RESEARCH ARTICLE

Empty Bursa SIGN: Significance in arthroscopic sub acromial decompression — an audit of consecutive patients 2003 to 2020

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Abstract

Objectives: To establish a relationship between sub acromial bursa and shoulder impingement by determining its presence or absence in sub acromial space. To determine the novel prospects and favourable outcome after surgery in shoulder impingement syndrome.

Methods: Over 1000 patients with the diagnosis of shoulder impingement were studied from 2003 to 2020 at Manor Teaching Hospital, Walsall, UK. During Arthroscopy, the findings were noted and documented. The sub acromial bursa and its presence or absence was noted along with kissing lesion of supraspinatus confirmed at Arthroscopy. Functional outcome in all patients was assessed with q-Dash score and pain relief was documented with VAS (Visual Analogue Scale).

Results: Sub acromial decompression did not completely resolve symptoms in 649(64.9%) patients having adequate bursa and no kissing lesion. Therefore, a cause other than acromion impingement was considered. However, in 351(35.1%) patients without any bursal tissue, sub acromial decompression alone had better results. Mean post-operative q-DASH score in group A (Bursa present) was 49.21±41 and in group B (Empty Bursa) it was 35.73±23. Mean post-operative VAS (Visual Analogue Scale) score in group A was 6.5±2.3 and in group B, it was 4.1±2.1.

Conclusion: We report that the presence of kissing lesion and an empty Bursal space under the acromion is a high predictor of successful outcome after arthroscopic decompression.

Keywords: Acromioclavicular Joint, Empty Bursal Sign, Shoulder Impingement, Sub acromial Decompression.

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Introduction

Shoulder impingement syndrome being a clinical diagnosis requires a thorough history and clinical findings exhibited by the patients. Shoulder is an area surrounded by a complex anatomy that is dynamically affected and the patient presents with a subtle complaint which is sometimes not easy to correlate with the evaluation to reach a diagnosis. Shoulder impingement is one of these problems with various types, mainly sub acromial and sub coracoid.

Sub acromial space is formed by the acromion above, humeral head below and coracoacromial arch constituting coracoid, coracoacromial ligament and medially the acromioclavicular joint.[1] Close proximity of these structures makes them prone to injury every time when there is excessive use and trauma. Repetitive trauma brings in oedema and inflammatory reaction to the supraspinatus tendon and there is reactive synovitis with resultant synovial hypertrophy and bursitis in sub acromial space. Pressure from the bursa and supraspinatus tendon causes pain in stressful positions and acromio-humeral space keeps getting narrower with time. A vicious cycle starts and symptoms gradually get worse. On MR images and ultrasound, indirect signs can be appreciated mainly, bone excrescences in acromion and acromioclavicular joint, thickening of coracoacromial ligament and low-lying acromion.[2,3] Some nonspecific changes like signal intensity alterations in the substance of supraspinatus tendon can also be seen. Neer introduced acromioplasty in 1971 and Ellman was the first to report arthroscopic sub acromial decompression in 1987.[4,5] Results began to improve after these procedures interrupted by a series of papers that stated supervised physiotherapy is equally effective as sub acromial decompression. With refining the objective and close follow up of large sample sized cohorts, it was made clear that sub acromial decompression is a better choice and improves symptoms. Since then, it has flourished extensively and now it is an established alternate technique as compared to open surgery.[6,7] We on average perform more than 150 shoulder arthroscopic procedures in our unit per year.

Purpose of the study was to evaluate patients with shoulder impingement and investigate the relationship between bursal presence and shoulder impingement.

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Significance of the presence of Bursa in the sub acromial space and its relationship to the sub acromial impingement as a cause of shoulder pain was found to be significant. Arthroscopic decompression procedures performed in 1000 patients showed that in the presence of thick and complete Bursal tissue, acromion is not the cause of impingement and sub acromial decompression alone does not significantly improve the preoperative symptoms. In these cases, the cause of impingement was either internal impingement or ACJ impinging on the rotator cuff. We present our series with pre- and post-operative evaluation of the patients and arthroscopic images.

Methods

This clinical audit was conducted at Manor Teaching Hospital, Walsall, UK and patient data were collected from July 1st, 2003 to June 30th, 2020. Patients with isolated shoulder pain without any comorbids, which were the inclusion criteria, were included. Patients with secondary frozen shoulder or history of previous shoulder injury were excluded. The patients were stratified in two groups based on arthroscopic findings. Sample size was calculated according to Cochran's Sample Size Formula.[8] Group A comprised of patients with presence of Bursal tissue in subacromial space and group B had patients without any bursa (Empty Bursa Sign). Diagnosis of sub acromial impingement was made by the history and clinical examination. Neers sign and Hawkins Kennedy test were employed to diagnose impingement clinically and confirmed with Neers Test (steroid injection relieved pain for minimum of four hours).[9] MR images and Dynamic Ultrasonography was also used to further strengthen our findings before embarking on the procedure.[10-12] After informed consent and explaining the risks and benefits of the surgery and outcome, the Consultant surgeon (Senior Author) performed the procedure of Arthroscopic decompression. Pre- and post-operative data were collected to compare the results. Patients were observed for having the signs of impingement and thick Bursa in sub acromial space on diagnostic arthroscopy. Both Groups (A; Bursa and B: No bursa) were followed prospectively and their functional outcomes score (qDASH) and VAS for pain relief was documented to see the improvement.

Data was analyzed by using SPSS V-23. Mean and standard deviation was calculated for quantitative variables and frequency and percentage was calculated for qualitative variables.

Results

Out of 1000 patients 453 (45.3%) were males and 547 (54.7%) were females with age ranging from 30-75 years and mean age 51.42±10.59 years. Of all the patients evaluated for absence of Bursa, 649 (64.9 %) displayed presences of bursa in subacromial space and 351 (35.1%) patients showed no fat pad (Empty Bursal sign) when an arthroscope was inserted into the joint (Table-1). Mean post-operative q-DASH score in group A was 49.21±41. Whereas mean post-operative q-DASH score in group B was 35.73±23. (Table-2). Mean post-operative VAS (Visual Analogue Scale) score in group A was 6.5±2.3 and in group B, it was 4.1±2.1 (Table-3). It was observed that in

Table-1: Distribution of age (years) ranging (30 to 75 years) in both groups.

Group	N	Min	Max	Mean
Bursa	649	30	75	51.69±10.68
No Bursa	351	30	75	50.93±10.38

Table-2: Mean Pre and Post op q-DASH Scores in Both the groups.

	Mean Pre op q-Dash Score	Mean Post op q-Dash Score
Group A (Bursa Present)	87.3±74	49.21±41
Group B (Empty Bursa)	81.32±93	35. 73±23

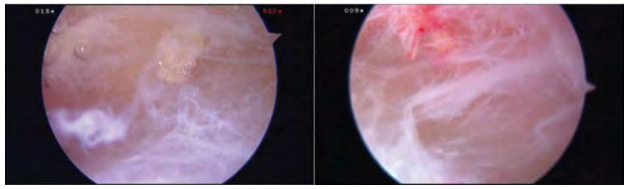

Figure-1: Bursa in instability patient no impingement (Normal).

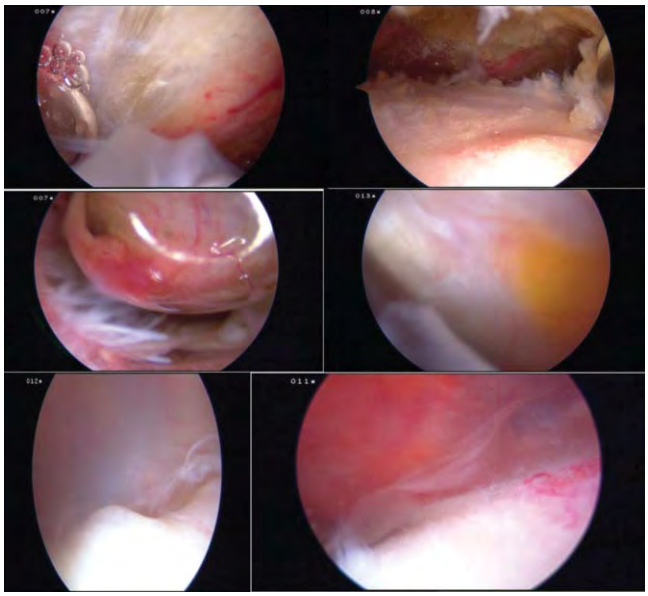

Figure-2: Bursa empty in multiple patients with Impingement.

Table-3: Mean pre- and post-op vas score in both the group.

Group	N	Pre	Post	% Pre	% Post	% Change
Bursal	649	8.52±1.72	6.5±2.36	85	65	20
No Bursa	351	8.94±3.23	4.1±2.12	89	41	48

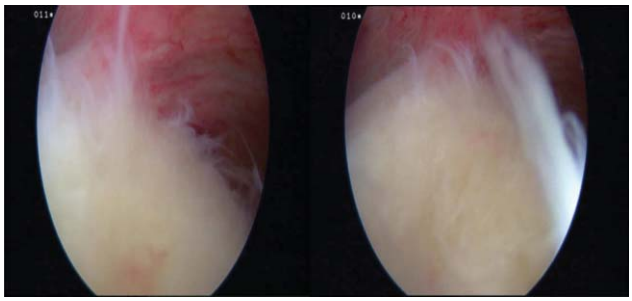

Figure-3: Kissing lesion.

patients having a thick pad of fat in the sub acromial space (Figure-1), decompression alone did not relieve the symptoms which lead to the hypothesis that acromion was not the cause of their impingement as compared to the patients without any Bursa (Figure-2) in sub acromial space and a Kissing lesion (Figure-3).

Discussion

Finding a relationship between empty Bursal sign and shoulder impingement has been a difficult struggle during the last decade. In this study, the relationship was studied and results reported. In patients where empty Bursal sign was clearly not present, it was observed that simple sub acromial decompression alone did not improve any symptoms emphasizing another cause for shoulder pain other than acromion.[13-15]

However, the current available studies do present design flaws, namely statistical under powering, particularly in type III acromion morphology; inadequate short-term follow-up; lack of imaging data to assess cuff healing; and insensitive outcome measures to capture the theorized benefits of sub acromial decompression.

Additionally, several relevant merits of acromioplasty have been reported, including decreased abrasive wear with prominent type III acromial morphology, release of natural growth factors to improve rotator cuff healing, and improved visualization during rotator cuff repair.[16,17]

Jarvis et al, found no significant correlation between the two and they also concluded that performing sub acromial decompression is the surgeon's discretion and is decided pre operatively and during the time of arthroscopic evaluation.[18] Lenza et al, reported an interesting case with sub deltoid lipoma with a cause of shoulder impingement.[13] Holt et al, produced MR images and techniques to correctly identify the degenerative wear that causes the symptoms of impingement.[10]

Khoury et al, explained the use of ultrasonography in diagnosing the impingement before embarking on the treatment plan.[10] Graichen et al, measured the width of sub acromial space and its deterioration in impingement and improvement after the sub acromial impingement. however, symptoms did not improve in their long-term analysis and there were no significant association between sub acromial decompression alone.[13] Hohmann et al,[14] exquisitely defined a few indications of sub acromial decompression and reported a reasonable outcome following the procedure provided rotator cuff muscles were intact and there was no bias affecting the study outcomes.

We also used VAS and according to Bird et al, a change of 12 to 20% is significant and as our result shows that the improvement in patients with no Bursa was significant.[18]

In all the studies referred here, there was a clear emphasis on performing the procedure and observing the outcome which was better than non-operative treatment.

Conclusion

Comparing the results with other studies, it could be concluded, that sub acromial decompression alone did not improve the symptoms in patients with a cause other than acromion. This is thus a useful procedure producing good functional outcome in patients with acromion morphology causing the symptoms of shoulder impingement. However, the results need validation by a longer follow up of these patients.

Disclaimer: None.

Conflicts of Interest: None.

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