CASE REPORT

Subscapularis pyomyositis: a rare presentation of shoulder pain

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Accepted 28 February 2018

SUMMARY

We present a rare case of a subscapularis pyomyositis in a 38-year-old woman and examine the diagnostic and surgical challenges posed. History and examination features were similar to that of septic shoulder arthritis without overlying features of warmth or erythema. Serological markers revealed a C-reactive protein of 221 mg/L and white cell count of $11.1 \times 10^9/L$. A dry shoulder aspirate was obtained. Contrast-enhanced MRI demonstrated a peripheral rim-enhancing lesion within the subscapularis muscle belly with lack of central enhancement. These features are consistently seen with an infective aetiology. A deltopectoral approach to surgical drainage was utilised and subsequent fluid cultures grew Panton–Valentine Leukocidin positive *Staphylococcus aureus* species. This rare bacterium is associated with an increased risk of osteomyelitis and despite making a full recovery, the patient was advised to reattend if any future shoulder pain was encountered.

BACKGROUND

Pyomyositis is a diagnostically challenging and rare condition, which in the past has resulted in fatal overwhelming sepsis. As such, after excluding shoulder septic arthritis, a low threshold of suspicion for its diagnosis should be applied to patients with persistent fever, pain and decreased range of shoulder motion. It should be investigated with contrast-enhanced MRI and treated with prompt surgical incision and drainage followed by appropriate antibiotic therapy.

CASE PRESENTATION

A 38-year-old right-hand dominant female was referred to our unit with a 4-day history of progressive right shoulder pain.

Prior to this, she had participated in her regular boxing class but denied any sudden pain or injuries sustained therein. The following day, she noticed a mild discomfort in her right shoulder. However, over the subsequent 3 days, this progressed to severe right shoulder pain and an inability to elevate her arm with an associated fever.

She denied any neck pain, radicular symptoms or paraesthesia affecting her arm.

The patient had a history of cutaneous abscesses in the past, the last being over a year ago. There was no recent history of infection, foreign travel or immunosuppression. She suffered with asthma as a child but no longer required the use of inhalers. She did not take any medications.

INVESTIGATIONS

Observations revealed a temperature of 38.5°C and she was haemodynamically stable. There was no evidence of swelling or erythema about the shoulder. She exhibited diffuse tenderness to the lateral aspect of right shoulder and posterior scapula; however, there was no overlying warmth.

She adopted a position of internal rotation of the shoulder with her arm across her chest. Any active or passive shoulder motion beyond this exacerbated severe pain, which she localised posteriorly. She had normal upper limb sensation and power was Medical Research Council (MRC) grade 5/5 about her elbow, wrist and hand. Her radial pulse was palpable with capillary refill time of 1 second.

Serological tests revealed a C-reactive protein of 221 mg/L and white cell count of $11.1 \times 10^9/L$. Blood cultures taken on presentation later revealed no growth after 4 days.

Plain radiographs revealed no bony abnormalities of her shoulder joint.

She underwent a dry aspiration of her shoulder at her initial treating institution.

MRI of her shoulder revealed evidence of an ovoid soft tissue mass within the subscapularis muscle belly measuring 6×3×5 cm. Following contrast administration, there was a peripheral thick wall enhancement with no enhancement centrally (figures 1 and 2). The peripheral rim enhancement with lack of central enhancement is consistent with a pyomyositis of the subscapularis muscle. The subscapularis tendon appeared intact. There was no evidence of a shoulder joint effusion and the underlying scapula demonstrated normal appearances with no features of osteomyelitis or infiltration.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis based on history and clinical findings alone is broad and include a septic shoulder, pyomyositis, calcific tendinitis, muscle strain, intramuscular haematoma, acute osteomyelitis, myonecrosis and sarcoma.

TREATMENT

She was taken to operating theatres and a diagnostic shoulder arthroscopy was initially performed with a standard posterolateral portal. No evidence of intra-articular pathology was identified and fluid cultures subsequently revealed no growth.

A standard deltopectoral approach was utilised. On mobilisation of the conjoined tendon medially, approximately 150 mL of blood-stained

To cite: Jagernauth S, Clough RAJ, Noorani A, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-223982

Figure 1 Axial MRI T1 sequence revealing evidence of a peripheral enhancing lesion with no central enhancement within the subscapularis muscle belly.

pus exuded from the subscapularis muscle. Fluid sample and muscle tissue biopsies were sent for microbiology cultures and cytology.

A thorough debridement was performed with irrigation using 6L of normal saline. While a defect was noticeable within the subscapularis muscle belly, the tendon integrity was preserved. A redivac drain was placed and the wound was closed in layers. A polysling was provided for comfort but the patient was encouraged to perform active movements of the shoulder within her pain threshold.

Under the advice of the microbiologist, she was started in empirical intravenous co-amoxiclav 1.2g three times daily and by the following day her fever had settled. Her pain had significantly improved and she could perform gentle shoulder pendular exercises.

Subsequent cultures obtained from the pus grew Pantone–Valentine Leukocidin (PVL) positive *Staphylococcus aureus* sensitive to flucloxacillin. Her treatment was changed to oral flucloxacillin 500mg four times a day for a total of 4 weeks.

Cytological tissue and fluid examination revealed the presence of neutrophils with scattered macrophages, fibrin and blood, in keeping with suppurative inflammation and no atypical cells were seen.

OUTCOME AND FOLLOW-UP

She made a rapid postoperative recovery and was discharged from hospital after 3 days. She commenced physiotherapy and at her 4-week follow-up, she had no further shoulder pain. Subscapularis MRC power was 5/5. Active forward flexion/abduction was 180°, external rotation 30°, with internal rotation to her lower lumbar vertebrae.

In light of her PVL *S. aureus* growth, she was advised of the risk of subsequent osteomyelitis and informed to reattend to the accident and emergency department if she noticed any future shoulder pain.

DISCUSSION

Pyomyositis is a subacute, deep pyogenic infection of skeletal muscle tissue that is most commonly caused by *S. aureus* species.¹ Several predisposing conditions have been identified and include intense exercise, trauma, recent infection, diabetes and immunocompromised state.²

It is a progressive condition with three distinct stages: stage 1 is typified by cramp-like muscle pain and a low-grade fever. If superficial, the affected muscle may have a characteristic ‘woody’ texture on palpation. During stage 2, there is worsening muscle pain and fever as an intramuscular abscess is formed. There may be overlying erythema and warmth arising from the affected muscle. In stage 3, the condition progresses to septicaemia and if untreated the patient’s condition may advance to septic shock.³ Ninety per cent of patients will present to a medical practitioner during stage 2 of the condition³ and is consistent with the clinical findings of our described case.

The pathogenesis of pyomyositis, although not fully understood, involves a transient bacteraemia in the presence of muscle injury.⁴ Healthy muscle tissue is usually resistant to infection; however, trauma to the muscle has been proposed as a prerequisite to the development of pyomyositis. It has been suggested that trauma may lead to a muscle haematoma which subsequently becomes colonised by the transient bacteraemia.⁴ Our patient’s symptoms only developed after a recent boxing class, and it is plausible that she may have developed a subscapularis haematoma at that point. This is more likely given that there was no history of recent infection or immunocompromise.

A subscapularis pyomyositis is a collection of pus within the subscapularis muscle, anterior to the glenohumeral joint. It is a rare problem with our literature search revealing only two documented cases of pyomyositis of the subscapularis muscle, one of which also involved teres minor and the other infraspinatus.^{5 6}

Figure 2 Coronal MRI T2 fat suppression sequences revealing evidence of a peripheral enhancing lesion with no central enhancement within the subscapularis muscle belly.

From our literature search, it has not been possible to identify any other previous isolated primary subscapularis pyomyositis.

The diagnosis of a pyomyositis can be challenging, particularly of the rotator cuff musculature. The degree of pain combined with limitation of shoulder movements can mimic that of a septic arthritis of the shoulder. As such, this must be promptly excluded through aspiration of the glenohumeral joint.

On exclusion of septic arthritis, the diagnosis is based on clinical suspicion as well as radiographic imaging, with MRI of the area being the modality of choice. Studies have shown that T2-weighted signal intensity on MRI provides the most specific and earliest detection of pyomyositis.^{7,8} Differentiation between a subscapularis abscess and underlying tumour on imaging is challenging. Features consistent with an infective process on contrast-enhanced MRI are a peripheral rim-enhancing lesion with no central enhancement and no evidence of underlying bony or periosteal changes. In addition, a lack of joint effusion virtually excludes a septic shoulder joint.

Management of pyomyositis is with emergent surgical exploration, washout and debridement and should ideally be performed before antibiotics have been administered. Fluid and tissue samples should be sent for gram stain, microscopy, culture and sensitivity as well as cytology.⁹ We utilised a deltopectoral approach that afforded excellent exposure to subscapularis. This was followed by copious debridement of the collection and irrigation with normal saline. The shoulder joint capsule was not breached and thus was preserved from bacterial contamination. Another case described in the literature did note recurrence and required four open debridement procedures before the patient showed clinical improvement.⁶ As such, close monitoring of the patient's postoperative clinical condition as well as monitoring inflammatory markers is highly encouraged. In addition, the authors suggest a global immune screen to be performed as well as HIV and diabetes testing to exclude an immunocompromised patient.⁶

Multiple microbiology specimen cultures were taken which subsequently yielded *S. aureus* species sensitive to flucloxacillin. Furthermore, our cultures revealed it was a PVL positive *S. aureus*. These are known to secrete the rare PVL cytotoxin, which can lead to neutrophil lysis. In addition, PVL *S. aureus* infections have been reported to correlate with higher rates of surgical drainage and increased complications such as chronic osteomyelitis and deep vein thrombosis, as well as lengthier hospital stay when compared with PVL-negative infection.¹⁰

Cases of adult PVL-positive *S. aureus* are much less common than in paediatrics or adolescents. However, one case of note was that of a 26-year-old British Army soldier who presented with a *S. aureus* PVL-positive septic arthritis who was readmitted 5 months later with an ipsilateral femoral osteomyelitis requiring debridement.¹¹ Due to the complications, the authors recommend a low threshold for requesting PVL testing in aggressive musculoskeletal *S. aureus* infections.¹¹

This is the first described case of an isolated primary pyomyositis of the subscapularis muscle. The clinical presentation is

consistent with that of a septic arthritis of the shoulder; however, it is essential to continue to investigate for other causes of pain particularly in the presence of a negative shoulder aspirate.

Learning points

- After excluding shoulder septic arthritis, a low threshold of suspicion for diagnosis of a pyomyositis around the shoulder should be applied to patients with persistent fever, pain and decreased range of shoulder motion.
- Fluid and tissue samples of intramuscular abscesses should be sent for microbiology cultures and cytology to exclude the presence of Panton-Valentine Leukocidin positive *Staphylococcus aureus* as this is known to be associated with an increased risk of osteomyelitis.
- Utilisation of the deltopectoral approach without exposure of the glenohumeral joint proved successful and would be encouraged in similar cases.

Contributors SJ and RAJC drafted the work, MA was involved in the image selection and interpretation and AN was involved in the concept and revision of manuscript. All the authors contributed equally to the production of the manuscript. All the authors have met the ICMJE recommendations for authorship and confirm there is no one else who fulfils the criteria that has been excluded as an author.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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