Secondary infection of chylothorax with *Serratia marcescens*: a rare scenario post-cardiac surgery

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Abstract

Infection of chylothorax is considered rare because chyle is inherently bacteriostatic. We report a case of an infected chylothorax occurring in a post-cardiac surgery patient caused by *Serratia marcescens*. Once considered a harmless saprophyte, *Serratia marcescens* is now recognized as an important opportunistic pathogen causing healthcare-associated infection with a propensity for antimicrobial resistance.

Keywords Chylothorax · *Serratia marcescens* · Thoracocentesis

Introduction

Chylothorax is often caused by trauma to the thoracic duct [1]. It is also caused by non-traumatic causes and various malignancies and is occasionally spontaneous [2–4]. Chyle is considered bacteriostatic and infection in a chylothorax is thought not to occur [5, 6]. *Serratia marcescens* harbors the gene AmpC which, if expressed, can cause the production of antibiotic destroying beta-lactamase enzymes making it multi-drug resistant. It is an organism in SPACE bugs (*Serratia*, *Pseudomonas*, *Acinetobacter*, *Citrobacter*, *Enterobacter*) [7].

This report describes infection by *Serratia marcescens* of a post-cardiac surgery refractory chylothorax which took a chronic course requiring decortication.

Case report

Our patient, 1-year 9-month-old male child, was a known case of congenital cyanotic heart disease (D-transposition of the great arteries, large inflow ventricular septal defect

amounting to single ventricle and severe pulmonary stenosis). He had undergone a bidirectional Glenn shunt with atrial septectomy as a stage I palliation for his cardiac condition. Intraoperative and postoperative Glenn pressures were around 10 mmHg. He had an uneventful postoperative period and discharged with diuretics. Forty days postoperatively, he presented with a 2-week history of respiratory distress. Diuretics had been stopped 2 weeks before the beginning of the present problem. On clinical examination, the child was afebrile and tachypneic, with room air saturation of 60%. Chest radiograph showed massive right-sided pleural effusion (Fig. 1). Ultrasound of the thorax showed a large effusion in the right pleural cavity. Thoracocentesis was performed which drained about 400 ml of creamy white fluid, suggestive of chyle.

Investigation showed a total blood count of 16,290 cells/cumm, with polymorphs 89% and a serum procalcitonin of 39.62 mg/ml. Pleural fluid analysis showed polymorphs 46%, lymphocytes 54%, red blood cells 300 cells/cumm, with a total count – 44,500 cells/cumm, and lipemic analysis showed cholesterol 800 mg/dl, triglycerides – 1505 mg/dl. The child was started on intravenous diuretics, medium-chain triglyceride diet, and octreotide infusion (5 mics/kg). Gradually over 10 days, pleural drainage decreased and the intercostal chest drain was removed. Two days later, the child developed fever and respiratory distress and a repeat chest X-ray showed recurrence of right-sided collection. Repeat thoracocentesis drained chyle and the pleural fluid culture showed growth of *Serratia marcescens*. He was started on sensitive intravenous antibiotics of cefoperazone-sulbactam and amikacin.

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Fig. 1 Chest radiograph showed massive right-sided pleural effusion

Intercostal drainage significantly decreased in quantity after 2 weeks. However, there was no radiological clearance and, therefore, contrast-enhanced computed tomography of the thorax was done. This showed a right moderate hydropneumothorax, subtle enhancement, and mild parietal pleural thickening along the inferior and posterior aspects of the right lower lobe (Fig. 2). Because of recurrent chylothorax and infection, the child was taken up for decortication of the right lung, which was performed through a right posterolateral thoracotomy. All infected fluid and flakes were removed and the thick peel over the right lower lobe of the lung was removed by gentle dissection. The pleural cavity was washed

Fig. 2 Right moderate hydropneumothorax, subtle enhancement, and mild parietal pleural thickening along the inferior and posterior aspects of the right lower lobe

with antibiotic solution. Thoracic duct ligation was not performed as during the surgery, the fluid seemed more of infectious etiology rather than chyle. The pleural fluid drainage subsequently reduced and the child had a normal recovery in the postoperative period.

Discussion

This report describes the occurrence of a secondary infection of a chylothorax in a post-cardiac surgery patient. The nature, color, and raised triglyceride levels of the pleural fluid confirm chylothorax [2, 3]. Occasional reports of secondary infection of chyle by organisms such as *Streptococcus agalactiae*, *Escherichia coli*, and *Acinetobacter calcoaceticus-baumannii* in non-immunocompromised patients are published till date [6]. Loss of T lymphocytes in chyle causes immunodeficiency and makes the patient susceptible to infections [8]. In our patient, with no prior history to suggest primary immunodeficiency disorder, we isolated *Serratia marcescens* from the chylothorax fluid, after an initial culture-negative period. This was after the reintroduction of an intercostal tube for refractory chylothorax. We believe the patient was predisposed to secondary infection due to the loss of T cells from the prolonged pleural drainage.

Serratia marcescens is a rod-shaped gram-negative bacteria in the family of *Enterobacteriaceae*, one of the common etiological factors for hospital-acquired infection. They are motile non-endospore-forming gram-negative rods. While it rarely causes community-acquired infections [9], it has emerged as an important nosocomial pathogen. It is a frequent cause of outbreaks of hospital-acquired infection attributed to many different sources like nebulisers, bronchoscopes, electrocardiogram leads, prefilled heparin syringes, saline solutions, total parenteral nutrition solutions, and environmental sources like air conditioning units, urobags, bedpans, liquid dispensers, and even tap water have also been implicated. The infection in this case though hospital-acquired was as an isolated event and with a strain sensitive to first-line antibiotics.

The etiology of chylothorax in our patient is probably due to elevated central venous pressures in the setting of bidirectional Glenn shunt. We feel the antegrade pulmonary blood flow although reduced because of the pulmonary stenosis is still slightly high for the child and can be currently medically managed with diuretics. Secondary infection of the chylothorax, with no evidence of respiratory, bloodstream, or urinary infection (all ruled out by culture analysis), complicated the clinical course of this child.

Conclusion Pleural space infection in the setting of spontaneous chylothorax with *Serratia marcescens* is rare and its potential for multi-drug resistance adds to the increased hospital stay and cost of treatment of these patients.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants/animals Not applicable

Informed consent Informed consent was obtained from the study subject to publish this case report.

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