



Does scapular morphology affect the integrity of the rotator cuff?

Vivek Pandey, MS Ortho^{a,*}, Deepu Vijayan, MS Ortho^a, Sandeep Tapashetti, MBBS^a, Lipisha Agarwal, MBBS^a, Asha Kamath, MD^b, Kiran Acharya, MS Ortho^a, Satish Maddukuri, MD Radiology^c, W. Jaap Willems, MD, PhD^d

^aDepartment of Orthopaedics, Kasturba Medical College, Manipal, Karnataka, India

^bCommunity Medicine and Statistics, Kasturba Medical College, Manipal, Karnataka, India

^cDepartment of Radiodiagnosis, Kasturba Medical College, Manipal, Karnataka, India

^dShoulder Unit, Lairesse Kliniek, Amsterdam, The Netherlands

Background: Current evidence suggests that distinct scapular morphologies may predispose patients to a rotator cuff tear. The objective of this longitudinal study was to evaluate the relationship between symptomatic degenerative cuff tears and different radiographic acromial characteristics, including acromion shape, indices (acromial index [AI], critical shoulder angle [CSA]), and acromial spur.

Methods: We divided 166 patients into 3 groups matched for age and sex: group 1, degenerative full-thickness tear; group 2, partial thickness bursal tear; and group 3, normal cuff. Patients were evaluated with standard radiographs and ultrasonography.

Results: The presence of an acromial spur was strongly associated with a full-thickness cuff tear (odds ratio, 3.5; $P = .001$). AI and CSA revealed a statistically significant difference between means of group 1 ($P = .006$) and group 3 ($P < .001$). There was no statistically significant difference in means of AI between groups 1 and 2 ($P = .695$) and between groups 2 and 3, with respect to AI ($P = .071$) and CSA ($P = .125$). Receiver operating characteristic curve revealed a higher area for CSA (0.70) than for AI (0.61). Stepwise logistic regression rejected AI as a cuff tear predictor but confirmed CSA and a spur to be stronger predictors of a full-thickness cuff tear. There was no association between the Bigliani acromial type and rotator cuff tear ($P = .06$).

Conclusions: The presence of an acromion spur is strongly associated with full-thickness cuff tear. Higher AI and CSA are associated with a full-thickness tear but not with partial tears. The type of acromion is not related to cuff tear.

Level of evidence: Level III, Cross Sectional Design, Prognosis Study.

© 2016 Journal of Shoulder and Elbow Surgery Board of Trustees.

Keywords: Scapular morphology; acromion; rotator cuff; degenerative tear; acromion spur; acromion index; critical shoulder angle; acromion shape

The Institutional Ethical Committee, Kasturba Hospital, Manipal, India, approved this study (IEC 451/2012).

*Reprint requests: Vivek Pandey, MS Ortho, Orthopaedic Surgery, Kasturba Medical College, Manipal, Karnataka, 576104, India.

E-mail address: vivekortho@gmail.com (V. Pandey).

The relationship between multiplanar acromion morphology and degenerative rotator cuff tears (RCTs) has always been quite enigmatic. Neer's theory of extrinsic abutment of the coracoacromial arch against the supraspinatus as the major factor causing impingement and

tears¹⁹ found much support in the literature.^{6,9,21,34} Bigliani et al⁵ further supported Neer's theory by proposing that anterior down-sloping of the acromion in the sagittal plane can cause a supraspinatus tear. Neer²⁰ and Ogawa et al²³ described an anterior traction acromion spur in close association with rotator cuff disease. However, there was less discussion about acromion morphology in the coronal plane affecting the integrity of the rotator cuff until Nyffeler et al²² described a distinct acromial index (AI) to assess the amount of lateral acromial extension in the coronal plane, which was closely associated with RCTs. Nyffeler et al²² postulated the biomechanical theory of how a lateral acromial extension can alter the deltoid muscle vector, leading to excess force on the rotator cuff insertion. More recently, Moor et al¹⁸ proposed another radiologic parameter, the critical shoulder angle (CSA), which also takes glenoid inclination into account along with lateral acromial extension, thus integrating both potential risk factors into one radiologic parameter. A few more indices have been described in the literature, such as the lateral acromial angle,⁴ acromial slope,¹⁶ and their association with degenerative RCT.

The evidence in the recent literature has been conflicting regarding the strength of the association of these indices in the pathogenesis of RCT. The aim of the present study was to evaluate the strength of the relationship between the morphology of the acromion and degenerative partial-thickness and full-thickness RCTs (FTRCTs) using various measurements: AI, CSA, acromial spur, and type of acromion.

Materials and methods

This longitudinal case-control study was conducted from November 2012 to September 2014.

Study patients

After the standard clinical examination, patients aged between 45 and 70 years who presented with nontraumatic unilateral shoulder pain were enrolled in the study. The inclusion and exclusion criteria are listed in Table I. We included patients aged from 45 to 70 years because this is the most common age group that presents with unilateral shoulder pain due to partial-thickness or FTRCTs. Each patient underwent standard radiographic assessment with true anteroposterior radiographs and a supraspinatus outlet view (SOV). Patients also underwent ultrasonographic assessment of the rotator cuff by a single musculoskeletal radiologist.

After the sonographic examination, the patients were divided into 3 groups: patients with full-thickness supraspinatus tears (group 1), partial bursal side thickness tears (40%-70%) of the supraspinatus (group 2), and those with no cuff tear (group 3). Patients in group 3 presented with isolated acromioclavicular arthritis or adhesive capsulitis. We decided to evaluate partial bursal tears of between 40% and 70% of the thickness of the supraspinatus because a tear of less than 40% could be an

Table I Inclusion and exclusion criteria of the study

Inclusion criteria	
Patients with	
1.	Clinical diagnosis of nontraumatic degenerative rotator cuff tear of the supraspinatus/infraspinatus (complete/partial) or patients with shoulder pain without a cuff tear.
2.	Availability of a preoperative true anteroposterior and outlet radiograph.
3.	Ultrasonography of the index shoulder assessing the rotator cuff.
Exclusion criteria	
Patients with	
1.	Improper radiographs.
2.	Articular side supraspinatus tear or intrasubstance tear.
3.	Acromiohumeral distance of less than 7 mm.
4.	Isolated subscapularis tears.
5.	Associated with fractures around the shoulder joint.
6.	Patients with glenohumeral arthritis (inflammatory, traumatic, infective, or degenerative).
7.	Previous surgery for the glenohumeral joint or subacromial space.
8.	Patients with a collapse of the humeral head due to osteonecrosis.

overestimation of a hypochoic tendinopathy, and a tear of more than 70% could be a nearly complete tear of the tendon that is probably underestimated sonographically. The tear estimation of 40% to 70% of the supraspinatus is similar to grade 2 and 3 of the Elman classification for a partial cuff tear.⁸ The sonographic accuracy to detect a partial cuff tear is comparable to magnetic resonance imaging (MRI).²⁹

All patients who were enrolled in group 1 with full-thickness supraspinatus tears also underwent arthroscopic supraspinatus repair that further confirmed the ultrasonographic finding. On the basis of data from previous studies,^{12,18,22} pre hoc power analysis determined a minimum sample size of 51 in each group to provide the desired power of 95% and a significance level (type I error) of 5%.

Measurement of various plane X-ray indices

Patient radiographs were uploaded to a digital radiography network (InstaRIS PACS, Meddiff Technologies Pvt Ltd, Mumbai, India). The accuracy of radiographs was decided by the radiologist for further measurement by the surgeons. Radiographic assessments and measurement of different indices were done by 2 independent fellowship-trained shoulder surgeons. The surgeons were unaware of ultrasonographic findings while measuring or observing the radiographic parameters. Of 242 patients who were screened, 76 were excluded due to insufficient radiographic quality or sonographic parameters because the radiologist failed to mention the percentage of the tendon or the side of the tendon (bursal/articular side) involved, leaving 166 for final analysis.

AI and CSA were measured as described by Nyffeler et al²² and Moor et al,¹⁸ respectively, in true anteroposterior radiographs. All shoulder radiographs were classified into 1 of 3

Download English Version:

<https://daneshyari.com/en/article/4073094>

Download Persian Version:

<https://daneshyari.com/article/4073094>

[Daneshyari.com](https://daneshyari.com)