The use of octreotide to treat congenital chylothorax

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Abstract

We report the use of the octreotide (a somatostatin analogue) in the treatment of idiopathic congenital chylothorax in a patient with Turner’s syndrome who had previously failed conservative medical therapy. The patient improved rapidly after initiation of octreotide with complete resolution after 5 days of continuous therapy (10 μg/kg per hour).

Chylothorax is a relatively uncommon condition defined as an abnormal collection of lymphatic fluid within the pleural space and may be encountered at any age. Recent reports describe an incidence of congenital chylothorax ranging from 1:1000 to 1:15,000 pregnancies [1]. This process has been recognized as a clinical entity since first being described by Asellius, in the 17th century, and typically occurs during the neonatal and childhood periods and less often during adulthood [2]. Currently, chylothorax in the neonate is usually associated with preceding surgical intervention(s). The incidence of iatrogenic chylothoraces is followed by the presence of various anatomical abnormalities resulting in venous obstruction and/or venous hypertension, such as malignancy, and congenital causes, both idiopathic and secondary to lymphangiomatosis. The diagnosis of chylothorax is typically established via fluid analysis and includes a triglyceride content of 1.1 mmol/L or more and a total cell count of 1000 cells/μL or more with 80% or more lymphocytes [3]. Several recent series have shown that approximately 0.25% to 2.5% of intrathoracic surgical procedures are associated with the development of a chylothorax in the postoperative period [3,4].

Treatment of chylothorax has traditionally been nonoperative, with as many as 80% of patients responding to conservative measures [5,6]. Most treatment algorithms are based on adequate drainage of the pleural fluid in combination with either modification or complete cessation of enteral feeds. Although no strict guidelines exist, most authors recommend 1 or several attempts to drain the pleural fluid using thoracentesis or chest tube drainage [4]. Prolonged chyle loss leads to loss of lymphocytes, protein, and immune globulins, placing the patient at risk for infection, malnutrition, and anasarca. Although most individuals respond to conservative therapy, surgical intervention such as thoracic duct ligation [7], pleuroperitoneal shunts [8-10], or pleurodesis is recommended after a 5 to 7 days course of medical therapy has failed [9].

Recent literature has suggested an alternative medical therapy involving the administration of octreotide (a long-acting somatostatin analogue) to infants with persistent chylothorax. The administration of this hormonal agent is thought to have an effect at the vascular somatostatin receptor level, resulting in decreased chyle production. Several recent case reports and small institutional series have reported a...
reduction in overall hospitalization as a result of hastened resolution of chylous effusions [4,7,8,11]. We report here the successful use of continuous administration of octreotide to treat congenital bilateral chylous effusions in a newborn.

1. Case description

The baby was a 3685-g, full-term female with Turner’s syndrome who was the product of an uncomplicated pregnancy born at an outside institution. She was delivered via a scheduled cesarean birth for breech presentation. The infant’s mother was culture positive for group B Streptococcus but did not receive any antibiotics before delivery. At the time of delivery, the infant’s Apgar scores were 6, 8, and 9 at 1, 5, and 10 minutes, respectively. Although the infant initially required minimal positive pressure assistance with bag and mask for poor respiratory effort, she responded quickly and was transferred to the well-baby nursery where enteric feeds were initiated. On day of life 3, the infant was noted to have sudden onset of tachypnea and increased work of breathing and required the administration of supplemental oxygen. An initial chest radiograph revealed bibasilar infiltrates. Blood cultures were obtained, and antibiotics were initiated. The following day, the neonate was noted to have deterioration of her respiratory status, resulting in intubation and full ventilatory support. Repeat chest radiograph demonstrated the development of moderate bilateral pleural effusions. Chest computed tomography confirmed the presence of significant bilateral pleural effusions, and the infant was transferred to our institution for further management on day of life 4. Serum electrolytes were unremarkable and transthoracic echocardiography showed no major structural abnormalities. Because of worsening effusions, a diagnostic thoracentesis was performed on the left side. Approximately 20 mL of straw-colored cloudy fluid was recovered. Fluid analysis demonstrated the presence of chylomicrons, β lipoprotein, pre-β lipoprotein, and α lipoprotein. White blood cell count was 2120 cells/mm³, with 96% lymphocytes. The infant was started on total parenteral nutrition and made nil per os. Despite the withdrawal of an additional 84 mL (50 mL from the right, 34 mL from the left) approximately 48 hours after the initial thoracentesis, the rapid reaccumulation of fluid required the neonate to undergo bilateral tube thoracostomy on day of life 9.

Combined chest tube drainage ranged from 100 to 400 mL/d (Fig. 1). In an effort to reduce the large volumes of chylous fluid, octreotide infusion was started 5 days after insertion of chest tubes (day of life 13) at 3.5 μg/kg per hour. Because no initial improvement was noted and no side effects of this therapy had been noted [4,11], this was increased to 7 μg/kg per hour and then to a maximum dose of 10 μg/kg per hour within 36 hours. A significant decrease in chest tube drainage was subsequently noted, with near-total cessation of chest tube output by the 20th day of life.

Enteral feedings, using a medium-chain triglyceride, high-protein formula (Portagen, Mead Johnson, Bristol-Myers Squibb, New York, NY) were initiated on day of life 20. Both chest tubes were removed by day of life 23, with the subsequent cessation of octreotide 24 hours later. After an additional period of observation using Portagen, the baby was switched to standard infant formula. The infant was discharged to home at 1 month of age with very small, stable bilateral pleural effusions.

Fig. 1  Increasing administration of continuous intravenous octreotide and corresponding reduction in chest tube drainage in neonate with congenital chylothorax.
2. Discussion

In both children and adults, somatostatin has been used to treat intractable diarrhea, enterocutaneous fistulae, and bleeding from esophageal varices; octreotide has been used to treat persistent neonatal hyperinsulinism. In addition, chylothorax as a serious complication of cardiothoracic surgery has been successfully treated with somatostatin and octreotide. Recently, there have been scattered reports of the use of somatostatin and octreotide for the treatment of congenital chylothorax. Goto et al [12] describe a chylothorax in a preterm infant with severe lung disease and pulmonary interstitial emphysema successfully treated with somatostatin. Although encouraging, the application of somatostatin 3 weeks into the course and at such a low dose bring into question the clinical significance of the therapeutic intervention in that report.

Octreotide is an octapeptide analogue of somatostatin with a longer half-life but can be used intravenously in the same doses as somatostatin [13]. Our current dosing regimen was based on the results of several recent series [4,6-8], which had used a continuous infusion of somatostatin with an initial dose of 3.5 μg/kg per hour with a doubling of this dose at 24 hours if there was no improvement in the patient’s condition. One study increased the dose to 12 μg/kg per hour in 1 patient [11] but did not note any therapeutic advantage to this. Other series have used subcutaneous intermittent or continuous octreotide with different dosage regimens. The initial dose of 3.5 μg/kg per hour [11] was increased to 7 μg/kg per hour at 24 hours and finally to 10 μg/kg per hour [11] when there had been no decrease in thoracostomy output during that time and no side effects of the therapy had been noted. The reduction in chylous drainage within 24 hours of reaching the maximal dose similar to the findings of Buettiker et al [11]. Although liver function abnormalities, hypoglycemia, and hyperglycemia have been described, these are usually transient, and we did not observe them in our patient.

Although further investigation is needed, it is the opinion of the authors that the continuous infusion of octreotide has been a valuable method for the management of congenital chylothorax when conservative medical management has failed and that it may present a first line of treatment in congenital chylothorax because of its excellent safety profile. This therapy may well decrease the length of stay associated with conventional surgical treatment of chylothorax [2,3,8] as well as avoid the complications associated with long-term placement of drains [10].

References