Septic subacromial bursitis caused by *Streptococcus pneumoniae*: A case report

Abir Bou Khalil, Ziad Hajj, Umayya M. Musharrafieh, Hassan Sidani, Dania Abdallah, Rima Abdallah Moghnieh

ABSTRACT

Introduction: Isolated infection of the subacromial bursa is a rare entity. Primary subacromial septic bursitis is uncommon compared to other superficial bursa because of its deep anatomic location. The potential for an underlying spread of infection to unusual sites has been reported in the setting of diabetes mellitus and can very easily be overlooked.

Case Report: We describe the clinical presentation, radiological investigations and strategies for the management of a 59-year-old diabetic male presented with subacromial bursitis as a result of *Streptococcus pneumoniae* infection. It resolved without sequelae using oral and parenteral antibiotics, incision and drainage, and surgical debridement. The range of motion improved gradually until full recovery.

Conclusion: Subacromial septic bursitis is rarely reported in medical literature. Its fast identification and treatment is needed to allow full recovery of range of motion.

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CASE REPORT

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Keywords: Subacromial, Bursitis, *Streptococcus pneumoniae*

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INTRODUCTION

The subacromial bursa is the synovial membrane between the acromial process and the capsule of the shoulder joint. Primary subacromial septic bursitis is uncommon compared to other superficial bursa because of its deep anatomic location. We present a case of subacromial septic bursitis due to *Streptococcus pneumoniae* infection in an immunocompromised host.

CASE REPORT

A 59-year-old male, a hospital kitchen worker in-charge of dish washing, known to have non-insulin-dependent diabetes mellitus controlled on oral hypoglycemic agent, presented to the emergency room with one week history of pain, swelling and coldness of the right arm and shoulder. The pain was so severe that it had been preventing him from sleep, where it was exaggerated by movement. He had no previous history of antecedent trauma, injury, or any shoulder pain. He denied any systemic symptoms such as fever, anorexia, weight loss, sweating, cough or dyspnea.

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The patient had undergone amputation of the right hallux and long toe as complication of diabetes mellitus several years ago. He had history of gastric cancer that was resected several years ago and is being followed-up, with no evidence for recurrence or metastasis. He was non-smoker and non-alcoholic. He had no travel history outside Lebanon and lives in a crowded area. He is married with two children, and denies any extramarital affairs.

On initial examination, vital signs were normal. No redness, hotness, or skin lesion of the right arm was observed. Yet, there was tenderness over deltoid muscle and stiffness in the range of motion (ROM) of the right shoulder. He had 10° external rotation, 10–15° abduction, 5° extension, 10° flexion and 0° internal rotation. He was moving freely his right elbow, wrist and fingers with no pain. He had intact neurovascular system. Otherwise, nothing was remarkable except that patient puts a denture, and there was no evidence of gingival inflammation, or any point of tenderness over the sinuses or mandibles. He had no meningeal signs, and no heart murmurs. His lungs were clear and, abdomen was soft. His laboratory tests showed white blood cell count 15,700/μL, neutrophils 83.1%, lymphocytes 9.7%, eosinophils 0.5%, platelets count 566,000/μL, hemoglobin 12.4 g/dL, hematocrit 39.6%, erythrocyte sedimentation rate (ESR) 28 mm/h, C-reactive protein (CRP) 25.7 mg/dL, serum blood urea nitrogen (BUN) 15 mg/dL, serum creatinine 0.8 mg/dL, serum lactate dehydrogenase (LDH) 129 U/L, serum alanine transaminase (SGPT/ALT) 36 U/L, serum creatine phosphokinase (CPK) 117 U/L, procalcitonin 0.41 ng/mL, microalbumin urine spot 249.4 mg/L, total protein 7.2 g/dL, albumin 3.7 g/dL, globulin 3.5 g/dL, HbA1c 10%, D-dimer 3.89 μg/mL. Blood cultures were taken on admission and grew *Streptococcus pneumoniae*, susceptible to penicillin with minimal inhibitory concentration (MIC) < 0.016 μg/mL after four days of incubation.

X-ray of right shoulder revealed calcific tendinitis at the rotator cuff insertion with no bony lesion (Figure 1). Computed tomography (CT) scan of the right shoulder showed similar results along with minimal acromioclavicular arthrosis with minimal inferior spurring and acromial enthesopathy. A gadolinium-enhanced magnetic resonance imaging (MRI) scan of the right shoulder (Figure 2) revealed acromioclavicular and glenohumeral degenerative osteoarthritic changes showing no osteomyelitis. With respect to the supraspinatus and subscapularis tendon, findings suggest severe tendinitis and partial tearing. There was mild to moderate synovial hyperplasia and remarkable distension and fluid filling of the subacromial/subdeltoid bursa. Mild synovial enhancement was noticed following injection of contrast where findings suggested synovitis/bursitis most likely to be reactive. Nothing was remarkable on CT scan of chest and upper extremity venous Doppler ultrasound. Echocardiography showed global hypokinesia with an ejection fraction (EF) 42% ruling out any endocardial

Figure 1: X-ray of the right shoulder, anteroposterior view, showing calcific deposition at the acromion and enlarged subacromial space.

vegetation. Serum protein electrophoresis was done and showed no abnormalities.

The patient was empirically started on antibiotic treatment with ceftriaxone (2 g IV daily), and then changed to penicillin G (2 MIU IV every 4 hours for 4 weeks), based on culture and antibiogram results. Anti-inflammatory and analgesic drugs were prescribed to the patient for pain management. Three weeks after the intravenous antibiotic therapy, the patient underwent arthroscopic synovectomy with resection of subacromial bursa. Intraoperatively, a thick purulent material was drained from the subacromial space. Pus removed from the bursa and sent to culture did not grow any organism. Histological analysis of the removed synovial tissue from the subacromial bursa was consistent with a diagnosis of bursitis showing thick fibrous membrane infiltrated by mononuclear inflammatory cells with granulation tissue formation and fibrinous deposition (Figure 3).

Physical examination few days postoperatively showed that the patient could freely move his arm. Intravenous penicillin G was stopped after completion of four weeks in total. The patient was discharged on good condition on oral cefadroxil and rifampicin for two weeks. The patient underwent physiotherapy for four weeks after discharge. His range of motion, in the follow-up visit at third month post-discharge, revealed up to 90° abduction, 30° external rotation, 40° internal rotation and full flexion.

DISCUSSION

The subacromial bursa is a fluid-filled sac or saclike cavity between the acromion and the insertion of the supraspinatus muscle, extending between the deltoid and greater tubercle of the humerus [1].

Septic bursitis is commonly seen in superficial bursae, such as the olecranon or the bursae around the

Figure 2: Magnetic resonance imaging of the right shoulder showing remarkable distension and fluid filling of the subacromial/subdeltoid bursa.

Figure 3: Photomicrograph demonstrating inflamed fibrovascular membrane covered by fibrin and leukocytic deposition on surface (H&E stain, $\times 200$).

knee since they are easily inoculated transcutaneously through minor trauma [2]. Deep bursal infections such as subacromial and subdeltoid septic bursitis occur much more rarely than superficial ones [2] with only a few cases reported in literature, mostly due to immunosuppression involved in the onset of infection.

Routes of infection into the subacromial bursa are associated with three main risk factors: immunocompromised state [2], injection into the subacromial bursa [3], and hematogenous spread [4, 5]. *Staphylococcus aureus* is the most common pathogen and has been reported in approximately 80% of cases [5]. Other pathogens have also been reported [2, 5–9].

Ultrasonography or MRI scan can be used to identify fluid collection in the subacromial space. A large fluid collection with surrounding tissue edema suggesting cellulitis is usually consistent with septic bursitis but should always be clinically correlated [10]. Needle aspiration will confirm the diagnosis and identify the pathogen with appropriate analysis and culture of the bursal fluid [10]. Since hematogenous spread is one of the main risk factors so blood cultures should be taken.

Depending on the severity of the illness, treatment of subacromial/subdeltoid bursitis includes oral and parenteral antibiotics, needle aspiration, incision and drainage, and surgical debridement [10]. All of the cases reported in literature were treated similarly through surgical and medical interventions. After treatment range of motion usually improves until full recovery as given in Table 1.

We conducted literature search from January 2004 to January 2014 in the following electronic databases: Pubmed, Sciverse (Science Direct), Springer, Wiley, and Ovid MD. Case reports of septic subacromial bursitis published in English language were only included. Only nine cases have been reported in literature in last ten years (Table 1).

Streptococcus pneumoniae is a known cause of otitis media and severe community-acquired pneumonia with invasive pneumococcal disease occurring in many forms to include bacteremia, meningitis, endocarditis and joint infections such as septic arthritis [11]. Although most cases of septic arthritis are caused by *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus pneumoniae* have been noted to cause up to 10% of reported cases [12, 13]. This is the second case to report *Streptococcus pneumoniae* induced septic subacromial bursitis. The first one was reported by Mukerji et al. [8] who described a case of a 68-year-old male diagnosed for septic subacromial bursitis with extra-articular involvement, pneumococcal endocarditis. Septic bursitis is an unusual presenting complaint in pneumococcal endocarditis. A high index of suspicion with a thorough physical examination and supportive investigations should be considered in patients with septic bursitis or pneumococemia and persistent fever. In this case, echocardiography ruled out any endocardial vegetation.

Diabetes is a well-known risk factor for invasive pneumococcal infection [14, 15] and our patient is diabetic and had pneumococemia. The MRI scan of the right shoulder showed fluid filling of the subacromial/subdeltoid bursa and revealed the presence of tendinitis thus facilitating the seeding of the infection to the patient's shoulder. Yet, the bursal pus culture, drained intraoperatively, did not grow any microorganism since the patient was already on antibiotic therapy. Costantino et al. reported a 52-year-old female who had a history of diabetes mellitus with concomitant *Staphylococcus aureus* induced septic glenohumeral arthritis and subacromial bursitis of her shoulder [16]. Lan et al. described another diabetic case of purulent subacromial/

Table 1: Subacromial/subdeltoid septic bursitis review of literature during the last ten years

Author and Year (Reference)	Age/Sex (Case)	Underlying Disease/Associated Condition(s)	Causative Organism	Extra-articular Involvement	Blood Cx/ Bursal fluid Cx	Surgical Intervention/ Anti-infective Treatment	Outcome
Drezner et al. 2004 [10]	55/F	Nodulocystic acne on isotretinoin, Subacromial corticosteroid injection	<i>S. aureus</i>	None	NA/(+)	Aspiration of fluids, ABX	FROM
Pookarnjanamorakot et al. 2004 [5]	80/F	None	Tuberculosis	None	NA/AFB (-)	Bursa resection, subacromial decompression, rotator cuff repair, Antituberculous chemotherapy	FROM
Khazzam et al. 2005 [2]	65/M	HTN, DL, Shoulder injury, Subacromial corticosteroid injections	<i>Candida</i> species	None	NA	Arthroscopic subacromial decompression with acromioplasty, Voriconazole	Clinical improvement Persistent shoulder stiffening
Mukerji et al. 2007 [8]	68/M	COPD	<i>S. pneumoniae</i>	Pneumococcal endocarditis	(+)/(+)	Incision and drainage of subdeltoid bursa, ABX	Complete resolution
Ejnisman et al. 2010 [9]	45/M	HIV on antiretroviral therapy	NA	None	(-)/(-)	Aspiration, drainage, surgical debridement of subacromial bursa	Complete resolution
Mathew et al. 2012 [7]	53/M	Dermatomyositis with associated arthritis, Interstitial lung disease on sequential immunosuppressive therapy (HDC,CTX,MMF, mAb)	<i>M. kansasii</i>	None	(-)/(+)	Incision, drainage, surgical debridement of bursae, Antituberculous chemotherapy	Complete resolution
Lan et al. 2012 [6]	56/F	DM type II, Shoulder sprain	<i>viridans Streptococcus</i>	None	NA/(+)	Bursectomy and drainage of infected loci, ABX	FROM
Khan et al. 2013 [4]	62/M	None	<i>S. aureus</i>	None	NA/(+)	Aspiration, drainage, surgical debridement of subacromial bursa, ABX	FROM
Costantino et al. 2007 [16]	52/F	DM type II, Shoulder sprain	<i>S. aureus</i>	None	NA/(+)	Aspiration of the subacromial bursa, surgical washout of the joint, ABX	Moderate functional impairment of the right shoulder

Abbreviations: ABX - Antibiotics, AFB - Acid Fast Bacilli, CTX - Cyllophosphamide, CX - Culture, DL - Dyslipidemia, DM - Diabetes, Mellitus, F - Female, FROM - Full range of motions, HDC - High dose corticosteroids, HTN - Hypertension, M - Male, mAb - Monoclonal Antibodies, MMF - Mycophenolatemofetil, NA - Not Available

subdeltoid bursitis and abscess formation in the rotator cuff muscles as a result of viridans *Streptococcus* infection [6].

CONCLUSION

In conclusion, subacromial septic bursitis is rarely reported in medical literature. Its fast identification and treatment is needed to allow full recovery of range of motion. The potential for an underlying spread of infection to unusual sites has been reported in the setting of diabetes mellitus and can very easily be overlooked. A high index of suspicion is required in such cases because any delay in diagnosis can be serious consequences.

KEY CLINICAL MESSAGE

Isolated infection of the subacromial bursa is a rare entity. We describe the clinical presentation, radiological investigations and strategies for the management of a 59-year-old diabetic male presented with subacromial bursitis as a result of *Streptococcus pneumoniae* infection, which resolved without sequelae.

Author Contributions

Abir Bou Khalil – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ziad Hajj – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Umayya M. Musharrafieh – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Hassan Sidani – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Dania Abdallah – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Rima A. Moghnieh – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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