

Case Report

Unusual Subscapular Abscess caused by *Escherichia Coli*: A Case Report

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Abstract

Background: Subscapular abscess is a rare condition that requires early recognition followed by prompt surgical intervention. *Staphylococcus aureus* is the most common etiologic agent. Here we present a rare case of subscapular abscess caused by *Escherichia coli* following a minor trauma to the shoulder in a patient with a history of intravenous antibiotic therapy for pneumonia.

Case presentation: A 72-year-old male who had been treated with intravenous antibiotics for six weeks due to pneumonia 14 weeks ago was referred from the Respiratory Department with pain and a limited range of motion in the left shoulder. The patient complained that the severe pain occurred with a popping sound when the physical therapist forcibly applied force to his shoulder for treating a frozen shoulder two weeks ago.

Magnetic resonance imaging revealed a large intramuscular complicated fluid collection at the level of the subscapularis muscle that was 10.0 cm × 5.2 cm × 11 cm in size. A bloody but turbid pus-like discharge was observed upon aspiration. He underwent urgent surgical drainage. Culture from the abscess fluid revealed extended-spectrum beta-lactamases (-) *E. coli*. After four weeks of ceftazidime intravenous treatment, his symptoms improved.

Conclusion: Hematogenous transmissions of *E. coli* may occur as a complication of long-term intravenous antibiotic use. In patients with *E. coli* bacteremia, hematoma resulting from an excessive manual therapy or manipulation might be a mediator of abscess formation.

Keywords: Abscess; Subscapularis; *Escherichia coli*; Intravenous injection; Manual therapy

Abbreviations

IV: Intravenous; *S. aureus*: *Staphylococcus aureus*; *H. influenza*: *Haemophilus Influenzae*; *E. coli*: *Escherichia coli*; CT: Computed Tomography; MRI: Magnetic Resonance Imaging

Introduction

Subscapular abscess is an uncommon condition. Predisposing conditions include an immunocompromised state, a recent infection, diabetes, end-stage renal disease, Intravenous (IV) drug use, and trauma to the shoulder area causing hematoma formation [1-4]. *S. aureus* is the most common etiologic agent [1-8]. Other less-common pathogens include *H. influenza* [9]. However, a case of *E. coli* causing a subscapular abscess has not been reported yet.

Meanwhile, manual therapy and exercise usually delivered together as components of a physical therapy are commonly used

interventions for adhesive capsulitis. Manual therapy includes any clinician applied movements of joints and other structures for mobilization or manipulation. Although manual therapy and stretching exercises can reduce pain and improve function in a frozen shoulder [10], there are few reports about complications related to manual therapy and stretching exercises for a frozen shoulder.

Here, we report an unusual case of *E. coli* subscapular abscess following a minor trauma to the shoulder in a 72-year-old man with a history of intravenous antibiotic therapy for pneumonia.

Case Presentation

A 72-year-old male was referred from the Respiratory Department with pain and a limited range of motion in the left shoulder. The patient complained that the severe pain occurred with a popping sound when the physical therapist forcibly applied force to his shoulder for treating a frozen shoulder two weeks ago. A review of his medical history indicated a consolidation lesion suspected to be pneumonia. It was observed in the upper left lobe of the lung in high-resolution Computed Tomography (CT) 14 weeks ago. Some Gram-positive cocci and Gram-negative rods were observed in the sputum immunoassay. However, laboratory tests such as acid-fast bacillus staining and mycobacterium tuberculosis complex polymerase chain reaction showed negative results. He was treated with Intravenous (IV) antibiotics into veins of the dorsum of both hands for six weeks in the respiratory intensive care unit of our hospital for pneumonia.

Physical examination done at the time of admission to our clinic revealed swelling in the anterior aspect of the shoulder and axillary regions. Regarding the range of motion of the left shoulder, it was 140° for forward flexion and L4 level for internal rotation and 40° for external rotation.

Citation: Ham DH, Sung Il Wang. Unusual Subscapular Abscess caused by *Escherichia Coli*: A Case Report. Am J Surg Case Rep. 2022;3(2):1033.

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Publisher Name: Medtext Publications LLC

Manuscript compiled: Jul 18th, 2022

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The patient presented with a mild fever of 37.8°C. Laboratory tests revealed a white-cell count of $4.69 \times 10^3/\mu\text{l}$ (normal range: $4.8 \times 10^3/\mu\text{l}$ - $10.8 \times 10^3/\mu\text{l}$), a neutrophil cell count of 51.8% (normal range: 50%-75%) of total white blood cells, an erythrocyte sedimentation rate of 28 mm/h (normal range: 0 mm/h-9 mm/h), and a C-reactive protein level of 81.54 mg/L (normal range: 0 mg/L-5 mg/L). Plain radiographs of the left shoulder were normal. Chest CT showed a newly observed lesion with thickened walls in the left subscapularis muscle, including fluid in an area of 10 cm × 5 cm (Figure 1 A and B). Subsequent sequential Magnetic Resonance Imaging (MRI) revealed a large intramuscular complicated fluid collection at the level of the subscapularis muscle that was 10.0 cm × 5.2 cm × 11 cm in size (Figure 2 A and B). A bloody but turbid pus-like discharge was observed upon aspiration (Figure 3).

Accordingly, we performed surgical drainage via a standard deltopectoral approach. During mobilization of the conjoined tendon, a large amount of blood-stained pus exuded from the subscapularis muscle. The culture from the abscess fluid revealed extended-spectrum beta-lactamases (-) *E. coli* susceptible to ceftazidime (minimum inhibitory concentration $\leq 1\mu\text{g/mL}$) and nine other tested antibiotics, but resistant to ampicillin and sulbactam (minimum inhibitory concentration $>32\mu\text{g/mL}$). Blood culture obtained at the time of admission also revealed extended-spectrum beta-lactamases (-) *E. coli*. However, urinalysis and urine culture results were negative for *E. coli*. Ceftazidime IV treatment was administered based on

consultation with Department of Infectious Diseases. After four weeks of treatment, the patient did not present with clinical symptoms of infection. His other symptoms also improved. Thus, the patient was discharged. Six-month follow-up MRI revealed that the previously observed abscess was in good condition without recurrence. There was no additional sign of symptom deterioration in the shoulder. ROM was 175° for forward flexion, T8 level for internal rotation and 50° for external rotation (Figure 4 A and B).

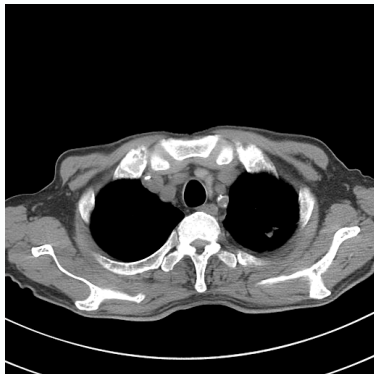


Figure 1A: Chest Computed Tomography (CT) Scan of a 72-year-old male with left shoulder pain. (A) CT scan taken at internal medicine before referral showing improvement of previous pneumonia without lesions around the shoulder.



Figure 1B: CT scan obtained after four weeks showing newly observed lesions with thickened walls in the left subscapularis muscle, including fluid in an area of 10 × 5 (white arrow).

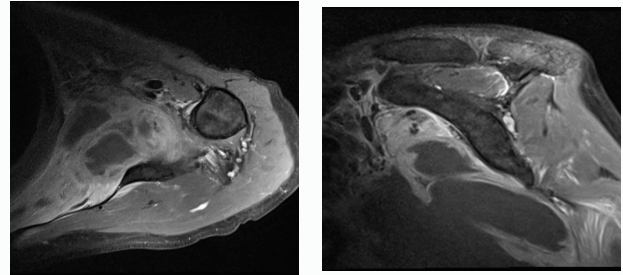


Figure 2A and B: Contrast-enhanced magnetic resonance (MR) imaging of left shoulder. Axial and sagittal fat-suppressed, T2-weighted images showing large intramuscular complicated fluid collection of 10.0 × 5.2 × 11 cm in size at the level of the subscapularis muscle.



Figure 3: Aspiration showing approximately 70 ml of bloody hematoma and turbid pus-like discharge.

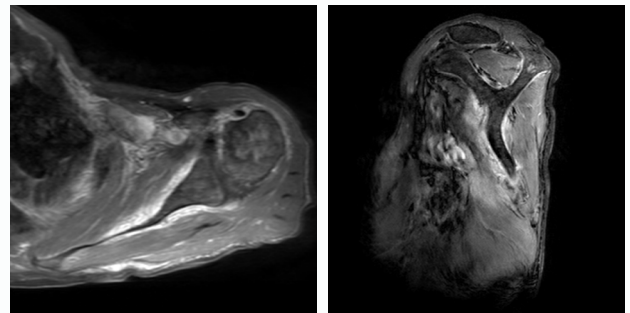


Figure 4A and B: Contrast-enhanced MR imaging obtained at 6 months after surgical drainage. The previously observed abscess was in good condition without recurrence.

Discussion

Subscapular abscess is a rare surgical diagnosis, where a collection of pus forms between the subscapularis muscle and the chest wall. It has been described in only a few case reports. Predisposing conditions for this type of abscess include an immunocompromised state, a recent infection, diabetes, end-stage renal disease, IV drug use, and trauma to the shoulder area causing hematoma formation [1-4]. In a subscapular abscess, *S. aureus* is the most commonly identified organism. In the literature, the organism was *S. aureus* in four cases [1-4], methicillin-resistant *S. aureus* in three cases [5-7], Panton-Valentine leukocidin positive *S. aureus* in one case [8], *H. influenza* in one case [9], and no organism found in one case [11].

To the best of our knowledge, the present case is an unusual report of subscapular abscess caused by *E. coli*, a common Gram-negative bacterium and the most common cause of bloodstream infection.

However, the epidemiology of subscapular abscess caused by *E. coli* has not been well defined in a non-selected population. A cohort study has shown that infants and elderly are at the highest risk for *E. coli* infection [12]. Hematogenous transmission of *E. coli* usually occurs as a complication of focal infection of the urinary tract or the gastrointestinal tract, although it occasionally occurs due to IV drug use [13].

Our patient did not have any known immuno compromising conditions, diabetes, or renal diseases. However, he had been treated with IV antibiotics for six weeks for a recent pneumonia in the upper left lobe of the lung. The culture from the abscess fluid and blood culture obtained at the time of admission revealed extended-spectrum beta-lactamases (-) *E. coli*. However, urinalysis and urine culture results were negative. We believe that the patient might have been vulnerable to transient bacteremia caused by translocation of *E. coli* from the IV injection route, ultimately resulting in an *E. coli* subscapular abscess.

Meanwhile, manual therapy comprises movement of joints and other structures by a healthcare professional (e.g., a physiotherapist). For a frozen shoulder, in order to increase range of motion of the joint; the physical therapist often forcibly applies force similar to manipulation. Manual therapy and stretching exercises have been demonstrated to be able to reduce pain and improve function in a frozen shoulder [10,14,15]. Düzgün et al. [16] have suggested that manual therapy has a positive effect on pain, range of motion, muscular strength, and level of functional activity for frozen shoulders following intervention by physiotherapists. However, manual or massage therapy can cause complications such as muscle bleeding, muscle rupture and myositis ossificans [17,18]. Sasanuma et al. [19] have reported that MRI in patients with severe frozen shoulder after manipulation show capsule tears, labrum tears, and bone bruises in the humeral head.

In the present case, the patient complained of severe pain with a popping sound during a manual therapy of the left shoulder for a frozen shoulder. Chest CT taken before and after the history of this minor trauma revealed new mass-like lesions not previously present in the left shoulder. Upon aspiration of this lesion, blood-stained pus exuded. The blood culture performed at the time of admission revealed extended-spectrum beta-lactamases (-) *E. coli*. Considering these facts, it was thought that this abscess was caused by hematomas mediated by minor trauma around the shoulder in the patient with *E. coli* bacteremia.

Meanwhile, surgery is indicated for a subscapular abscess to drain abscesses or to debride infected tissues in a subscapular abscess. Antimicrobial therapy should also be started immediately. Although the optimal length of therapy is not established, some reports have recommended treatment for a minimum of 4 to 6 weeks [20]. In the present case, surgical drainage was performed and ceftazidime IV treatment was administered for four weeks based on consultation with the Department of Infectious Diseases.

Conclusion

Hematogenous transmissions of *E. coli* may occur as a complication of long-term intravenous antibiotic use. In patients with *E. coli* bacteremia, hematomas resulting from an excessive manual therapy or manipulation might be a mediator for abscess formation.

Declarations

Ethics approval and consent to participate

The ethical approval of this study was waived by the ethics committee of Jeonbuk National University Hospital because it was a case report about only one patient.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials

This is a case report of a single patient. In order to protect privacy and respect confidentiality, no part of the raw data has been made available in any public repository. The original operation reports, intraoperative photographs, imaging studies, and outpatient clinic records were retained among medical records of our institution per the normal procedure. All data concerning the case are presented in the manuscript.

Authors' contributions

SIW designed this study. DHH participated in data collection, data analysis, and data interpretation. DHH and SIW were main contributors to the writing of this manuscript. All authors read and approved the final manuscript.

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