Salvage of Right Colon Interposition by Microsurgical Venous Anastomosis

H. D. L. Patel, MD, PhD, Yi-Chieh Chen, MD, and Hung-Chi Chen, MD, FACS

Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, Kuei Shan, Taoyuan, Taiwan

Venous insufficiency of a right colon interposition in esophageal reconstruction can be a fatal complication resulting in total failure. A case is presented of the salvage of the right colon interposition by additional microsurgical venous anastomosis to relieve the problem of venous stasis. The outcome was successful in a young patient with a complicated medical history.


Accepted for publication April 1, 2002.

Address reprint requests to Dr Chen, Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, No. 5, Fu-Hsing St, Kuei-Shan, Taoyuan 333, Taiwan; e-mail: pschenyc@yahoo.com.tw.

© 2002 by The Society of Thoracic Surgeons
Published by Elsevier Science Inc

Salvage of Right Colon Interposition by Microsurgical Venous Anastomosis

Since the first description of the use of the colon independently as an esophageal substitute by Vuillet and Kelling in 1911, its use for a variety of benign and neoplastic conditions has been well established. There are many reports describing the morbidity and mortality associated with this procedure. Most authors emphasize the importance of the adequate marginal arterial flow to the graft survival. Ventemiglia and associates [1] in 1977 and Peters and associates [2] in 1995 reported a case of graft necrosis separately. Both patients had favorable arterial patterns confirmed by preoperative mesenteric arteriography. The cause of their graft failure was related to venous insufficiency. Here we describe a procedure for salvage of the interposed right colon segment when confronted with anatomic variation in mesenteric vascular result ing in venous insufficiency.

A 6-year-old girl presented with complications of four previous surgical attempts at repair of her tracheoesophageal fistula. The esophageal atresia and tracheoesophageal fistula required operative intervention on the second day of life at another institute. The operative procedures included ligation of the fistula and esophageal anastomosis. However, 1 year later she required further surgery as a result of dysphagia due to a stricture and therefore had further resection and reanastomosis, which unfortunately were complicated by constant leakage with persistent pneumonia necessitating a gastrostomy for feeding. At this stage she was referred to our institute.

The patient's main complaints on presentation were pneumonia, dysphagia, and weight loss as a direct result of tracheoesophageal fistula and esophageal stricture. Preoperative investigations included an magnetic resonance imaging scan, which revealed an esophageal stricture of the thoracic part and a small tracheoesophageal fistula above the previous anastomotic site. She underwent surgery that included esophagectomy, right colonic interposition based on ascending branch of left colic artery, and Roux-en-Y colonojjunostomy. After dividing the mesocolon and mobilizing the right colon from its retroperitoneal attachment, the right colon appeared significantly engorged right colic and ileocolic veins were noted with no marginal venous communication to the middle colic vein (Fig 1). It required additional venous drainage for the right colon graft to survive. The interposed colon segment was transposed by the subcutaneous route to reconstruct the thoracic esophagus, with the lower end anastomosed to the Roux limb of the Roux-en-Y jejuno-jejuncostomy to prevent postoperative reflux and aspiration. The upper end was joined to the previous pharyngeal remnant and a mesenteric vein of the right colon about 3 mm in diameter was Anastomosed to a branch of the internal jugular vein using microscopy by interrupted 10-0 nylon sutures. The congestion and swelling of the right colon subsided and the color turned pink promptly after drainage of the congested veins. The patient made a full postoperative recovery.
Adequate marginal artery can be confirmed preoperatively by mesenteric arteriography or intraoperatively by direct inspection of the vascular pattern under transillumination, palpation of the arterial pulsation, or Doppler examination. Venous insufficiency however is difficult to detect before ligation of the pedicles. This is the reason that use of the right and transverse colon has not gained popularity. Our case showed such an ominous situation regarding the venous insufficiency; the only way to salvage the congested graft and maintain viability of a pedicled colon is immediate alternate drainage of its venous flow. With microsurgical techniques this situation can be easily remedied by creating an additional pathway for venous return. Arterial supercharge may also be considered if equivocal distal perfusion of the colon graft is noted intraoperatively. Adequacy of the circulation of the right colon graft should be evaluated before the graft is pulled through the subcutaneous tunnel in order to make sure that the vascular compromise, if it develops, is not caused by external compression to the vessels. The subcutaneous tunnel should be widely dissected to prevent any possible compression on the graft, especially over the inlet and outlet of the tunnel.

Revascularization of an ischemic colon transfer using microsurgical techniques has been described in a case report by Sung and coworkers [5]. They performed additional anastomosis of the internal mammary vessels to the ileocolic vessels with successful outcome. O’Rourke and Threlfall [6] first described additional microvascular anastomosis of the colon graft to ensure adequate distal perfusion in 14 patients, with no case of colon graft necrosis or anastomotic leakage. This study was repeated by Fujita and associates [7] who evaluated the impact of microvascular supercharge on colon interposition for esophageal replacement and concluded that additional microvascular anastomosis prevented serious complications caused by graft ischemia.

These studies have been carried out in adult patients in whom systemic vascular disease could compromise the blood supply as a result of atherosclerotic vessels and focused in particular on increasing the arterial flow to the distal part of the colon segment. To date there have been no reports of additional microsurgical venous anastomosis for salvage of the interposed right colon segment in a young healthy patient.

References
Simultaneous Bronchopleural and Esophagopleural Fistulas After Pneumonectomy
Walid Trigui, MD, Françoise Le Pimpec-Barthes, MD, Walid Shaker, MD, Loïc Lang-Lazdunski, MD, PhD, and Marc Riquet, MD, PhD
Service de Chirurgie Thoracique, Hôpital Européen Georges Pompidou, Paris, France

The simultaneous occurrence of bronchopleural fistula (BPF) and esophagopleural fistula (EPF) after pneumonectomy is very rare. We describe a 60-year-old man who developed empyema associated with bronchopleural fistula as a complication of a right pneumonectomy. Initial chest tube drainage and antibiotic therapy were ineffective. Five months later ingested food particles appeared in the drainage fluid. Esophagoscopy revealed an esophageal fistula of 10 mm in diameter. After nutritional support by feeding jejunostomy both BPF and EPF were repaired by subscapular muscle myoplasty and extensive thoracoplasty through a right thoracotomy. Endoscopic examination performed 1 month after surgery showed complete closure of both fistulas and 9 months after surgery the patient was eating and gaining weight. The patient’s death was due to aspiration pneumonia of another origin.


The incidence of bronchopleural fistula (BPF) after pneumonectomy ranges from 1% to 4% [1]. Esophagopleural fistula (EPF) is an even more rare complication with an incidence ranging from 0.5% to 0.65% [2]. The simultaneous occurrence of both bronchopleural and esophagopleural fistulas after lung resection has only exceptionally been reported either after pneumonectomy [3–5] or lobectomy [6, 7]. We report an original case of simultaneous BPF and EPF after right-sided pneumonectomy and discuss the etiology and the management of such a complication.

A 60-year-old man with no significant medical history was referred to our department after a right pneumonectomy performed in another institution in January 1997 for adenocarcinoma of the right lower lobe (T2N0M0). The early postoperative course had been complicated by an empyema associated with a BPF that was initially treated by antibiotics and chest tube drainage. No data were available regarding the cultures and the antibiotic treatment received during this period. However, the infection was not controlled and 5 months later ingested food particles were seen in the drainage from the chest and the empyema evolved toward “empyema necessitans,” at the anterior part of the thoracotomy. EPF was confirmed on gastrografin swallow. The patient was discharged and referred to our department.

On admission the patient was cachectic and dyspneic. Admission chest roentgenogram demonstrated a right-side air fluid level and left lower lobe pneumonia. Fiberoptic bronchoscopy revealed a fistula of 5 mm in diameter located on the right bronchial stump. Esophagoscopy showed an esophageal fistula of 10 mm in diameter approximately 30 cm from the incisors. There was no evidence of lung cancer recurrence. Because of the poor general status of the patient a new chest tube was inserted. Direct analysis of the pleural fluid revealed Mycobacterium tuberculosis. Antituberculosis therapy was instituted and a feeding jejunostomy was performed in order to start nutritional support. After 2 months of pleural drainage the patients nutritional status was satisfactory and M tuberculosis had disappeared. Owing to the persistence of both fistulas and the recurrence of fever a videothoracoscopy was performed and the pleural cavity cleaned.

One month later a right thoracotomy was performed in view of cure. The cavity was widely debrided and the location of the esophageal fistula and bronchial stump were identified. The esophageal fistula was visualized in the midportion of the esophagus. Its edges were freshened and a single row of interrupted sutures was set very close to the fistula. The BPF was also identified and its edges freshened and was closed by interrupted sutures. An extensive thoracoplasty was then performed with ribs 3 to 8 being removed together with the lower two thirds of the scapula. The sites of esophageal fistula and bronchial stump were then covered by a subscapular muscle flap. Postoperatively the patient suffered from respiratory insufficiency and required a tracheostomy. He finally recovered and endoscopic examinations performed a month after surgery demonstrated complete closure of both fistulas.

Nutritional support through the jejunostomy was progressively reduced and oral food intake started. The following month a nasopharyngeal (cavum) carcinoma was diagnosed and treated by cervicofacial radiotherapy and chemotherapy (Cis-platyl). The patient had no evidence of recurrence of either the bronchial or esophageal fistula. However, a swallowing disorder developed as a consequence of radiotherapy to the neck. He died in July 1998 of acute respiratory insufficiency secondary to aspiration pneumonia.

Comment
The management of simultaneous postpneumonectomy EPF and BPF has only rarely been reported in the literature. Evans [3] reported 8 cases of EPF after 1389 pneumonectomies, 7 of which were preceded by a bronchial fistula. However, when EPF and BPF were simultaneous, all patients died. The only survivors were patients whose EPF occurred a long time after the BPF (12 and 22 months). Richardson and associates [4] reported the case of a patient with late EPF and who also recovered. Massard and colleagues [5] reported 8 cases of EPF. A