

A minimally invasive option for the treatment of persistent postoperative esophageal leak

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Persistent postoperative leaks in esophageal surgery in children are highly morbid. They usually require technically difficult major reoperations. A less invasive approach is always desirable. During the period 2003 to 2007, we used a minimally invasive approach for the treatment of persistent postoperative esophageal leaks in two children by injection of fibrin glue into the leak site through a small catheter that was introduced through the chest tube. The procedure was successful in one case. We introduce this approach as an alternative to surgery. We found it to be a safe and viable option for the treatment of persistent postoperative esophageal leaks. *Ann Pediatr Surg* 7:94–96 © 2011 Annals of Pediatric Surgery

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Introduction

Persistent postoperative esophageal leak represents a serious problem in children. Inability to feed orally, the risk of infection, and the development of fistulae to adjacent structures are complications that are of great concern. Reoperations are technically difficult, have high morbidity, and carry the risk of developing the same postoperative complications. Thus, a less invasive approach is desirable in these situations. We present two patients with persistent esophageal leak after complicated multiple esophageal surgeries, who were treated using fibrin glue (Tisseel Lyo; Duplojet system; Baxter Healthcare Ltd. Norfolk, UK) injection through a chest tube.

Case 1

A newborn girl underwent repair of esophageal atresia with distal tracheoesophageal fistula. Postoperatively, she developed anastomotic leak that led to a recurrent tracheoesophageal fistula. Surgical repair of this fistula was performed twice, but failed. The patient then underwent fundoplication for severe gastroesophageal reflux. She was referred to our hospital at the age of 4 years with repeated chest infections resulting from recurrent tracheoesophageal fistulae.

Upper gastrointestinal contrast study showed a tiny tracheoesophageal fistula, no distal esophageal obstruction, and no reflux. Bronchoscopy with sclerotherapy of this fistula using fibrin glue was attempted three times, at intervals of 4–6 months, and the fistula was closed. Later, the patient developed another fistula between the esophagus and the right main bronchus. Bronchoscopy failed to visualize the fistula opening, and a surgical repair of the fistula with pleural flap interposition was performed. Postoperatively, the patient developed an esophageal leak. She was kept NPO (Nothing Per Os; i.e. fasting), and a nasojunal tube (Abbot Laboratories, Ross

Products Division, Columbus, Ohio, USA) was inserted under fluoroscopic guidance for enteral feeding. Another tube was placed in the proximal esophagus and was connected to low continuous suction. The patient was also on proton pump inhibitors (Omeprazole: Astra Zeneca, Sweden) and prokinetic agents (Metaclopramide: Baxter Healthcare Corporation, Deerfield, Illinois, USA). The esophageal leak persisted for 70 days. The chest tube drained approximately 180 ml of saliva daily. Under general anesthesia with fluoroscopic guidance, a small catheter was advanced through the chest tube (Tyco Health Care, Gosport, Ireland) to the site of the leak, and 2 ml of fibrin glue was injected by the catheter into that site. Drainage decreased to 5 ml daily over the next 2 days, and stopped completely on the third day. The patient was gradually started on oral feeding, the chest tube was removed, and she was discharged home in a good status. Follow-up for the next 2 years was uneventful.

Case 2

A 20-month-old boy who had repair of esophageal atresia with distal tracheoesophageal fistula in the neonatal period developed a postoperative esophageal leak that led to recurrent tracheoesophageal fistulae. Surgical repair of this fistula was attempted twice and was complicated by severe right lung infection that resulted in right pneumonectomy. The patient also had severe gastroesophageal reflux, which resulted in an anastomotic stricture. Fundoplication and resection of esophageal stricture were performed. Postoperatively, the patient developed a major anastomotic leak. He was referred to our hospital with a chest tube draining more than 200 ml of saliva daily. Upper gastrointestinal contrast study showed anastomotic dehiscence with a diameter of approximately 4 cm, no distal esophageal obstruction, and no reflux. The patient was on nasojunal tube feeding. Another tube was advanced to the proximal

Fig. 1



Shows injection of fibrin glue by a small catheter that was advanced under fluoroscopic guidance to the site of the esophageal leak through the chest tube.

esophagus, connected to low continuous suction. The patient was on proton pump inhibitors and prokinetic agents. *Pseudomonas* was cultured from the chest tube drainage, and antibiotics were started. The esophageal leak persisted for 76 days. Under general anesthesia with fluoroscopic guidance, a small catheter was advanced through the chest tube to the site of the leak, and 6 ml of fibrin glue was injected by the catheter into that site (Fig. 1). Chest tube drainage significantly decreased in the first few days after the procedure, but slowly increased, and finally, a fistula developed between the esophagus and the stump of the right bronchus. Right thoracotomy and repair of the fistula with pleural flap interposition were performed. Postoperatively, the patient developed a minimal esophageal leak that responded well to conservative treatment. The patient was started on oral feeding, and was discharged home in a good status. Follow-up for 1 year was uneventful.

Discussion

Injection of fibrin glue through the chest tube was attempted in both of our patients, and was successful in one. In the second case, the effect was temporary. We intended to repeat the procedure, but the development of a fistula to the right bronchial stump in the presence of a solitary left lung shifted our decision toward surgical repair. Success in the first case was attributable, probably because of the small well-formed tract. We believe that failure in the second case was related to the large size of the tract resulting from major anastomotic disruption. *Pseudomonas* infection could also be a possible contributing factor to failure.

Postoperative esophageal leak is a well-known complication, which is estimated as between 14–16% of cases after repair of esophageal atresia [1]. In most cases, the leak is minimal and responds to nonoperative measures. Persistent esophageal leaks are less common, but can lead to

recurrent tracheoesophageal fistulas, and may require surgical intervention in the majority of cases. Repeated operations carry high morbidity and the risk of developing the same postoperative complications, as occurred in our two patients.

Fibrin glue has been used in Europe since the 1960s [2–4]. In the USA, the Food and Drug Administration approved the first commercial fibrin sealant (Tisseel) in 1998. Its hemostatic and adhesive properties have been used in a variety of clinical situations [5–13]. Although prospective trials are still lacking, the advantage is evident in many reports. Different application methods have been described, including direct application during surgical procedure, and application under endoscopic and radiologic guidance [1,14–19]. To the best of our knowledge, injection of fibrin glue through a chest tube for the treatment of esophageal leak in children has not yet been described. We found this procedure to be safe, technically easy, and quite effective in the management of persistent esophageal leaks. We think that this modality may eliminate the need for technically difficult and potentially dangerous reoperations. Prospective trials with larger number of patients are needed.

Conclusion

Persistent leaks require complex decision-making. Radiologically guided injection of fibrin glue by a chest tube is a viable and safe, minimally invasive option for the treatment of persistent postoperative esophageal leaks.

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