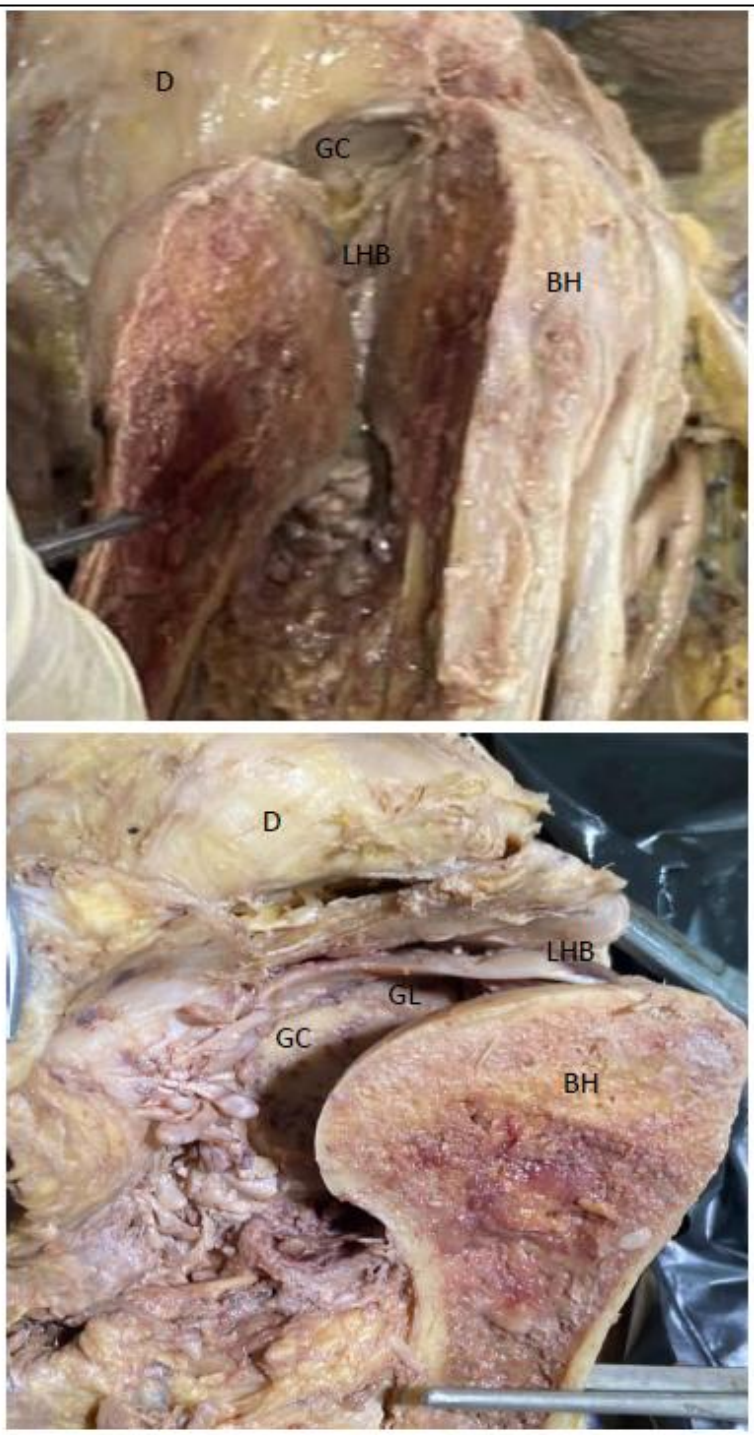

Figure 3 :- Photograph showing the intra-capsular view of Glenohumeral joint.
D – Deltoid, **BH**- Bisected humerus, **LHB-** long head of biceps brachii, **GC** – Glenoid Cavity. **GL –** Glenoid labrum, **LHB –** long head of biceps