

Case Report

A Good Result of Cardiopulmonary Resuscitation Following Colonic Segment Interposition with Vascular Supercharge

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A 70-year-old man who underwent surgical excision of an esophageal leiomyoma developed esophageal leak and underwent esophagectomy. Colonic segment interposition was performed to address the esophageal defect. Cardiopulmonary resuscitation (CPR) was subsequently performed for desaturation due to pulmonary atelectasis; spontaneous circulation resumed without indication of contrast leakage or necrosis. Redundancy of the esophagus in the neck occurred due to migration of the colon segment during CPR. We shortened the colonic segment, which improved swallowing function.

Here we report the first case of a positive outcome of cervical herniation of a colon graft due to CPR after a colonic interposition procedure.

Keywords: Colonic Interposition; Colon Segment Interposition; Esophageal Reconstruction; Cardiopulmonary Resuscitation; Vascular Supercharge

Abbreviations

CPR: Cardiopulmonary Resuscitation; POD: Postoperative Day

Introduction

Colonic interposition is a widely used surgical technique for esophageal reconstruction, especially in children with esophageal atresia, peptic strictures, or caustic strictures. Gastric transposition is more commonly performed among adults due to ease of the procedure, and colonic interposition is the second choice of intervention [1]. However, gastric transposition may not provide enough length through some routes for esophageal replacement and poses a higher risk of anastomotic leak and stricture [2].

The posterior mediastinal route is the shortest and most direct route; however, the posterior mediastinum may be unavailable due to previous surgery, fibrosis, or inflammation [3].

In this case, the mediastinum was unavailable due to previous surgery, therefore, a substernal route was chosen for reconstruction. Additionally, the colonic interposition was preferred rather than gastric transposition because a longer length was required for the substernal route.

Here we report a case of a patient who received cardiopulmonary resuscitation (CPR) for 10 minutes on postoperative day (POD) 13 following colonic interposition; there was no anastomosis leakage or conduit necrosis after the resuscitation.

Case Presentation

A 70-year-old man with a surgical history of total thyroidectomy for hyperthyroidism underwent esophagogastroduodenoscopy during a general medical examination, which incidentally revealed a tumor located in the upper third of his esophagus. Endoscopic ultrasonography showed a 13-mm submucosal tumor. Surgical

enucleation of the esophageal tumor was performed, and pathologic examination indicated a leiomyoma (Figure 1 A-C).

On POD 5, dyspnea was observed; the chest X-ray and computed tomography showed right loculated pleural effusion containing gas with right lung consolidation; hence, empyema due to esophageal leakage was suspected. Esophagography demonstrated contrast media extravasation from the upper third of the esophagus (Figure 2 A-C). After antibiotic administration and vital sign stabilization, the patient underwent a right thoracotomy for esophagectomy; bacterial culture of the right pleural fluid showed *Klebsiella pneumoniae*.

The patient visited our outpatient department and a left-sided, vascular supercharged colonic interposition was performed for reconstruction of the esophageal defect. Notably, we constructed two additional bridge vein grafts connecting the transverse cervical artery to the marginal artery of Drummond (near the D-colon) and the marginal vein to the external jugular vein.

On POD 13, we observed a change in consciousness and cyanosis. Due to apnea and absence of pulse, CPR was initiated immediately. Ten minutes later, the cardio pulmonary function normalized and migration of the redundant reconstructed esophagus to the neck was observed. Therefore, the patient was admitted to the intensive care unit.

Esophagography performed 8 days after the CPR revealed no contrast leakage or focal stenosis in the neck region (Figure 3A). There was no sign of sepsis or conduit necrosis. The patient resumed liquid diet by mouth.

Two months after the esophageal reconstruction, the patient experienced difficulty in swallowing. Dysphagia caused by the herniation of the colonic graft to the neck was detected; therefore, we shortened the colon segment in the patient's left neck by 7 cm



Figure 1: (A) Esophagogastroduodenoscopy shows an esophageal tumor located in the upper-third of the esophagus. (B) Endoscopic ultrasonography shows a 13-mm submucosal tumor. (C) Surgical excision of the esophageal tumor.

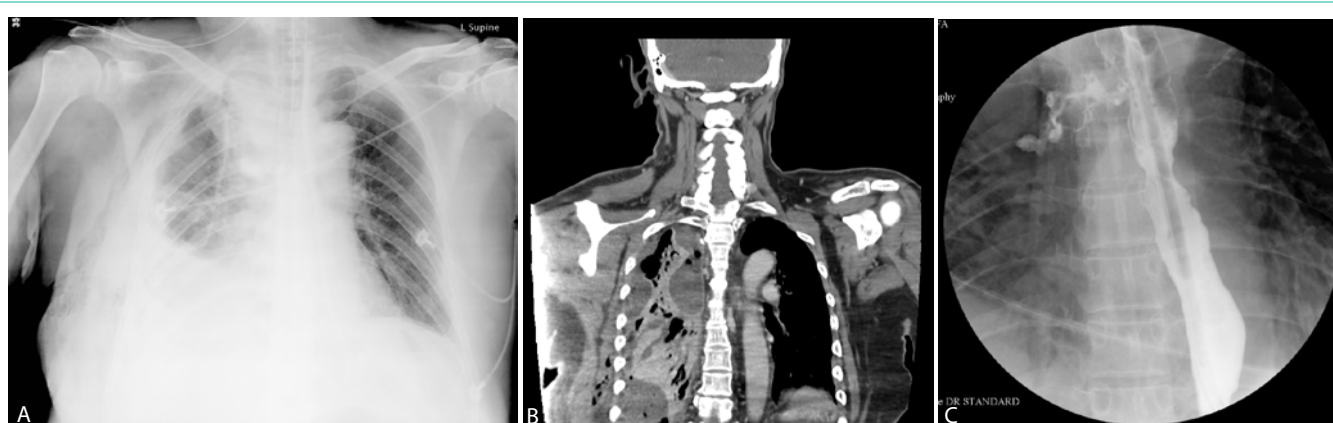


Figure 2: (A) X-ray shows right loculated pleural effusion. (B) Computed tomography shows right loculated pleural effusion containing gas with right lower lobe lung consolidation. (C) Esophagography demonstrated contrast media extravasation from upper-third esophagus.

with end-to-end anastomosis. The patient recovered well after this procedure. Two months later, esophagography showed good swallowing function without dysphagia (Figure 3B), and the patient could eat soft food at the third month follow-up.

Discussion and Conclusion

Colonic interposition has been performed with several modifications over the last 100 years (approximately) [4]. Traditionally, blood flow in the colon graft in left-sided colonic interposition is from the middle colic artery to the marginal artery of Drummond near the D-colon. To increase blood supply, vascular supercharge [5] with vein grafts connecting the transverse cervical artery to the marginal artery and the marginal vein to the external jugular vein was performed in this case. It was surprising that after the chest compression, the colon graft beneath the sternum remained healthy with no anastomosis leak or necrosis; we believe that the increase in blood supply might have contributed to this positive result.

We found two similar cases in a literature review of PubMed and Google Scholar:

(1) CPR following colonic interposition has been reported only in one study—the patient was unresponsive to CPR and died [6].

(2) In the current report, after the CPR, a colon segment migrated to the left neck due to high intrathoracic pressure following



Figure 3: (A) Esophagography shows herniation of the colonic graft to the left neck 8 days after the CPR. (B) Esophagography image at the 2-month follow-up after shortening of the colon segment at the neck.

the chest compressions. This is a rare complication of colonic interposition. We found only one other report describing herniation of the colon graft after colonic interposition (an intrathoracic hernia of a retrosternal colon graft [7]) and resection of the redundant colon graft. To our knowledge, herniation of the reconstructed colon to the neck has not been previously reported.

To our knowledge, a positive outcome of CPR after colonic interposition or herniation of the reconstructed colon to the neck has never been reported before [6,7]. We believe that vascular supercharge may be the key point of this good result. Here we report the first case of a positive outcome of cervical herniation of a colon graft due to CPR after a colonic interposition procedure.

References

1. Spitz L, Coran AG. Esophageal Replacement. In: Coran, AG, Editor Pediatric Surgery (Seventh Edition). Philadelphia: Mosby; 2012; 927-938.
2. John W Briel, Anand P Tamhankar, Jeffrey A Hagen, Steven R DeMeester, Jan Johansson, et al. Prevalence and risk factors for ischemia, leak, and stricture of esophageal anastomosis: gastric pull-up versus colon interposition. *J Am Coll Surg.* 2004; 198(4): 536-541.
3. Kunisaki SM, Coran AG. Esophageal replacement. *Semin Pediatr Surg.* 2017; 26(2): 105-115.
4. Fürst H, Hartl WH, Löhe F, Schildberg FW. Colon interposition for esophageal replacement: an alternative technique based on the use of the right colon. *Ann Surg.* 2000; 231(2): 173-178.
5. Yasuhiro Shirakawa, Yoshio Naomoto, Kazuhiro Noma, Kazufumi Sakurama, Toshio Nishikawa, et al. Colonic interposition and supercharge for esophageal reconstruction. *Langenbecks Arch Surg.* 2006; 391(1): 19-23.
6. Tihan D, Matlım T, Çelik T, Altıntoprak F, Asoğlu O. Thoracoscopic vagal-sparing esophagectomy and colonic interposition for caustic stricture. *Turk J Surg.* 2018; 34(1): 53-56.
7. Tomoyoshi Takayama, Kohei Wakatsuki, Sohei Matsumoto, Koji Enomoto, Tetsuya Tanaka, et al. Intrathoracic hernia of a retrosternal colonic graft after esophagectomy: report of a case. *Surg Today.* 2011; 41(9): 1298-1301.