



## Unusual lesions mimicking impingement syndrome in the shoulder joint - Think medially



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### HIGHLIGHTS

- Impingement syndrome is defined as impingement of the rotator cuff by the anterior one-third of the acromion, 1.
- Iatrogenic causes such as sutures, can cause similar symptoms.
- Symptoms and signs of impingement may be present can originate outside the sub-acromial space.
- MRI scan remains an important imaging tool.

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### ABSTRACT

Impingement syndrome is usually caused by irritation of the rotator cuff within the sub acromial space and this includes the coraco-acromial arch (Acromion and Coraco-acromial ligament), the acromio-clavicular joint and occasionally the coracoid. Iatrogenic causes such as sutures, pins, plates or wires left from previous surgery can cause similar symptoms. We present a series of four cases mimicking “classical” impingement symptoms/signs in which the causal pathology was identified outside the sub-acromial space. Magnetic Resonance Imaging (MRI) showed lesions that were present in the supra-spinatus fossa but were causing pressure effects on the sub-acromial space, namely - a ganglion cyst in one case, lipomata in two other cases, and a glomus tumour. A ganglion cyst and glomus tumour mimicking impingement syndrome is a rare reported case to our knowledge.

These are unusual causes that should be considered when investigating classical impingement syndrome and particularly those who may have failed to respond to decompression surgery. They highlight the potential value of looking beyond the sub-acromial space for causal lesions and in these cases, at a time when limited ultrasound investigation has become increasingly popular; MRI has clearly played an important and was essential in planning surgery as these lesions would not have been identified on USS. Even though the symptoms were classical.

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## 1. Introduction

Impingement syndrome is often caused by encroachment of the rotator cuff on the coraco-acromial arch, the acromio-clavicular joint or occasionally the coracoid [1]. Iatrogenic causes such as sutures, pins or wires left from previous surgery can cause similar symptoms. We present a series of four cases mimicking classical impingement symptoms/signs in which the causal pathology

existed outside the sub-acromial space. MRI showed lesions, which were present in the supra-spinatus fossa but were causing pressure effects on the sub-acromial space, namely - a ganglion cyst, lipomata, and a glomus tumour.

These are unusual causes that should be considered when investigating “classical” impingement syndrome and particularly those who have failed to respond to “decompression” surgery. They highlight the potential value of looking beyond the sub-acromial space for causal lesions and in these cases, at a time when limited ultrasound investigation has become increasingly popular; MRI may play an important role.

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## 2. Case report 1

A 63-year-old gentleman presented with a 2-year history of worsening left shoulder pain and a painful arc.

On examination, he was tender over the cuff and with provocation of the acromio-clavicular (AC) joint. Hawkins's sign was positive and Neer's test using a mixture of local anaesthetic and steroid was positive, consistent with impingement.

He was investigated with X-rays and an MRI scan which showed evidence of an intramuscular lipoma within the supra-spinatus fossa causing pressure effects onto the sub-acromial space thereby causing symptoms (Fig. 1). The lipoma was not obvious clinically. A decision was made to proceed to left shoulder manipulation under anaesthesia (MUA), Arthroscopy ± subacromial decompression.

At surgery, the lateral extent of the lipoma was identified arthroscopically within the sub-acromial space and this was excised through a supra-lateral incision in-order to access the supra-spinatus muscle. A routine decompression was performed including distal clavicle excision. Histology confirmed the lesion to be a lipoma without any atypical features.

Immediate alleviation of pain and tenderness followed resection of the lipoma, and he remained pain free at 6-month follow up.

## 3. Case report 2

A 53-year-old gentleman presented with left shoulder pain, which was worse with elevation.

Examination revealed tenderness over the antero-lateral cuff and over the AC joint. He had a painful arc between 80 and 120° of abduction. Hawkins sign and Neer's test were positive.

A MRI scan was done to rule out a rotator cuff tear; however it showed a large fatty tumour in the supra-spinatus fossa (Fig. 2), which was not evident clinically.

At surgery, the fatty tumour was removed from the supra-spinatus fossa (Fig. 3). An AC joint excision and a sub-acromial decompression was performed. There was no evidence of a rotator cuff tear. Histology confirmed that the patient had a benign lipoma.

Immediate alleviation of pain and tenderness followed resection of the lipoma, and he remained pain free at 6-month follow up.



Fig. 1. Fat sensitive MRI sequences show a fatty tumour.

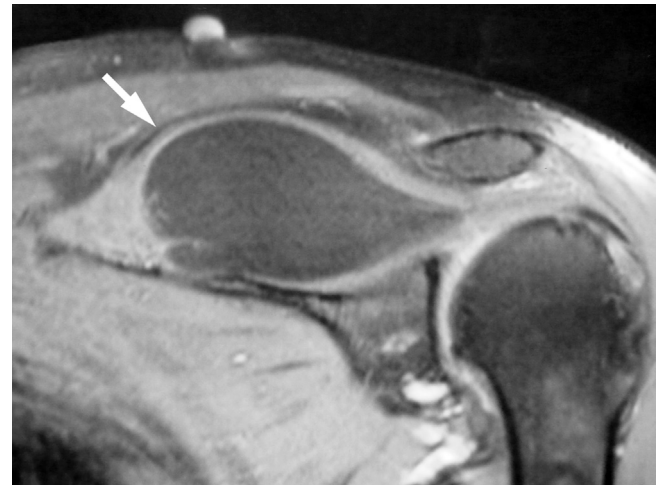


Fig. 2. Fluid sensitive sequences showing fatty tumor in supra-spinous fossa.



Fig. 3. Intra-operative photograph showing fatty tumor from supra-spinous fossa.

## 4. Case report 3

A 51-year-old gentleman presented with pain and restricted movement affecting his right shoulder.

Signs and symptoms were consistent with AC joint pain and impingement.

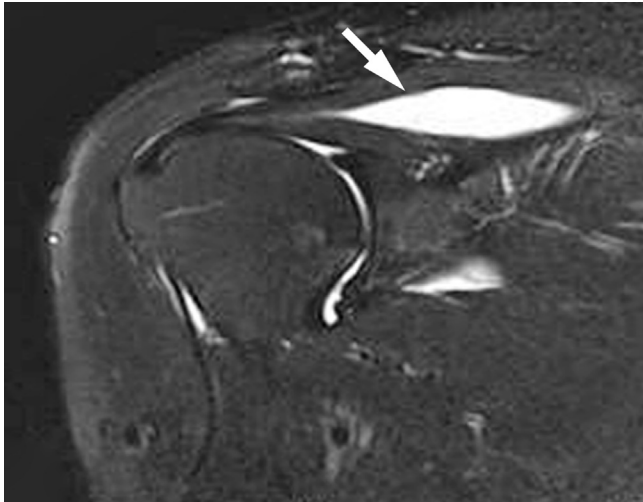
He had a short-lived response to an AC joint injection. Therefore, a right shoulder arthroscopy and open excision of the acromio-clavicular joint was performed. During surgery the sub-acromial space was found to be entirely normal and no decompression was performed. The distal end of the clavicle was excised and the shoulder checked intra-operatively for any signs of impingement.

Despite physiotherapy he continued to have painful symptoms consistent with impingement.

A subsequent MRI arthrogram showed a cystic structure within the supra-spinatus muscle measuring 7 cms in length and 1.4 cms in depth (Fig. 4), consistent with a ganglion type cyst, likely to cause patients symptoms. Surgical resection of the ganglion cyst was carried out. At 6 months follow up; the patient had recovered a normal range of pain free movement.

## 5. Case 4

A 70-year-old gentleman presented with persistent right



**Fig. 4.** MRI coronal section showing cystic structure within the supra-spinatus.

shoulder pain and restriction of movement, with signs and symptoms consistent with sub-acromial impingement.

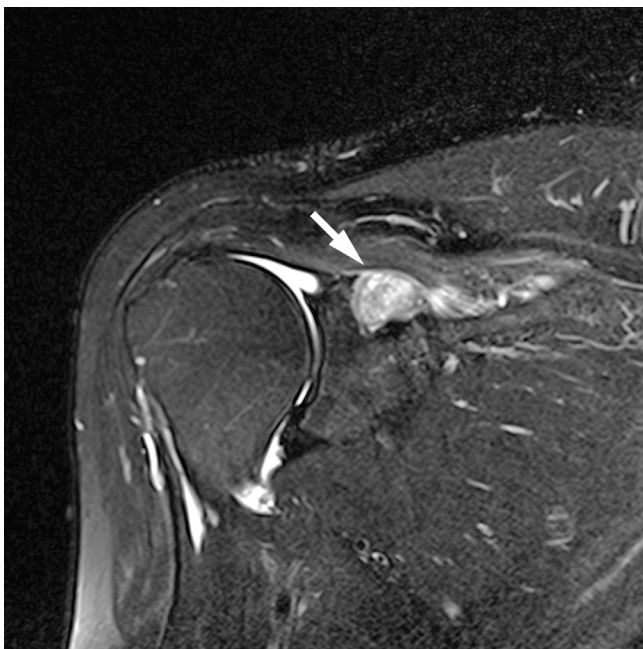
The symptoms had been present for over 6 years despite repeated physical therapy, analgesia, local steroid injections, and arthroscopic sub-acromial decompression.

The cause of the condition remained undiagnosed and obscure. Due to the ongoing symptoms, an MR arthrogram (Fig. 5) was performed which showed a lesion in the suprascapular notch, low in T1, that enhanced following administration of gadolinium.

The appearances were that of a benign neoplasm. The 'tail sign' visible on MRI (Fig. 5) suggests close approximation to the suprascapular nerve.

This lesion was removed by open surgery where the trapezius was detached and the exposed tumour was dissected of the suprascapular nerve and sent for histology.

The histology actually showed a glomus tumour. They are well



**Fig. 5.** MR showing tail sign indicative of a lesion close to a neurovascular structure – suprascapular nerve.

known to be very painful. This is an unusual location. Diagnosis is usually very difficult due to its small size.

Immediate alleviation of the pain and tenderness followed complete resection of the mass, and the patient remained free of pain at 1-year follow up.

A glomus tumour arises from the modified smooth muscle cells of the glomus body, a neuromyoarterial receptor that is sensitive to variations in temperature and regulates arteriolar flow [2]. Glomus bodies, normally located in the subcutis or dermis, are most commonly found in the distal portion of the digits, especially in the subungual region. These masses are exquisitely painful to touch and pressure. Infrequently, atypical glomus tumours have been reported to involve other sites, including muscles, joints, head and neck, stomach, penis, and rarely the mediastinum [3,4]. Surgical excision remains the treatment of choice, although radiotherapy has been advocated as a primary or adjunctive modality [5,6].

## 6. Discussion

Impingement syndrome is defined as impingement of the rotator cuff by the anterior one-third of the acromion, the coraco-acromial ligament, and the acromio-clavicular joint rather than by just the lateral aspect of the acromion [1]. Neer suggested that the portion of the rotator cuff that is impinged upon (the impingement zone) is centred on the insertion of the supra-spinatus tendon on the greater tuberosity [7]. He further postulated that the formation of spurs in the substance of the coraco-acromial ligament leads to chronic wear and to tear of the rotator cuff [7].

Neer described three stages of impingement. Stage-I impingement is characterized by oedema and haemorrhage of the bursa and cuff and is typically found in patients who are less than twenty-five years old. Stage-II impingement represents irreversible changes, such as fibrosis and tendonitis of the rotator cuff, and is typically found in patients who are twenty-five to forty years old. Stage-III impingement is marked by more chronic changes, such as partial or complete tears of the rotator cuff, and usually is seen in patients who are more than forty years old [1].

The etiological factors of impingement syndromes can be divided into intrinsic and extrinsic [8]. The intrinsic factors include – muscle weakness, overuse of shoulder and degenerative tendinopathy. The extrinsic factors include – glenohumeral instability, degeneration of acromio-clavicular joint, impingement by coraco-acromial ligament, coracoid impingement, impingement on the postero-superior aspect of the glenoid and biomechanical considerations [8].

Rotator cuff impingement symptoms generally arise from pathologic shoulder lesions related to instability or extrinsic factors involving the coraco-acromial arch [9–11]. Bursal causes are less common and include thickening from rheumatoid arthritis and iatrogenic causes such as sutures or implants from previous surgery [9]. Rare causes reported are coracoid impingement [8], synovial chondromatosis [10,11], clavicular malunion [12], unstable os acromiale [13], ossification of the subscapularis tendon [14], lipoma [15] and tumours such as osteochondroma of the distal clavicle [16]. Certain lesions may mimic impingement such as cervical spondylosis, a thoracic disc herniation [17] or tumours of the proximal humerus [18,19].

In the 1960's Edward de Bono famously encouraged us to "think laterally" [20] about problems, and our experience with these cases would endorse that – but in a "medial" direction! Each of the sources of pain in this series, whilst presenting clinically as impingement had their origin medial to the area on which we normally focus our attention. Indeed in two cases – that of the glomus tumour and that of the ganglion, failed surgery for



impingement had already been under taken.

## 7. Conclusion

In our series we have shown that although the symptoms and signs of impingement may be present, it is clearly possible on some occasions, for the responsible pathology to originate outside the sub-acromial space – in these cases within the supraspinatus fossa. In none of the cases was the pathology evident on clinical examination and was clearly “medial” to the sub acromial space. MRI was invaluable in each case to establish the causal pathology. Despite the considerable importance of ultrasound imaging in impingement if there is suspicion regarding the cause of pain then an MRI scan remains an important imaging tool.

Some may argue that the addition of subacromial surgery (decompression and acjoint resection) may have been responsible for relieving the symptoms. However, we would comment that in two cases, surgery had already failed to resolve the symptoms and in the remaining two cases – those of the large lipomata within the supraspinatus fossa, given their size within this tight space, in is difficult to imagine that they were not responsible for symptoms.

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## Author contribution

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Rohit Singh – wrote paper.

Akshay Malhotra – wrote paper.

Gillian Cribb – consultant involved in case and reviewed paper.

Paul Cool – consultant involved in case and reviewed paper.

Stuart Hay – consultant involved in case and reviewed paper.

## Conflicts of interest

No conflicts of interest.

## Guarantor

The Guarantor is the one or more people who accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Rohit Singh.

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