

## ANATOMICAL VARIATIONS OF THE DISTAL END OF HUMERUS

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### ABSTRACT

**Background:** The study was aimed at determining the variations of lateral epicondyle, capitulum and lateral trochlear crest of humerus and finding out the prevalence of different forms.

**Materials and Methods:** 60 dried Human humeri were examined grossly from the collection of Anatomy department, Pacific Medical College & Hospital for the location of lateral epicondyle, extent and shape of distal margin of capitulum and for the lateral trochlear crest.

**Results:** In 76.67% of humeri, lateral epicondyle was located at the same level/ slightly below the level of capitulum whereas in 23.33% of humeri, it was located above the level of capitulum, Distal margin of capitulum was Flat and extending onto distal surface in 83.33% of humeri where as it was Convex and extending onto posterior surface in 16.67% of humeri. Lateral trochlear crest was poorly developed in 10%, moderately developed in 85% and well developed prominent in 5% of humeri.

**Conclusion:** This study may help in repairing the fractures/reconstruction of trochlea and capitulum, designing of elbow prosthesis, repairing the damage to radial collateral ligament as well as lateral epicondyle surgeries of humerus.

**KEY WORDS:** Lateral epicondyle, Trochlea, Capitulum, Distal end of Humerus.

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### INTRODUCTION

Humerus is the largest and longest bone in the upper limb, has expanded ends and a shaft. The lateral epicondyle occupies, lateral part of non articular portion of condyle. The capitulum is a rounded convex projection, considerably less

than half a sphere which covers the anterior and inferior surfaces of the lateral part of the condyle of the humerus but does not extend onto its posterior surface. Trochlea is a pulley shaped structure that covers the anterior, inferior and posterior surfaces of the condyle of humerus medially and on its lateral side, it is

separated from capitulum by a faint groove [1]. Uptill now, distal end of the humerus was used by researchers for the studies like determination of Total length of humerus from the fragments of distal end of humerus, gender determination, forensic sciences and supratrochlear foramen studies [2-4]. These studies used complex statistics and measurements which were time consuming, so this study was conducted to determine different types of presentations of lateral epicondyle, capitulum and lateral edge of trochlea as well as their prevalence in dry human humerus by gross examination.

Knowledge of the these anatomical variations at the lower end of humerus is required to orthopaedic surgeons in repairing the fractures/ reconstruction of trochlea and capitulum, designing of elbow prosthesis, repairing the damage to radial collateral ligament as well as lateral epicondyle surgeries of humerus.

## MATERIALS AND METHODS

This study was undertaken at Pacific Medical College and Hospital, Udaipur. A Total of 60 dry humeri were examined irrespective of their side and sex from the collection of Department of Anatomy, Pacific Medical College and Hospital, Udaipur. Distal end was examined for the following parameters:

1. Location of lateral epicondyle.
2. Shape and extent of distal margin of capitulum.
3. Lateral trochlear crest.

**Fig. 1:** (a) Lateral epicondyle at the same level of capitulum, (b) Lateral epicondyle above the level of capitulum.



**Fig 2:** (a) Distal margin of capitulum flat and extending on to distal surface of lower end of humerus, (b) Distal margin of capitulum convex and extends on to posterior surface of lower end of humerus.



**Fig. 3:** Lateral trochlear crest (a)poorly developed, (b)well developed and prominent, (c)moderately developed.



## RESULTS AND DISCUSSION

In our study, Lateral epicondyle of humerus was found at the same level of capitulum/slightly below the level of capitulum in about 76.67% of humeri where as in 23.33%, it was well developed and located above the level of capitulum which may prove advantageous for added lever action of long extensors of fingers and wrist. High placed lateral epicondyle makes the trochlea easily accessible during the Built-on surgical techniques for distal humerus shear fractures [5]. As the Radial collateral ligament is attached to distal surface of lateral epicondyle [6], knowledge of exact location of lateral epicondyle is important to diagnose Radial collateral ligament abnormalities [7]. Among the varieties of capitulum, capitula with flat distal margin extending onto distal surface were 83.33% whereas capitula with convex distal margin extending onto posterior surface were 16.67%. Flat distal margin extending onto distal surface only may prevent the hyper extension of elbow. These variations may help in designing elbow prosthesis and capitular reconstruction. Lateral trochlear crest was poorly

developed in 10%, moderately developed in 85% and well developed prominent in 5% of humeri. Any fracture of trochlea involving the lateral trochlear crest makes the person susceptible for the capitular fracture as well [8]. So the knowledge of variations of lateral trochlear crest may help in diagnosis of extent of fracture and thereby guiding the surgical procedure. Presentations of various types and their prevalence are illustrated in the Table-1.

**Table 1:** Presentations of various types and their prevalence.

PARAMETER	VARIATIONS		
Location of lateral epicondyle (60)	At same level/ slightly below the level of capitulum(46) - 76.67%	Above the capitulum(14)- 23.33%	
Distal margin of capitulum (60)	Flat and extending onto distal surface(50) - 83.33%	Convex and extending onto posterior surface(10) - 16.67%	
Lateral trochlear crest (60)	Poorly developed (6) - 10%	Moderately developed(51) - 85%	Well developed and prominent (3) - 5%

## CONCLUSION

Lateral epicondyle, capitulum and lateral trochlear crest do exhibit variations. Such variations of distal humerus have been studied least in india so far. Knowledge of these variations having variety of clinical implications such as in making elbow prosthesis, to diagnose extent of fracture and to determine mode of surgeries etc.

**Conflicts of Interests: None**

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