Surgical Treatment of Chylothorax Caused by Cardiothoracic Surgery in Children

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Four pediatric cases of chylothorax after cardiothoracic surgery, which were managed surgically, are reviewed retrospectively. All patients underwent right thoracotomy and mass ligation of the right thoracic duct without detecting the true site of leakage. Although 1 patient died from heart failure the day after operation, the other 3 recovered quickly without sequelae. Based on our limited experience, we suggest that right thoracotomy with mass ligation of the right thoracic duct can successfully cure chylothorax on either side, particularly if identification of the site of leakage is considered too risky because of severe adhesion from previous cardiothoracic surgery. [*J Chin Med Assoc* 2005;68(5):234–236]

Key Words: cardiothoracic surgery, chylothorax, thoracic duct

Introduction

Chylothorax is not often encountered in children. Except for congenital chylothorax, most cases of chylothorax are caused by injury of the thoracic duct due to cardiothoracic surgery or trauma.[1] The mainstay of treatment is a low fat diet or total parenteral nutrition (TPN), combined with pleural drainage.[2] Some reports suggested that octreotide was very effective, but the drug's mechanism of action was unclear.[3] Cope and Kaiser[4] reported the use of percutaneous embolization and blockage of retroperitoneal lymph vessels to treat chylothorax, but clinical experience with this approach is still limited. Most cases of chylothorax can be cured by conservative treatment, as mentioned above, but a massive leakage of chyle will, in the long run, lead to impaired nutritional and immunologic status. Surgical intervention is needed in some patients with continued massive leakage of chyle, despite conservative treatment. The surgical methods used include pleurodesis, leak site suturing or glue application, and thoracic duct ligation.[5,6] From 1999 to 2003, 4 patients with chylothorax due to cardiothoracic procedures were managed surgically in our pediatric surgical division. All patients had received unsuccessful conservative therapy. Right thoracotomy and mass ligation of the right thoracic duct was performed in all patients, and the results were good, except for 1 case in which the patient died from postoperative heart failure.

Case Reports

Case 1

A 1.5-year-old boy with complex congenital heart disease received a Glenn shunt through medial sternotomy. Four weeks after this operation, chylothorax was noted over the right chest. TPN and chest tube drainage were used for 6 weeks to treat chyle leaks ranging from 100 mL to 120 mL per day (the patient's bodyweight was 7.7 kg). His heart condition was stable, but mild pulmonary hypertension was noted. Four hours before operation, olive oil 60 mL was administered. A right thoracotomy was performed, but the leak site could not be identified

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clearly because of adhesions from previous surgery and fear of shunt disruption. We performed mass suture ligations of the right thoracic duct, located between vertebral bodies and the aorta, from the diaphragm to level T6. The chyle leak decreased to 40 mL on the first postoperative day. The patient started to consume a normal diet 5 days postoperatively, and the chyle leak stopped 10 days postoperatively. No sequelae were noted during 4 years' follow-up.

Case 2

A boy, aged 3.5 years, with alkaline corrosive injury of the esophagus underwent left thoracotomy and esophagectomy plus intrathoracic colon interposition. A massive chyle leak from the left neck region was noted immediately after the operation. Despite TPN, chyle continued to leak at a rate of approximately 2 L per day (the patient's bodyweight was 16.5 kg). One week after colon interposition, we performed a right thoracotomy and mass ligation of the right thoracic duct from the diaphragm to level T6, as was done in case 1. The chyle leak stopped immediately, and the patient had a normal diet the day after surgery. Unfortunately, internal herniation with small bowel gangrene occurred 2 weeks later, and the patient underwent an operation to resect a 100-cm segment of small bowel. No sequelae were noted during 4 years' follow-up.

Case 3

A 20-day-old male baby with complex congenital heart disease received a Blolock-Taussig shunt through right thoracotomy. A chyle leak was noted in the right chest after operation. Despite TPN, the leak continued at about 120 mL per day for 4 weeks (the patient's bodyweight was 2.2 kg). Four hours before operation, olive oil 20 mL was administered. Right thoracotomy was performed, but the leak site was not clearly visible because of adhesions from previous surgery and fear of shunt disruption. We performed mass ligation of the right thoracic duct, located between vertebral bodies and the aorta, from the diaphragm to level T6. Unfortunately, the baby died from heart failure the day after operation.

Case 4

A 10-year-old boy with congenital heart disease underwent Rastelli's operation through medial sternotomy. Chylothorax over the left chest was noted after the diet began 4 days postoperatively. During 7 weeks of conservative treatment, the chyle leak was about 500 mL per day with TPN, and about 1 L per day with a low fat diet (the patient's bodyweight was 42 kg). An octreotide injection had severe adverse effects, including nausea, vomiting, and diarrhea. A right thoracotomy with mass ligation of the right thoracic duct, as mentioned above, was performed. The chyle leak decreased to 40 mL per day on the day after operation, and stopped 3 days postoperatively. No sequelae were noted during 6 months' follow-up.

Discussion

There are many causes of chylothorax in children, and cardiothoracic procedures can be complicated by postoperative chylothorax in 0.5–2% of cases.[1] Most cases of chylothorax can be cured by TPN, low fat diet and/or octreotide injection, plus pleural tapping or drainage.[2,3] However, surgical intervention is necessary for prolonged chyle leaks because nutritional and immunologic status will be impaired. There have been various surgical methods reported,[5,6] and theoretically, localization and ligation of the leak site should be the surgical principle. On some occasions, however, it is difficult or risky to locate the leak site.

In our cases, the sites of chyle leakage were all difficult to identify. In the cases of post-cardiac surgery, the leak sites were near vascular anastomoses, while in the case of corrosive esophageal injury, the leak site in the neck could not be approached for fear of injuring the esophagocolonic anastomosis. So, we were unable to repair the sites of chyle leakage directly. Further, cases of congenital chylothorax requiring surgical intervention may be different from the 4 cases reported here. We have experienced 1 case of congenital chylothorax in a patient undergoing surgery, and in which the leak site was easily identified when the patient was fed olive oil 4 hours before operation.[7]

It is easy to perform right thoracotomy with mass ligation of the thoracic duct, from the diaphragm to level T6, even without identifying the site of chyle leakage or the thoracic duct. Mass suture ligation of the parietal pleura, between the aorta and vertebral body, and as wide as possible, can block the main route of chyle returning from the cisterna chyli in the abdomen. The chyle will return via other, unobstructed collaterals. Indeed, thoracoscopic ligation of the thoracic duct has been reported with good results,[8] and this mini-invasive method may replace standard thoracotomy for treating chylothorax.

Based on our limited experience, we suggest that surgical intervention with right thoracotomy and mass ligation of the thoracic duct should be performed as soon as possible if chyle leak remains persistently large after TPN and/or octreotide injection. Two weeks is

sufficient for observing the effects of conservative treatment in patients with chylothorax due to cardiothoracic surgery.

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