

## Effectiveness of somatostatin in the conservative management of chylothorax

Rıza Doğan, Metin Demircin, Ömer Faruk Doğan, Mehmet Öç, Elif Kuzgun

Department of Thoracic and Cardiovascular Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

**SUMMARY:** Doğan R, Demircin M, Doğan ÖF, Öç M, Kuzgun E. Effectiveness of somatostatin in the conservative management of chylothorax. Turk J Pediatr 2004; 46: 262-264.

Chylothorax is a rare but potentially serious and well recognized cause of pleural effusion. Chylothorax commonly occurs following general thoracic and cardiac procedures. Additionally it sometimes develops secondary to non-surgical trauma, i.e. weight lifting. Here we report two additional cases with chylothorax. Somatostatin was added to conservative treatment protocol to increase effectiveness of therapy in both cases. Although the first case required surgical intervention, we avoided any surgical procedure in the second patient with conservative management combined with somatostatin.

**Key words:** chylothorax, somatostatin, modified Blalock-Taussing shunt, thoracic duct, pleural decortication.

Chylothorax is the accumulation of chyle in the pleural space due to the disruption of the thoracic duct or its lymphatic tributary. Light<sup>1</sup> divided the etiology of chylothorax into four major categories as tumoral, traumatic, idiopathic and miscellaneous. Traumatic chylothorax is commonly associated with surgery for congenital heart disease. Postoperatively reported incidence of chylothorax ranges from 0.5% to 2.0%<sup>2</sup>. Non-surgical trauma leading to chylothorax includes penetrating injuries, sudden hyperextension of the spine, weight lifting, straining, severe coughing or vomiting<sup>3,4</sup>.

The optimal method of treatment remains controversial. Currently conservative treatment includes the use of a low-fat high-protein diet supplemented with medium chain triglycerides (MCT) or total parenteral nutrition (TPN), combined with pleural drainage. Recently, it is suggested that the use of somatostatin as an adjunct to the conservative treatment may increase the effectiveness of conservative management in patients who have moderate drainage<sup>5-7</sup>. When chyle leakage seems undiminished after three or four weeks of conservative management or reaccumulation of chyle follows relaxation of dietary restriction, surgery is recommended.

Herein we report two cases with traumatic chylothorax in which somatostatin was used as an adjunct to conservative management.

### Case Reports

#### Case 1

A 16-year-old boy was admitted to our outpatient clinic with the complaint of chest pain on his left hemithorax in November 2000. A chest roentgenogram revealed an accumulation of fluid and diaphragm elevation on the left side. Thoracic ultrasonography (USG) and (CT) scan confirmed the large amount of fluid accumulation and atelectasis. Patient's past history revealed no significant finding other than weight lifting training a week previously. Analysis of the aspirated orange-yellow colored fluid revealed  $9.0 \times 10^9$  cells/L of which 86% were lymphocytes, triglyceride level of 840 mg/dl, cholesterol level of 74 mg/dl and a total protein level of 4.4 g/dl. Simultaneous blood analysis showed a triglyceride level of 86 mg/dl (n: 10-200), cholesterol of 147 mg/dl (n: 150-200), and total protein of 6.5 g/dl. After a tube thoracostomy, 3550 ml of chylous effusion was drained within the first 24 hours.

Patient was placed on a low-fat high-protein diet supplemented with MCT. As the amount of drainage showed no decrease, enteral

nutrition was replaced with TPN on the 7<sup>th</sup> day of treatment; nonetheless the drainage could not be controlled via conservative treatment. In order to reduce lymph production, somatostatin (3.5  $\mu\text{g}/\text{kg}/\text{h}$ ) was continuously employed after a bolus injection of 240  $\mu\text{g}$  somatostatin subcutaneously on the 16<sup>th</sup> day. Within the next 48 hours, drainage material was not reduced sufficiently and the dosage of somatostatin was doubled. The drainage material decreased to 200 ml/day initially, but increased to 1000 ml/day on the 20<sup>th</sup> day (750 ml/day on the 21<sup>st</sup> day). No side effects, e.g. hypotension or hyperglycemia, were observed during the whole procedure. Somatostatin therapy was stopped and surgery was planned because of the failure of the conservative treatment. Lymphangiography-CT was not useful for the identification of the leakage point. At thoracotomy, Evans Blue dye (0.7 mg/kg) was injected into the leg subcutaneously but the chyle source could not be defined. Thus, parietal pleural decortication and trunk ligation of the thoracic duct were performed. On the 5<sup>th</sup> postoperative day, the chest drain was removed, but the TPN therapy was continued for a week. Thereafter a diet with low fat and cholesterol, supported with Alitraq<sup>®</sup>, was prescribed for one week. We followed the patient postoperatively for 10 days and discharged him on the 54<sup>th</sup> hospital day without any recurrence of chylothorax.

### Case 2

A one-year-old boy (weight 9.2 kg) with tetralogy of Fallot for whom total correction was planned, underwent a left modified Blalock-Taussing (B-T) shunt operation for coronary artery anomaly observed during the exploration. On the 3<sup>rd</sup> postoperative day, his chest radiography revealed a perigraft seroma causing atelectasis of the left upper lobe. Thorax CT scan confirmed the diagnosis. Rethoracotomy was performed and perigraft seroma of gelatinous consistency was removed. Reexpansion of the lung was proven on the chest X-ray.

On the 5<sup>th</sup> postoperative day of rethoracotomy, the amount of drainage increased and the fluid character became milky. The triglyceride level was 318 mg/dl and WBC count  $6.0 \times 10^9$  cell/L of which 72% were lymphocytes. The cultures of the fluid were negative. A high-carbohydrate, high-protein and MCT diet was administered. The amount of drainage continued above 25 ml/kg/day. The patient was kept nothing by mouth

(NPO) and TPN was started on the 8<sup>th</sup> postoperative day. As conservative therapy appeared insufficient, somatostatin infusion was added (5  $\mu\text{g}/\text{kg}/\text{hr}$ ). The drainage decreased to 200 ml/day for two days and remained stable. The dosage of somatostatin infusion was increased to 7.5  $\mu\text{g}/\text{kg}/\text{hr}$ . When drainage was less than 5 ml/kg/day, somatostatin administration was withdrawn for four days. No side effects were observed. Chest drain was removed four days later and enteral nutrition with MCT was employed. The patient was discharged on the 33<sup>rd</sup> day of hospitalization and kept on MCT diet for another two weeks. One month later, the patient was rehospitalized with complaints of fever and shortness of breath. A chest roentgenogram showed fluid accumulation within the left hemithorax. A thoracentesis was performed and 180 ml serosanguineous fluid was aspirated. A chest tube was then placed to drain the effusion completely. The triglyceride and protein levels were 138 mg/dl and 4.0 g/dl, respectively. The cultures were all negative. The effusion contained 0.8 cells  $\times 10^3/\text{ml}$ , of which 78% were lymphocytes. He was given intravenous fluid for 48 hours and started on an MCT diet. The chest tube was removed on the 8<sup>th</sup> day of the second hospitalization when no fluid accumulation was noted. He was discharged and no pleural fluid was observed one month later.

### Discussion

The ideal management of the patient with chylothorax is controversial. In general, initial treatment consists of chest tube replacement, nutritional support (low-fat diet, MCT diet), and intravenous hyperalimentation with no oral diet. Conservative management will lead to successful resolution of most non-surgical chylothoraces in children. It was reported that adding somatostatin to the conservative treatment created a dramatic response<sup>5-7</sup>. Somatostatin is a peptide that acts as a neurohormone as well as a paracrine agent. It reduces gastric, pancreatic, and intestinal secretion, decreases hepatic venous pressure, and reduces splanchnic blood flow<sup>8</sup>. The use of somatostatin as an adjunct to the conservative management of chylothorax is a relatively new concept. It may be of particular benefit in a borderline situation of moderate drainage. In fact, in this report, somatostatin did not seem to be quite as effective as in the literature. This

may be related to the dosage of the drug. It was administered as a continuous infusion at a dose of 250  $\mu\text{g}/\text{h}$  as suggested by Ulibarri and associates<sup>5</sup>, as subcutaneous injections of 50 mg every eight hours as reported by Kelly<sup>7</sup> and as a continuous infusion at a dose of 3.5-7  $\mu\text{g}/\text{kg}/\text{h}$  as suggested by Rimensberger et al.<sup>6</sup>.

When chyle leakage seems undiminished after three weeks of conservative management or reaccumulation of chyle follows relaxation of dietary fat restriction, surgery is considered. Operation in chylothorax in children is recommended when the average daily chyle loss exceeds 100 ml per year of age for more than five days or nutritional complications appear.

Thoracic duct ligation has been considered to be the definitive approach in chylothorax when all means of conservative measures fail. Alternative successful treatments for managing chylothorax have been reported as talc pleurodesis, drainage with a pleuroperitoneal shunt, or intrapleural fibrin glue application. If a localized thoracic duct injury is not identified, parietal pleurectomy is the surgical procedure of choice as in the first case discussed. Thoracic duct ligation was also performed because of the widespread chylous leakage from visceral pleura.

We conclude that the usage of somatostatin in conjunction with keeping patients NPO and on TPN diet is beneficial. Early application of

adjunctive therapy may increase the effectiveness of conservative management by preventing further loss of protein, vitamins, electrolytes, and lymphocytes. However, further controlled studies are required both for the confirmation of effectiveness of this agent and the definition of the effective dosage.

#### REFERENCES

1. Light RW. Pleural Diseases. Philadelphia: Lea&Febiger; 1983: 209-219.
2. Higgins LB, Mulder DG. Chylothorax after surgery for congenital heart disease. *J Thorac Cardiovasc Surg* 1971; 61: 411-418.
3. Herzog KA, Brauscam JJ. Spontaneous chylothorax. *Chest* 1974; 65: 346-347.
4. Ktjeldsen CS, Struve-Christensen E. Chylothorax. *Scand J Thorac Cardiovasc Surg* 1974; 8: 138-141.
5. Ulibarri JI, Sanz Y, Fuentes C, Mancha Aramendia M, Sanchez S. Reduction of lymphorrhagia from ruptured thoracic duct by somatostatin. *Lancet* 1990; 335: 258.
6. Rimensberger PC, Müller-Shenker B, Kalangor H, Beghetti M. Treatment of a persistent postoperative chylothorax with somatostatin. *Ann Thorac Surg* 1998; 66: 253-254.
7. Kelly RF, Shumway SJ. Conservative management of postoperative chylothorax using somatostatin. *Ann Thorac Surg* 2000; 69: 1044-1045.
8. Davis SN, Granner DK. Insulin, oral hypoglycemic agents, and the pharmacology of the endocrine pancreas. In: Gilman AG, Hardman JG, Limbird LE, Molionoff PB, Ruddon RW (eds). *Goodman and Gilman's The Pharmacological Basis of Therapeutics* (9<sup>th</sup> ed). New York: Pergamon Press; 1996: 1512-1513.