

# Evaluating Scapular Processes in Relation to Rotator Cuff Tears and Acromial Spurs using a 3D Microscribe Digitizer

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## Background

- The scapula processes, acromion and coracoid, with the coracoacromial ligament form the coracoacromial arch above the subacromial space. The subacromial space contains subacromial bursa, rotator cuff tendon, and the tendon of the long head of biceps<sup>1, 2</sup>.
- Changes in the angulation of the elements of the coracoacromial arch may affect on the dimensions of the space<sup>3</sup>.
- Narrowing of the subacromial space may impinge the contents of the space with the undersurface of the coracoacromial arch<sup>4</sup>.

## Aims

This study aims to: (i) evaluate the acromion and coracoid processes, and (ii) investigate differences in relation to rotator cuff tears and/or acromion spurs using a 3D microscribe digitizer.

## Methods

- Dissection was undertaken in 60 scapulae from 40 female and 20 male cadavers, with mean age 82 years (range 62-101 years).
- The scapular processes were scanned and measurements taken using a 3D microscribe digitizer and Rhino software (Figure 1c).
- Four angles were measured with respect to the centre of the glenoid fossa: the angle of the acromion head, the acromion root, the coracoid head and the coracoid root (Figure 1a, b).

## Results

- The mean angles of the acromion head and root were  $182.8^\circ \pm 12.1$  and  $114.5^\circ \pm 9.1$  respectively (Table 1).
- The mean angles of the coracoid head and root were  $109.8^\circ \pm 11.0$  and  $114.7^\circ \pm 13.9$  respectively (Table 1).
- There was a high significant moderate positive correlation ( $r=0.510$ ,  $p<0.01$ ) between the angles of the coracoid head and root to the glenoid.
- Left shoulders also showed larger angles ( $p<0.05$ ) of the coracoid and acromion heads to glenoid than right shoulders (Figure 2).
- A significant difference ( $p<0.05$ ) of the angle of the coracoid head was observed between females and males, being  $112.4^\circ$  and  $104.5^\circ$  respectively, (Figure 3).

## Conclusion

- A 3D microscribe digitizer and Rhino software can be used to measure the relationship between anatomical features of the scapula.
- In the study sample the left shoulder had significantly higher ( $p<0.05$ ) acromion head and coracoid head angles to the glenoid fossa than the right shoulder.
- The angles were showed no statistically significant differences in relation to rotator cuff tears or acromion spurs.

## References:

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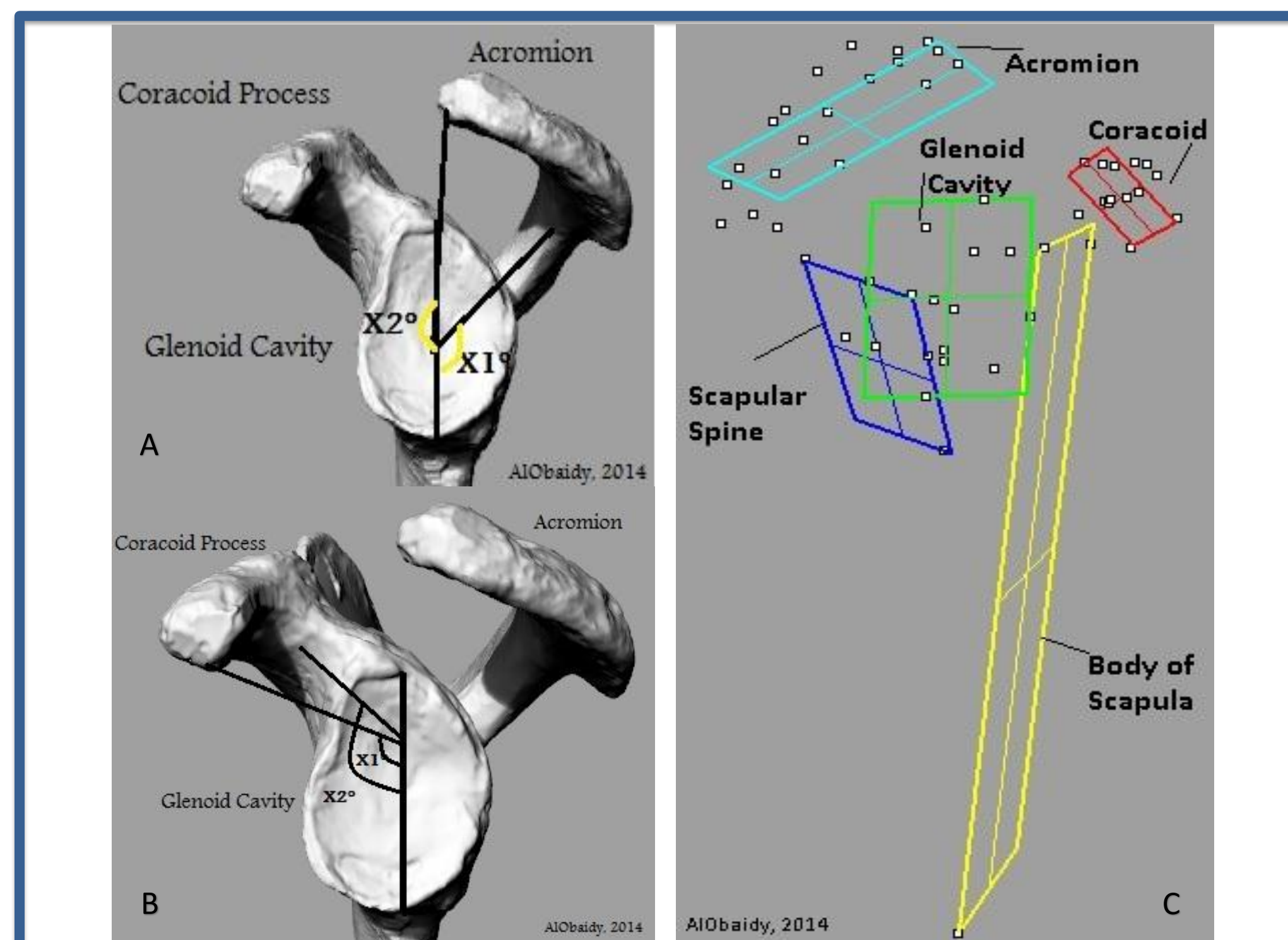


Figure 1: A, angles of the acromion head and root in relation to the glenoid cavity: B, angles of the coracoid head and root in respect to the glenoid fossa: C, the scapular processes as viewed using the Rhino software.

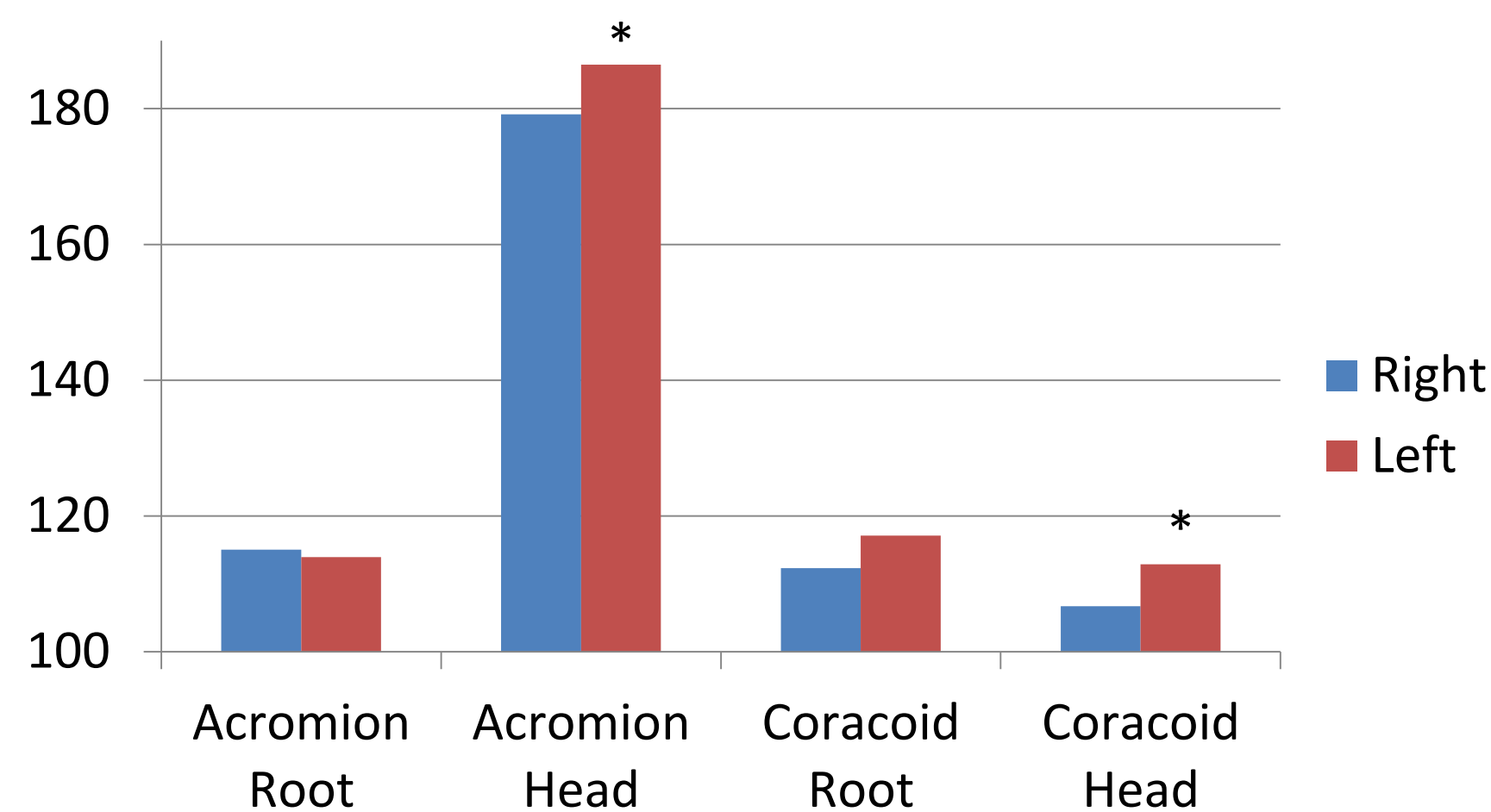


Figure 2: The relationship between the right and left sides of the acromion root, acromion head, coracoid root and coracoid head angles. \*  $p<0.05$

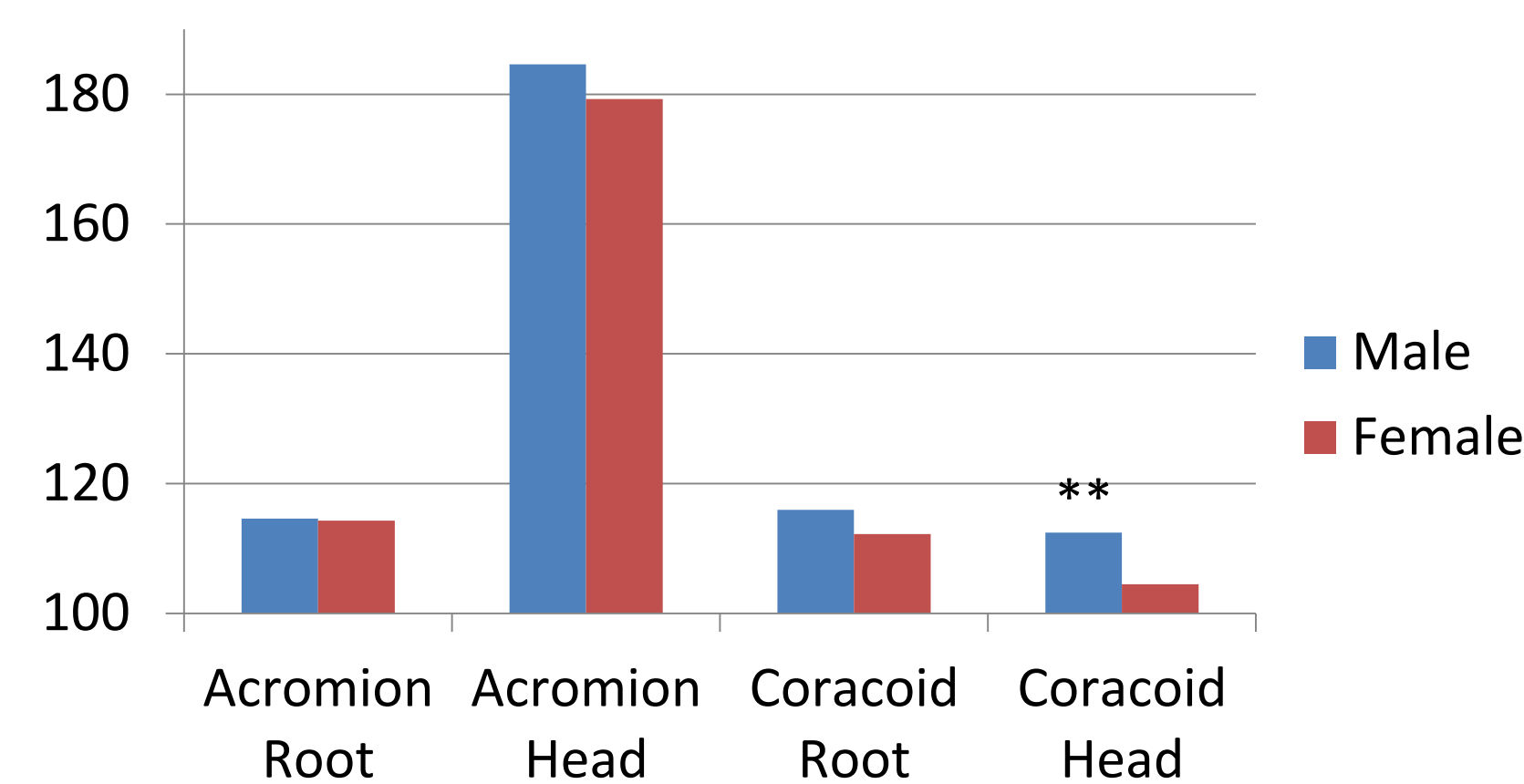


Figure 3: Comparison between males and females of the acromion root, acromion head, coracoid root and coracoid head angles. \*\*  $p<0.01$

Table 1: Angles of the acromion root, acromion head, coracoid root and coracoid root with respect to the glenoid fossa.

Angles	N	Mean	Minimum	Maximum	Std. Deviation
Acromion root	60	114.5	92.8	134.7	9.1
Acromion head	60	182.8	155.4	209.8	12.1
Coracoid root	60	114.7	93.7	149.1	13.9
Coracoid head	60	109.8	81.2	130.1	11.1