

Escherichia Coli Subscapular Abscess as a Rare Complication of Manual Therapy in Frozen Shoulder: A Case Report

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Case report

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Abstract

Background:

Subscapular abscess is a rare condition usually secondary to immunocompromised state and recent infection. *Staphylococcus aureus* (*S. aureus*) is the most common etiologic agent. To the best of our knowledge, we present the first case of a patient with a frozen shoulder performing manual therapy, which resulted in an *Escherichia coli* subscapular abscess.

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. He complained that the pain was exacerbated with popping sound during manual therapy for frozen shoulder two weeks ago. Magnetic resonance imaging revealed a large intramuscular complicated fluid collection at the level of the subscapularis muscle 10.0 × 5.2 × 11 cm in size, and a bloody but turbid pus-like discharge was observed upon aspiration. He underwent urgent surgical drainage. The cultures from the abscess fluid revealed extended-spectrum beta-lactamases (-) *E. coli*. After 4 weeks of Ceftazidime intravenous treatment, symptoms of the patient had improved.

Conclusions: This case highlights the risks of aggressive manual therapy in severe frozen shoulder. It also presents a clinical scenario in which practitioners of manual therapy in frozen shoulder should be aware of the risk of subscapular abscess in patients undergoing recent infection therapy

Background

Subscapular abscess is an uncommon condition. Predisposing conditions include an immunocompromised state, recent infection, diabetes, end-stage renal disease, intravenous (IV) drug use, and trauma to the shoulder area causing hematoma formation [1–4]. *Staphylococcus aureus* (*S. aureus*) is the most common etiologic agent [1–8], and other less-common pathogens include *Haemophilus Influenzae* (*H. influenza*) [9]. However, there are no reported cases of *Escherichia coli* (*E. coli*) causing a subscapular abscess.

Meanwhile, manual therapy and exercise, usually delivered together as components of a physical therapy intervention, are commonly used interventions for adhesive capsulitis. Manual therapy includes any clinician-applied movement of the joints and other structures, for example, mobilization or manipulation. Although manual therapy and stretching exercises have been demonstrated to reduce pain and improve function in a frozen shoulder [10], few reports of complications related to this for frozen shoulder.

Here, we report the first case of an *E. coli* subscapular abscess that occurred after manual therapy for the treatment of frozen shoulder in a 72-year-old man.

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. He complained that the pain was exacerbated with popping sound during manual therapy for frozen shoulder two weeks ago. A review of his medical history indicated that he was treated with intravenous (IV) antibiotics for 6 weeks in the respiratory intensive care unit of our hospital for atypical pneumonia 2 months ago.

Examination done at the time of admission to our clinic revealed swelling in the anterior aspect of the shoulder and axillary regions. The patient presented with a mild fever of 37.8 °C. In laboratory tests, his white-cell count was $4.69 \times 10^3/\mu\text{l}$ (normal $4.8\text{--}10.8 \times 10^3/\mu\text{l}$), neutrophil cell count was 51.8% (normal 50–75%), erythrocyte sedimentation rate was 28 mm/h (normal 0–9 mm/h), and C-reactive protein was 81.54 mg/L (normal 0–5 mg/L). The plain radiographs of the left shoulder were normal. Chest computed tomography showed a newly observed lesion with thickened walls in the left subscapularis muscle, including fluid in an area of 10×5 cm (Fig. 1A and 1B). Subsequent sequential magnetic resonance imaging (MRI) revealed a large intramuscular complicated fluid collection at the level of the subscapularis muscle $10.0 \times 5.2 \times 11$ cm in size (Fig. 2A and 2B), and a bloody but turbid pus-like discharge was observed upon aspiration (Fig. 3).

Accordingly, we did 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 cultures from the abscess fluid revealed extended-spectrum beta-lactamases (-) *E. coli*, susceptible to ceftazidime (minimum inhibitory concentration $\leq 1 \mu\text{g/mL}$, as well as to nine other tested antibiotics, and resistant to ampicillin and sulbactam ($> 32 \mu\text{g/mL}$). Blood cultures obtained at the time of admission also revealed extended-spectrum beta-lactamases (-) *E. coli*. However, urinalysis and urine culture results were negative. Ceftazidime IV treatment was administered based on consultation with the department of infectious diseases. After 4 weeks of treatment, the patient was discharged, since he did not present with clinical symptoms of infection and other symptoms had improved. On the 6-month follow-up MRI, the previously observed abscess was in good condition without recurrence, and there were no additional signs of symptom deterioration in the shoulder (Fig. 4A and 4B).

Discussion And Conclusions

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, 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 most commonly identified. The organism was *S. aureus* in four cases [1–4], methicillin-resistant *S. aureus* in three cases [5–7], Pantone-Valentine leucocidin positive *S. aureus* in one case [8], *H. influenza* in one case [9], and no organism was grown in the last case [11].

To the best of our knowledge, this is the first report of a subscapular abscess caused by *E. coli*, which is a common gram-negative bacterium and the most common cause of bloodstream infection. However, the

epidemiology has not been well defined in the non-selected population. A cohort study showed that infants and elderly were at highest risk for *E. coli* infection [12]. Hematogenous transmissions of *E. coli* usually occur as a complication of focal infections of the urinary or gastrointestinal tracts, but occasionally also can occur as IV drug use [13].

Our patient did not have any known immunocompromising condition, diabetes, or renal disease. However, he had been treated with IV antibiotics for six weeks for recent pneumonia in the upper left lobe of the lung. The cultures from the abscess fluid as well as blood cultures 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, allowed translocation of *E.coli* from the IV injection route, ultimately resulting in an *E.coli* subscapular abscess.

Meanwhile, manual therapy and exercise, usually delivered together as components of a physical therapy intervention, are commonly used interventions for frozen shoulder. It includes any clinician-applied movement of the joints and other structures, for example, mobilization or manipulation. Mobilization is employed to reduce pain by stimulating peripheral mechanoreceptors and inhibiting nociceptors, and to increase joint mobility by enhancing exchange between synovial fluid and cartilage matrix [14, 15]. Manual therapy and stretching exercises have been demonstrated to reduce pain and improve function in a frozen shoulder [10]. Düzgün et al.[16] reported that manual therapy may be safely applied in frozen shoulder. He also suggested that manual therapy has a positive effect on pain, range of motion, muscular strength and level of the functional activity on frozen shoulders following intervention by physiotherapists. However, manual or massage therapy can cause complications, such as muscle bleeding, muscle rupture, or myositis ossificans [17, 18]. Sasanuma et al.[19] reported that MRI in patients with severe frozen shoulder after manipulation showed capsule tears, labrum tears, and bone bruises in the humeral head.

In present case, the patient complained of experiencing severe pain with popping sound during a manual therapy of the left shoulder for frozen shoulder. MRI was observed with abscess in subscapularis. The minor trauma caused by manual therapy in severe frozen shoulder may have led to a small hematoma in the subscapular space that subsequently was seeded by extended-spectrum beta-lactamases (-) *E. coli*.

In summary, hematogenous transmissions of *E. coli* may occur as a complication of long-term intravenous drug use. Surgeons and physiotherapists should pay attention to the subscapular abscess as a rare complication of manual therapy in severe frozen shoulder.

Abbreviations

IV: Intravenous; *S. aureus*: *Staphylococcus aureus*; *H. influenza*: *Haemophilus Influenzae*; *E. coli*: *Escherichia coli*; MRI: Magnetic resonance imaging;

Declarations

- Ethics approval and consent to participate

Not applicable

- Consent for publication

Written informed consent was obtained from the patients for publication of their clinical details and clinical images.

- 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 the medical records of our institution per the normal procedure. All data concerning the case are presented in the manuscript.

- Competing interests

The authors declare that they have no competing interests.

- Funding

None.

- Authors' contributions

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

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Figures

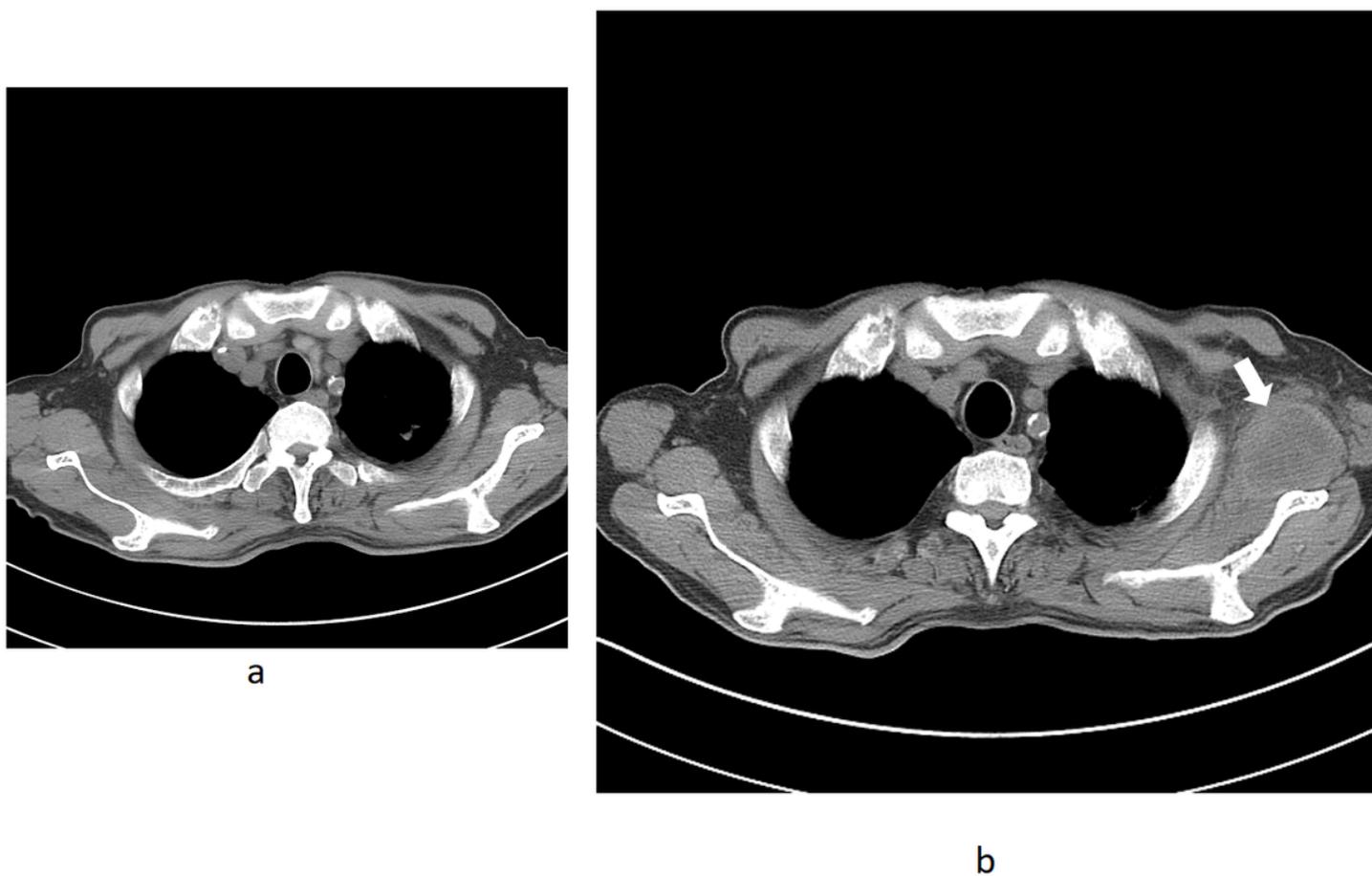
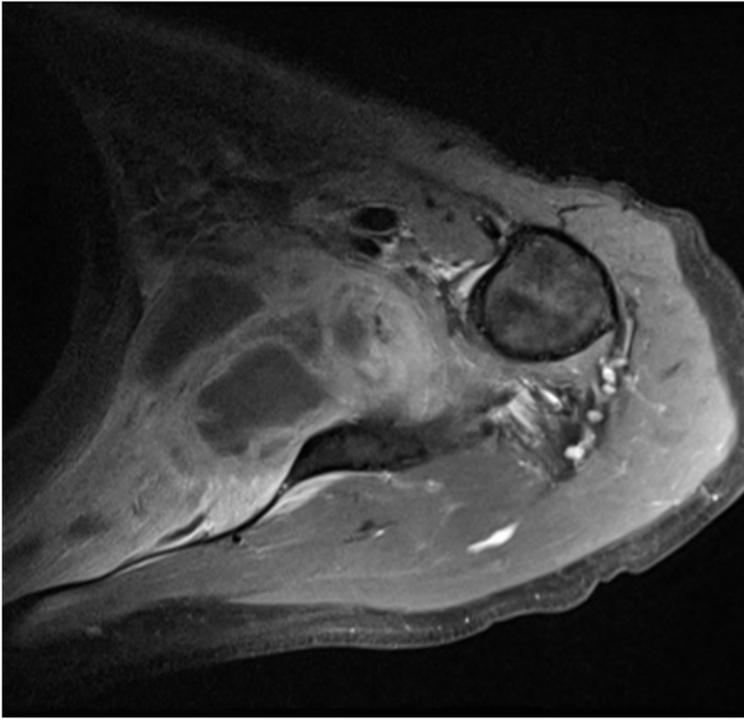
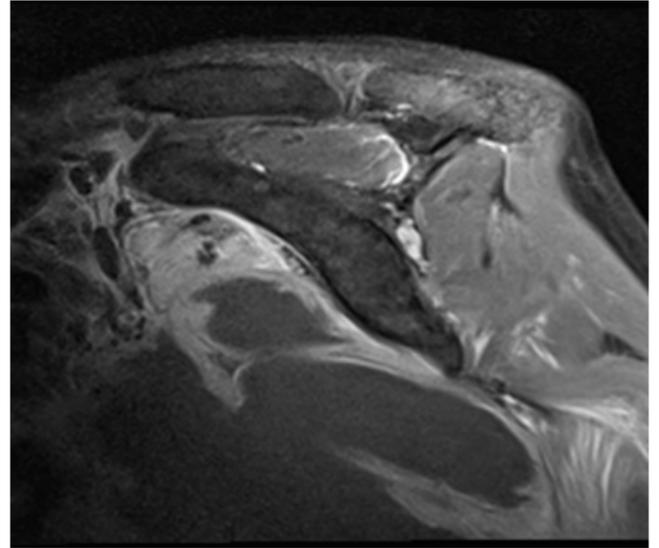


Figure 1

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 and no lesions around the shoulder B: CT scan obtained after 4 weeks showing newly observed lesion with thickened walls in the left subscapularis muscle, including fluid in an area of 10 ×5 (white arrow).



a



b

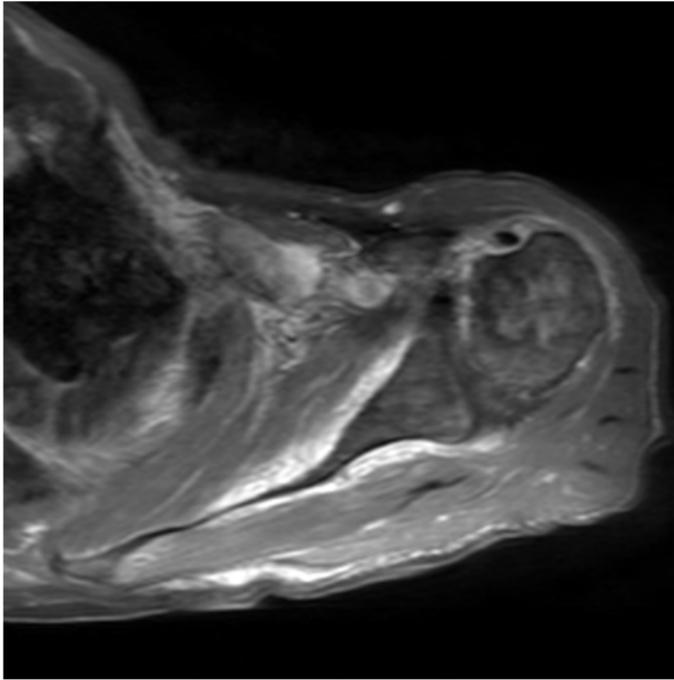
Figure 2

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

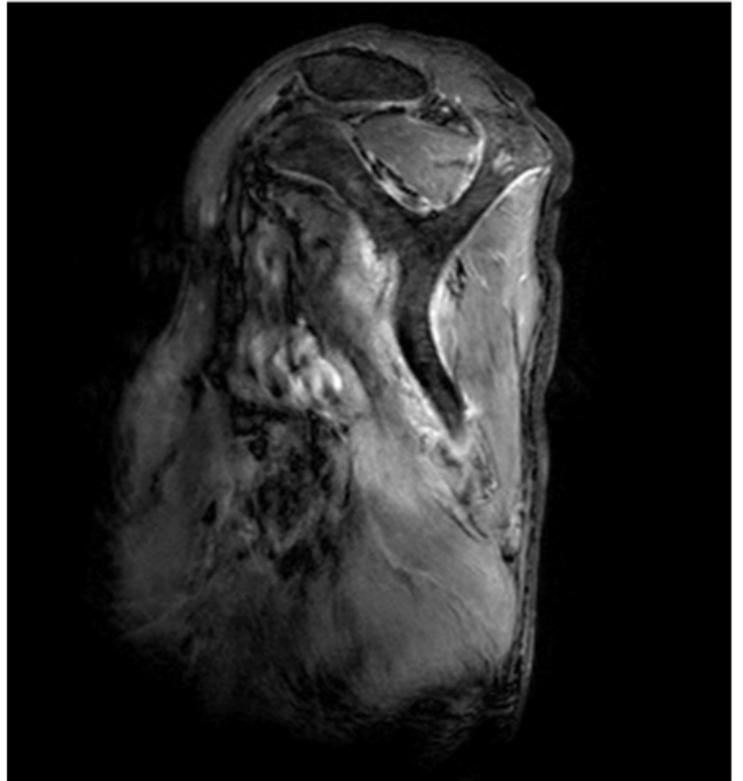


Figure 3

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



a



b

Figure 4

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