

Octreotide for the Management of Chylothorax in Newborns, Case Report

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ABSTRACT

Chylothorax is the most common cause of pleural effusion in neonates. It is usually idiopathic. Neonatal chylothorax successfully respond to octreotide treatment and can reduce the duration of hospitalization. A number of therapeutic interventions have been used to reduce chyle production and promote resolution of a chylothorax. Initial management typically includes restriction or temporary cessation of enteral feedings. Enteral feedings high in medium-chain triglycerides (MCT) or parenteral nutrition may be used. These strategies alone are not successful in all patients.

In the last several years, octreotide has become another option for management of patients with chylothorax. octreotide has a number of effects on the gastrointestinal system, including a decrease in splanchnic blood flow and inhibition of serotonin, gastrin, vasoactive intestinal peptide, secretin, motilin, and pancreatic polypeptide.

We report an infant who had spontaneous chylothorax with patent ductus arteriosus that was managed primarily as congenital heart disease.

Our case was treated successfully with octreotide without the need to insertion of chest tube.

Keywords: Chylothorax, Newborns, Octreotide

Introduction

Pleural effusion that is defined as fluid accumulation in the pleural space is rare, ranging from 5.5 per 10,000 to 2.2% (1). Pleural effusion may occur at neonatal period or delivery and diagnosed by ultrasound (1).

Chylothorax is the most common reason for pleural effusion in neonates (42%) (1). Sometimes It can cause non immune hydrops fetalis. The etiology of Chylothorax is: idiopathic, lymphatic abnormalities, and congenital heart disease (2). Chylothorax can be acquired after congenital heart disease or congenital diaphragmatic hernia surgery (2).

Following damage to the thoracic duct, chyle, a mixture of triglycerides, fatty acids, proteins, immunoglobulins, and lymphocytes, may accumulate in the pleural space, resulting in a chylothorax. The loss of fluid through excessive chyle drainage may result in nutritional, electrolyte, and immunologic complications (3).

A number of therapeutic interventions have been used to reduce chyle production and promote resolution of a chylothorax. Initial management typically includes restriction or temporary cessation of enteral feedings. Enteral feedings high in medium-chain triglycerides (MCT), such as Portagen®, or parenteral nutrition

may be used. These strategies alone are not successful in all patients. MCT formulas have been shown to produce resolution of chylothorax in approximately one-third of patients after two weeks, while parenteral nutrition typically results in resolution in 75 to 80% of cases by that time. In resistant cases, pleurodesis, ligation of the thoracic duct, or placement of drains and pleuroperitoneal shunts may be considered (3, 4).

In the last several years, octreotide has become another option for management of patients with chylothorax.

Octreotide is a long-acting synthetic analog of endogenous somatostatin. Like somatostatin, it is a potent inhibitor of growth hormone, glucagon, and insulin. It suppresses the release of leutenizing hormone in response to gonadotropin releasing hormone and inhibits the secretion of thyroid stimulating hormone. In addition, octreotide has a number of effects on the gastrointestinal system, including a decrease in splanchnic blood flow and inhibition of serotonin, gastrin, vasoactive intestinal peptide, secretin, motilin, and pancreatic polypeptide. Octreotide has also been shown to inhibit gallbladder contractility and decreases bile acid secretion (5-7).

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Rosti and colleagues reported two cases the following year, using octreotide infusions of 0.5 to 1 mcg/kg/hr (8). Time to discharge was shorter in the octreotide-treated children (13 and 15 days) than in a previous group of patients treated with dietary or surgical methods (average 25.5 days).

The most common adverse effects reported after octreotide use in adults include: arrhythmias (9%), injection site pain or hematoma (7.5%), headache (6%), nausea, vomiting, constipation, or diarrhea (5-10%), hyperglycemia or hypoglycemia (1-2%), dizziness, fatigue, weakness, flushing, edema, pruritus, alopecia, joint pain, biliary sludge, fat malabsorption, blurred vision, and symptoms of an upper respiratory tract infection or urinary tract infection (1 to 4%). Hypersensitivity reactions, including anaphylactic shock, have been reported, but appear to be rare. The frequency of some adverse effects varies with the disease state being treated. For example, bradycardia, hyperglycemia, and hypothyroidism occur more often in patients being treated for acromegaly (5,6).

In the pediatric cases published to date, adverse effects have been uncommon. Hyperglycemia and hypoglycemia have each been reported in one patient (6,7). Earlier this year, Mohseni-Bod and coworkers reported a case of necrotizing enterocolitis (NEC) in a neonate treated with octreotide (8).

Octreotide has been shown to prolong the QT_c interval in some patients at therapeutic doses. Although there are no studies demonstrating an additive effect, it is recommended that patients not receive other agents which can prolong the QT_c interval, such as azole antifungals, cisapride, or macrolide antibiotics during octreotide administration (8).

For infants and children who develop a chylothorax, octreotide offers an additional mode of treatment. In this article we present a neonate with chylothorax and its management.

Case presentation

A boy was born by vaginal delivery at term with appropriate Apgar score and weighed 3000 gram at first. He was the first child of non-consanguineous parents without any problem during pregnancy. After 2nd day of life his cyanotic spells during crying were get started. He was referred to cardiologist and admitted with the diagnosis of small PDA and PVC arrhythmia and minimal left side pleural effusion. Over time his condition get worse and respiratory distress appeared and thus he admitted to neonatal intensive care unit on 10th day of life. At the time of

admission he was cyanotic and had systolic murmur without hepatomegaly and had bigeminic and trigeminic rhythms on cardiac monitoring. his weight get 2700g at that time. The patient gets better after nasal ventilation. But because of opacity on left hemithorax in his cxr, we tap his left hemithorax and we evacuated 40-50 cc milky fluid. After this procedure his condition gets better and cyanosis disappeared an nasal ventilation removed and his arrhythmia get better. Chylothorax was defined with characteristics of pleural fluid: triglycerid 1612mg/dl, protein 4.2g/dl, leukocyte as 1200 and 90% of them were lymphocytes. Total parenteral nutrition began and feeding discontinued for 5 days and then diet treatment with low fat and medium chain triglycerid started. But because of recurrence of symptoms and accumulation of fluid in left hemithorax, tap of 30cc fluid, that its appearance was more transparent than first time, was done. Then, Octreotide was started in a dose of 2mcg/kg/h via intravenous infusion. The drug was continued for 1week. The patient's respiration was markedly relieved after 2 days of the treatment and oxygen therapy was discontinued. So he was discharged at postnatal 37th day with formula feeding and weight gain to 3500g. Outpatient follow-up is continued with a good general condition and without any problem with breast milk feeding until 3rd month of life.

Discussion

Chylothorax in an infant is a rare disease. It can cause with congenital anomaly of lymphatic flow or by traumatic injury or obstruction of thoracic duct. However hyperextension of the neck during delivery can cause chylothorax but the most traumatic injury to the duct was iatrogenic (2). Chylo thorax can be definitely diagnosed by laboratory analysis of fluid that aspirated from pleural space. Lymphatic fluid has high concentration of triglycerides (more than 1.1 mmol/L), protein, and cells (more than 1000 cells/micro lit with more than 80% lymphocytes (9).

The principle approach to this condition is conservative management to prevent pulmonary colapes by pleural fluid drainage (70% Of cases need to chest tube placement (1), and ventilation and supplemental therapy and use of low fat diet. MCT oil rich diet must be used because it enters directly into the portal circulation and thus decreasing lymphatic flow (2,9). In one study in2010 complete cessation of enteral feeding and use of total parental nutrition followed with infant formula containing medium-chain triglyceride was

successful in 67% of the patients with chylothorax (1).

If these proceedings are unable to control chyle accumulation, somatostatin and its analogs, octreotide, are only pharmacologic agents that are successfully used. Their mechanism in control of chylothorax isn't well known but perhaps their effect on splanchnic circulation can reduce lymphatic flow (2,3). Side effects of octreotide relate to reduced intestinal secretion and consist of malabsorption, nausea, flatulence, hepatic dysfunction, hyperglycemia and transient hypothyroidism, and necrotizing enterocolitis. However, octreotide seems to be very well tolerated and these complications are rare, so monitoring should be done (10).

The conservative method with chest tube insertion and low fat diet for a prolonged period can lead to loss of lymphocytes, proteins, coagulation factors, and antibodies and increase the risk of complications like hypoproteinemia, coagulopathy, leukopenia, hypogammaglobulinemia, sepsis, and ventilator-related pulmonary injury (11,12).

In the case of continuation of drainage despite 2 to 5 weeks of total parenteral nutrition, it is advocated to perform surgery-like ligation of the thoracic duct, pleuroperitoneal shunt, pleurectomy or pleurosis (10,13,14).

Conclusion

Congenital chylothorax is a rare cause of respiratory distress in neonates, but usually requires prolonged hospitalization and multiple procedural interventions.

Administration of octreotide led to a more rapid resolution of chylothorax and improves clinical symptoms, with shorter hospitalization.

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