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CASE REPORT

Devastating chest wall necrotizing fasciitis following pigtail catheter drainage

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Summary

Pigtail catheter for drainage of pleural effusion has gained popularity. Complication related to the insertion of these small-bore catheter is low. In this report, we highlight two cases with devastating necrotizing fasciitis of chest wall following pigtail catheter insertion.

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Introduction

Pleural effusion is a common condition in daily clinical practice. The management of pleural effusion varies from single aspiration to invasive surgical treatment. The standard of pleural drainage has been traditionally tube thoracotomy. However, the potential morbidity associated with chest tube insertion led to the development of smaller and less painful drainage tube such as percutaneous pigtail catheter. Although the safety and efficacy of pigtail catheter have been proved in the clinical setting, we present here

two cases of chest wall necrotizing fasciitis as a complication of pigtail catheter insertion.

Case presentation**Patient 1**

A 42-year-old male patient with mental retardation and cerebral palsy was referred to our institution because of left side empyema. He was treated in a local clinic because of fever for 1 week, purulent sputum and left empyema thoracis. Pigtail catheter drainage was inserted 3 days before admission. On physical examination, he had a body temperature of 39.7 °C; tachypneic, coarse breath sound and respiratory rate of 28 breath/min; blood pressure of 110/70 mmHg and pulse rate of 112 beat/min. Purulent

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pleural effusion was drained out from the pigtail catheter. The pigtail catheter insertion wound was mild erythematous without local heat, and local cellulitis was impressed. Laboratory examination revealed WBC 28.300 cell/mm³ (PMN 92%, band 4%, lymphocyte 1%, monocyte 3%) and C-reacting protein 377.8 mg/L (normal range < 500 mg/L). Parenteral antibiotics with amoxicillin-clavulanic acid 600 mg every q8h plus ceftriaxone 1000 mg q12h were administered. Culture data revealed the presence of streptococcus Gr.D, coagulase negative staphylococcus and peptostreptococcus micros. Two days after admission, the erythema surrounding the pigtail catheter insertion wound had progressed with local heat and pain on palpation. Chest computed tomography revealed left side empyema thoracis with extensive subcutaneous emphysema involving the chest wall and neck. Twenty-four hours later, the “subcutaneous emphysema” had extended to involve the face and left arm (Figure 1). Thoracic and plastic and reconstructive surgery consultation was made. Necrotizing fasciitis was impressed and an emergency operation was scheduled. Operative finding revealed extensive necrosis of chest wall soft tissue and fascia, pus accumulation beneath the latissimus dorsi muscle, loculated empyema. Decortication of pleura, evacuation of empyema cavity and extensive chest wall debridement were performed. The infection was controlled after five more subsequent debridements over a period of 3 weeks. Chest wall reconstruction was undertaken with fasciocutaneous rotational flap and split-thickness skin flap. The patient became ventilator dependent and was transferred to a respiratory care facility. The patient is alive after 3 months.

Patient 2

A 66-year-old male patient with fever, productive cough, dyspnea and pleuritic chest pain of 1-week duration was

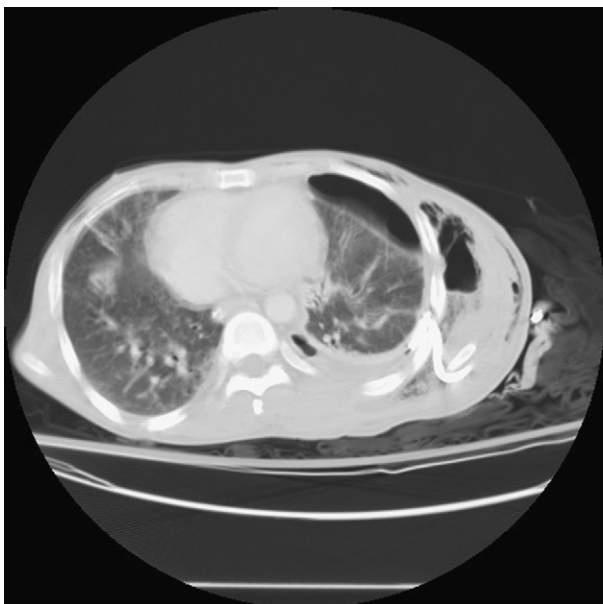


Figure 1 Chest computed tomography revealed bilateral infiltration, left pleural thickening with enhancement, hydro-pneumothorax and extensive soft tissue “gas formation.”

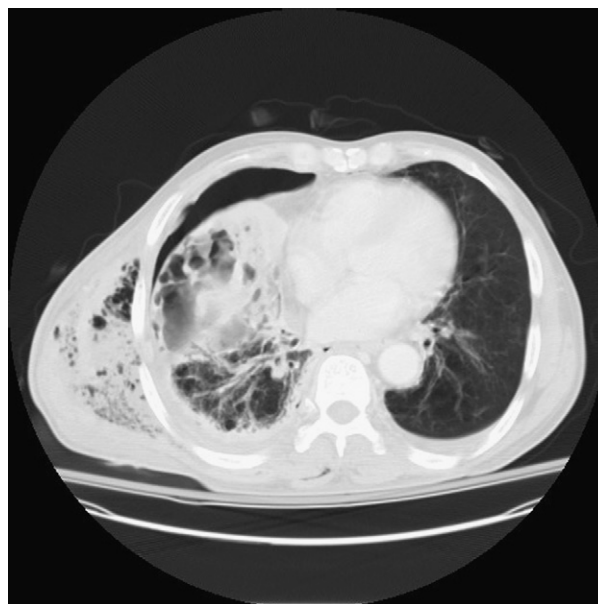


Figure 2 Chest computed tomography shows necrotizing pneumonitis change of the right middle and lower lobe, pleural thickening with hydro-pneumothorax, and amorphous fluid and air accumulation over chest wall.

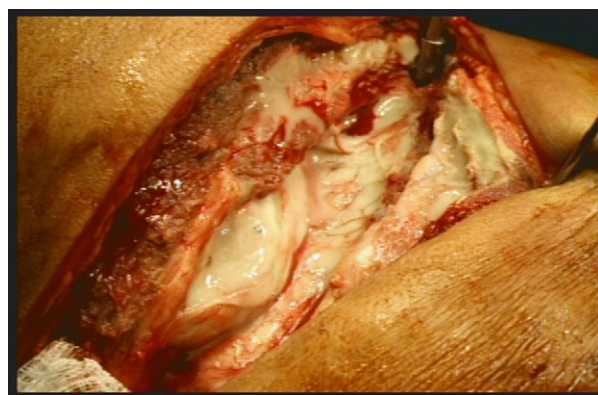


Figure 3 Intra-operative picture at thoracotomy revealed extensive foul smelling pus accumulation with fascia tissue necrosis.

admitted to our chest medicine department. Laboratory examination revealed WBC 6700 cell/mm³ (PMN 78%, band 7%, lymphocyte 5%, monocyte 8%), blood creatinine 2.5 mg/dL, and D-dimer 2137 ng/ml (normal range < 500). Chest-X-ray revealed right middle and lower lobe pneumonia with right side pleural effusion. Pleural effusion analysis from diagnostic thoracentesis revealed: pH 7.1, purulent characteristics, WBC 7.200/cu mm, GPC +, GNB +, glucose 6 mg/dL, total protein 4.4 g/dL and LDH 9337 u/L. Empiric antibiotics treatment was given with ceftriaxone 1000 mg q12h and vancomycin 1000 mg qd. A 16 french pigtail catheter was inserted for drainage (PBN Medicals, Denmark). Two days later, the pigtail catheter insertion wound became painful and erythematous with local heat. Chest CT scan revealed extensive necrotizing pneumonitis of the right middle and lower lobe, extensive subcutaneous emphysema from neck and chest wall to the flank area with

amorphous fluid collection (Figure 2). An emergency operation that included right middle and lower lobe bilobectomy and extensive debridement of necrotic intermuscular fascia from upper border of scapula to lower portion of latissimus dorsi muscle was performed. Pleural effusion and thoracotomy wound culture revealed (Figure 3) *Haemophilus influenzae*, *Eikenella corrodens* and *Prevotella* sp. Three further surgical debridements, once every other day, were done till sepsis was under control. Chest wall reconstruction was undertaken with fasciocutaneous rotational flap and split-thickness skin flap. The patient was weaned off from mechanical ventilation after 2 weeks, is currently alive and has returned to work.

Discussion

The initial management of pleural effusion is based on the characteristics of the pleural effusion and the amount of effusion accumulation. Although most cases of parapneumonic effusion have an uncomplicated resolution with antibiotic therapy, 5–10% of hospitalized patients will require pleural drainage. The British Thoracic Society guideline for the management of pleural infection recommended that complicated parapneumonic pleural should be drained. However, there is no consensus on the size of the optimal chest tube for drainage.¹ Insertion of a large-bore chest tube is painful and there is no lack of associated morbidity. Since the introduction of smaller and flexible percutaneous pigtail catheter for drainage of pleural effusion, it has promptly gained popularity.^{2,3} Safety and lack of morbidity have been demonstrated with very low infection incidence that is attributed to the good sterile technique in insertion of these catheters.⁴

Necrotizing fasciitis of the chest wall following percutaneous pigtail catheter drainage is an uncommon and devastating condition. It is usually related to previous surgical procedure and trauma. The most common surgical procedure in the series reported by Urschel et al.⁵ was chest tube insertion. Difficult chest tube insertion and unnecessary subcutaneous tissue dissection are responsible for microorganism dissemination.⁶

Necrotizing fasciitis is a rapidly progressive infection of subcutaneous tissue and fascia along with systemic manifestation of severe sepsis and shock.⁷ Clinically the patient may complain of wound pain, smelling watery wound discharge and skin blister formation. Crepitus and soft tissue gas formation on radiology examination are classical signs but also indicate an advanced stage of infection. As in our patients, the presence of soft tissue gas formation has been easily mistaken for subcutaneous emphysema.

Infectious agents in necrotizing fasciitis are usually polymicrobial.^{8,9} In our patient 1, wound culture revealed the presence of streptococcus Gr.D, coagulase negative staphylococcus and peptostreptococcus micros, while for patient 2 they were *Haemophilus influenzae*, *Eikenella corrodens* and *Prevotella* sp. Mono-bacterial infection usually involves

group A streptococcus or *Clostridium perfringens*. The latter may produce an extensive necrotizing infection of skeletal muscle.⁸

The treatment of this devastating condition required an adequate fluid resuscitation, appropriate antibiotics coverage and aggressive surgical debridement. There is no optimal frequency for surgical debridement. Intensive debridement “every-day or every-other-day in the operating room during the first week” was suggested by Praba-Egge et al.¹⁰ Bed-side debridement will be an acceptable option if frank tissue necrosis is encountered during wound dressing and the patient is too sick to stand anesthesia; because, vascular thrombosis of subcutaneous tissue does not cause much bleeding problems.

The mortality rate for this condition has been high, even in the hands of a skilled surgeon. The mortality rate in a recent review reached 59% in the case of necrotizing fasciitis of chest wall; this is higher than that of necrotizing fasciitis in general.¹⁰ Deaths are usually associated with multi-organ failure associated with sepsis. Fortunately, both of our patients survived this devastating condition.

Management of necrotizing fasciitis requires an extremely high index of suspicion and meticulous evaluation of every chest tube or pigtail catheter insertion wound. In a proved case of chest wall necrotizing fasciitis, aggressive surgical debridement, appropriate antibiotics selection and adequate supportive treatment are essential.

Conflict of interest statement

None of the authors have a conflict of interest to declare in relation to this work.

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