The Association Between Irregular Humeral Greater Tuberosities and Rotator Cuff Tears: An Arthrographic Study

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Objectives. Although there is an association between rotator cuff tears and irregular humeral greater tuberosities, no formal study has been done. Our study was designated to investigate the relationship between irregular humeral greater tuberosities and rotator cuff tears.

Methods. The study group consisted of 53 patients with a history of shoulder pain for more than 3 months whose radiographs showed irregular greater tuberosities. The control group comprised 51 individuals with a history of shoulder pain for more than 3 months whose radiographs were normal. These two groups received arthrographic study.

Results. Arthrographs of 22 patients (41.5%) in the study group showed rotator cuff tear, while those of 5 patients (9.8%) in the control group showed rotator cuff tear. The incidence of tear was high and statistically significant ($p = 0.00023$).

Conclusions. If radiographs of patients with chronic shoulder pain show irregular greater tuberosities, the chance of rotator cuff tear is high. Shoulder arthrography study is necessary and early detection of rotator cuff tear is possible. **(Mid Taiwan J Med 2003;8:274-7)**

Key words

great tuberosity of humerus, rotator cuff tear, shoulder arthrographic study

INTRODUCTION

Chronic shoulder pain is a common complaint in outpatient clinics and rotator cuff tear is one of the causes. When there is subacromial spur, or the acromio-humeral space is narrow, the incidence of rotator cuff tear is high [1]. Subacromial spur is the most common radiographic finding in patients of shoulder impingement syndrome [2]. Irregularities at the humeral greater tuberosity are common findings in shoulder radiographs; however, these irregularities have seldom been correlated with rotator cuff tears. Our study was designated to investigate the relationship between irregular humeral greater tuberosties and rotator cuff tears.

Milgrom et al have stated that rotator cuff tears are related to aging [3]. Our study included a control group of patients with chronic shoulder pain with normal radiographs to see whether irregular humeral greater tuberosities are simply age-related or dependent on the presence of rotator cuff tears.

MATERIALS AND METHODS

All patients who met the following criteria were included in the study: 1) chronic shoulder pain with conservative treatment for more than 3 months, 2) irregular humeral greater tuberosities on shoulder radiographs, 3) radiographs showed subacromial spur, narrowing of acromio-humeral distance of less than 6 mm in length, and no

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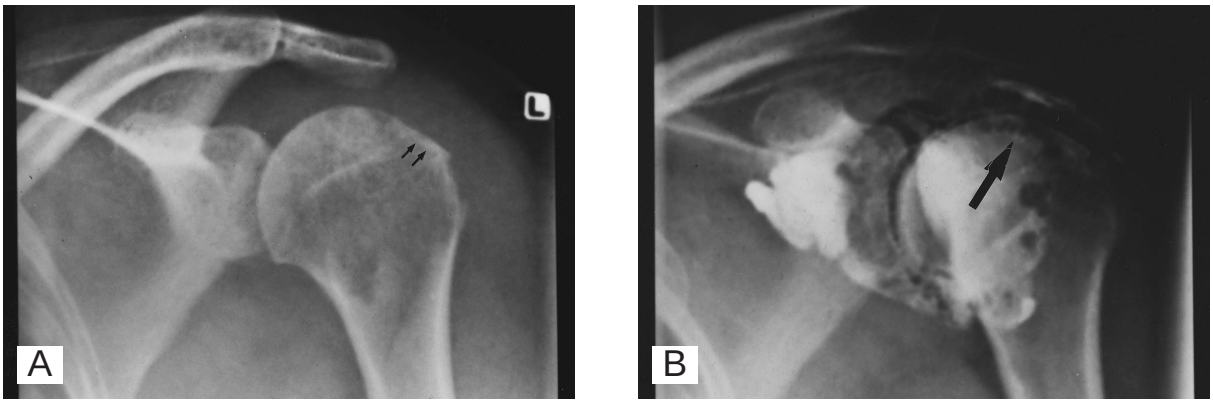

Figure. A: Radiograph of shoulder joint shows irregularity and sclerotic bone change in the great tuberosity of humerus (arrows). B: Shoulder arthrograph shows leakage of contrast medium to the subdeltoid bursa, which indicated rotator cuff tear (arrow).

fracture of humeral greater tuberosity. Patients with rheumatoid arthritis or infection were excluded also.

Irregular humeral greater tuberosity on shoulder radiograph was defined if there was loss of normal contour at the greater tuberosity and/or if a sclerotic band of more than 2 mm was visible on conventional anteroposterior projection of shoulder joint radiograph [4,5].

Soulder impingement projection was taken in all patients to exclude the presence of subacromial spur, since it is an important factor of rotator cuff tear.

The study group consisted of 53 patients (24 men, 29 women; mean, 54.7; range, 27 to 77); all underwent shoulder arthrographic study.

The control group included 51 patients (24 men, 27 women; mean, 52.7; range, 21 to 79); all were selected under the same conditions except that their radiographs were normal. They also underwent shoulder arthrographic study.

Shoulder arthrography was performed by injecting 2 mL of iopamidol 300 with 10 to 15 mL of air into the glenohumeral joint under fluoroscopic control. If there was leakage of contrast medium from the shoulder joint to the subdeltoid bursa, rotator cuff tear was diagnosed. If less than 10 mL of air could be injected into the reduced joint space , adhesive capsulitis was considered.

RESULTS

Among the 53 patients in the study group, 22 showed leakage of contrast medium into the subdeltoid bursa, 18 patients showed normal arthrographic results, and 13 patients showed adhesive capsulitis.

Among the 51 patients in the control group, 5 cases showed rotator cuff tear, 22 patients were normal and 24 patients had adhesive capsulitis.

The incidence of rotator cuff tear was high in the study group (41.5%) while that in the control group was low (9.8%). We performed a chi-square test between these two groups to show whether there was statistical significance.

The p is 0.00023 which indicated that there is statistical significance.

DISCUSSION

Several radiographic features of shoulder joint are associated with rotator cuff tears such as a narrow subacromial space, cystic changes in the humeral greater tuberosity, and reversal of the normal convexity of the inferior surface of the acromion [6]. The incidence of rotator cuff tear is high when a large subacromial spur is seen on impingement view of patients with chronic shoulder pain.

However, irregularities at the humeral greater tuberosity have never been formally correlated with rotator cuff tears although the relationship was suggested by two reports on shoulder radiographs [4,5]. There has been no formal study on the correlation between irregularities of greater tuberosity of the humeral head and rotator cuff tear.

Milgrom et al stated that rotator cuff tears are a natural correlate of aging and that they are often present without clinical symptoms [3]. Their study did not mention whether humeral irregular tuberosities were caused by aging or were associated with rotator cuff tears.

In our study group, there were 22 (41.5%) patients with rotator cuff tear (Figs. A, B); in our control group, there were 5 (9.8%). Our results suggest that after accounting for age, there is a statistically significant correlation between irregular humeral greater tuberosity and rotator cuff tear.

When patients present with chronic shoulder pain, attention should be paid to the humeral greater tuberosity on shoulder radiograph. The incidence of rotator cuff tear is high when abnormalities are present. A normal radiograph is a strong indicator of a normal rotator cuff.

There were a few limitations in our study. Rotator cuff tear was evaluated by shoulder arthrography which can detect tears on synovial sites with high accuracy; however, it cannot detect partial tears on bursal sites. Such tears may have been missed in this study.

Magnetic resonance imaging is a good, non-invasive modality for detecting all tears; however, it is expensive and was therefore not used in this study.

Degenerative enthesopathy and shoulder impingement syndrome are known to cause irregularities of humeral great tuberosity, but our study did not focus on these conditions.

Although shoulder pain and limited range of motion are common findings, diagnosis of rotator cuff tear is often delayed [7]. Shoulder arthrography is simple and easy to perform, and it provides valuable information about shoulder joints.

If radiographs of patients with chronic shoulder pain show irregular humeral greater tuberosities, the chance of rotator cuff tear is high. Shoulder arthrography is necessary and may lead to early detection of rotator cuff.

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肩關節雙重對比攝影術評估轉軸肌斷裂和肱骨大粗隆之關聯性

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目的　在骨科的文章中，有提及不規則邊緣之肱骨大粗隆和轉軸肌腱斷裂。但是並未有正式的研究，本研究是要確定這兩者的關係。

方法　在慢性肩關節疼痛的病人，如果接受保守治療三個月，並未有成效。如果其肱骨大粗隆有不規則邊緣，我們將請53位這一類的病患接受肩關節雙重對比攝影術。另外，我們請51位照片正常的病患，作爲對照組，以作參考。

結果　在53位研究組的患者中，其中22位有轉軸肌腱斷裂。在51位對照組中，5位有轉軸肌腱斷裂。

結論　在慢性肩關節疼痛的病人，如果其肱骨大粗隆有不規則邊緣，我們建議其早日接受肩關節雙重對比攝影術，以便早日發現轉軸肌腱斷裂。（中台灣醫誌 **2003;8:274-7**）

關鍵詞

肱骨大粗隆，轉軸肌斷裂，肩關節雙重對比攝影術

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