Result of Esophageal Reconstruction Using Supercharged Interposition Colon in Corrosive and Boehave’s Injury: Thammasat University Hospital Experience

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Seven esophageal reconstructions with interposition colon in severe suicide corrosive ingestion and Boehave’s injury at Thammasat University Hospital were presented. Vascular enhancement (as called “supercharge”) were done. Only one patient had micro-leakage at pharyngeal anastomosis with healed by conservative treatment and no late anastomotic stricture. The operation need more time and general surgeon skill but better comparison outcome.

Conclusion: Using supercharged interposition colon in adult esophageal reconstruction in corrosive and Boehave’s injury was benefit in lowering the incidence of anastomotic leakage and late anastomotic stricture. Just a longer operative time and vascular anatomy skill were need.

Keywords: Esophageal reconstruction, Supercharged, Interposition colon, Thammasat University Hospital

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Thammasat university hospital as the trauma center, severe suicide corrosive ingestion were common. Total loss of esophagus and stomach are challenge problems for the late reconstructions. Esophageal reconstructions can be done by small and large bowl. As a choice, pedicle interposition colons were used. Anastomotic leakage and late stricture were common post-operative complications. Ischemia was believed to contribute significantly to this complication(1). With the advent of vascular anastomosis, vascular augmentation (as called “supercharge”) were adopted as a means of avoiding this problem.

Case Report

Seven total loss of esophagus patients, who reconstructed by interposition colon in Thammasat university hospital between 2000-2005 were vascularized by augmented microvascular anastomosis. Five were male and two were female. Their mean age was 23.3 years (rang, 18-33) (Table 1).

Six were caused by suicide corrosive ingestion and one by Boehave’s syndrome. All corrosive ingestion were previous esophago-gastrectomy due to necrosis of esophageal and stomach (Fig. 1). The patient, who Boehave’s syndrome, was only previous esophagectomy.

By the judgments of general surgeon depend on vascular anatomy and fibrosis severity. Five were reconstructed by left interposition colons and two by right interposition colons. Retro-sternum dissections and rail-road technique were all done. The interposition colon anastomosis were done between pharyngeal and jejenum, except who Boehave’s syndrome was done between pharyngeal and stomach.

Technique

The operation was performed by two teams of general and plastic surgeons. After laparotomy, the colon and their mesocolonic vessels were selected by the general surgeon. At distal-end of colon flap, that pharyngeal anastomosis were planned, the recipient vessels should be meticulous dissected as longest as possible for the vascular anastomosis was easily done (Fig. 2, 3).

After that left side neck incision was done...
and the colon was pulled up rail-road pass the retro-
sternum route. During the general surgeons did intra-
abdominal bowl anastomosis, the plastic surgeons did
the microvascular anastomosis at cervical site.

In six patients, donor artery were transverse
cervicalis artery and one patient, superior thyroid artery
was used. The donor vein all were external jugular veins
and only one anterior jugular vein was added. The first
five patients, the vascular anastomosis were done under
microscope magnifications. The two later were done
under loupe magnifications. The suture technique were
interrupted 8/0 nylons (Fig. 4).

Before and after the microvascular anasto-
mosis, proximal interposition colon vascularization were
observed. All were better vascularized for the bright
arterial bleeding and congestion of colons were
diminished. Then the general surgeons did the
pharyngeal anastomosis and completed the operations
as their technique.

Results The operative time were average 6.8 hours
(rang, 6-8). When comparison to previous performed pedicle interposition colon in this hospital, operative
time were 40-60 minutes longer than. No immediate
post-operative complications were noted. After 10th
post-operative days, the contrast media swallow study
was done. Only one patient had micro-leakage at
pharyngeal anastomosis, that healed after 7 day
conservative treatment. For the 2nd, 4th week, 3rd and 6th
month follow-up, all had no late anastomosis stricture
problem.

Discussion Colonic flap or conduit is more appropriate
for esophageal reconstruction for the following
reasons\(^{(2)}\): it has a straight shape, end-to-end anastomosis is possible to both the pharynx and distal anastomosis (may be stomach or jejunum site). In spite of careful selection of patients for surgery and meticulous operative technique, incidence of anastomotic leakage or late anastomotic stricture just were high (5.1-13.3\%)\(^{(3,4)}\). Many believes that these complications were the sequelae of ischemia. Some of the factors were identified as correlating with the risk of ischemia include length of conduit, intra-abdominal fibrosis, route of passage of the conduit and tension to mesocolon.

Esophageal reconstruction after suicide corrosive ingestion or severe infection, intra-abdominal fibrosis was main problem. In spite of delayed reconstructive time, fibrotic mesocolon and surrounding area often remained. These caused tension to mobilized pedicle colon that secondary caused venous insufficiency.

Ischemic complications occurred from arterial insufficiency or secondary to venous insufficiency\(^{(5)}\). To avoiding the entire ischemic complications, enhanced both arterial and venous vascularization should be considered\(^{(6,7)}\). If these procedures were planned, they did not take so more time. Only selected longer distal pedicle and anastomizes to local vessels at same neck incision of pharyngeal anastomosis.

Vascular anastomosis can be done under microscopic or loupe magnifications. These vascular skills can be performed by general surgeons. Importance successful techniques were distal vascular pedicle need meticulous dissected and longest as possible and proper donor vessels preparation for the vascular anastomosis can be easily done in the operative neck field.

Choices of donor artery were transverse cervicalis, superior thyroid, facial artery. Because of in the most case, the pulled-up colons had lots of surrounding adipose tissue. Transverse cervicalis artery was preferred because of their length and easy harvest. The artery is rather reliable fixed anatomic position. It lay on prevertebral fascia (fascial carpet), easily found on scalenus medius muscle before to feed trapezius muscle. Its diameter is proportion to colonic artery. With its enough length, the anastomosis can clearly be performed in out of colonic adipose tissue disturbance. For choices of donor vein, external jugular vein was preferred. This vein places in subcutaneous layer and mobilized and avoid for its clicking. In some cases external jugular vein were damaged from previous operations, internal jugular veins were suggested as end-to-side anastomosis. The bowl veins were rather thin, finished anastomosis were always fully checked especial about double wall suture.

Vascular anastomosis should be done before pharyngeal anastomosis. Good signs of good enhanced vascularization were dark colored arterial bleeding change to be bright colored, swelling mucosa were shrunk and diminished of mucous producing.

In these series, there were no incidence of major anastomotic leakage or late anastomotic stricture.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
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<td>Ext. jugular</td>
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<td>Rt</td>
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### Table 1. Esophageal reconstruction using supercharged interposition colon (n = 7)
Comparison to previous pedicle colon interposition in the other report, more operative time but less complications\(^6\).

On the other hand, other esophageal reconstructions such as gastric pull up or extended colon interposition; if poor blood flow is suspected, augmentation of microvascular blood flow by this technique can be expected to reduce the risk of leakage and partial necrosis\(^9\-\^{11}\).

**Conclusion**

The report showed that using supercharged interposition colon in adult esophageal reconstruction in corrosive and Boehave’s injury was benefit in lower the incidence of anastomotic leakage and late anastomotic stricture. Just a longer operative time and vascular anatomizes skill were need.

**References**


ผลการผ่าตัดสร้างทดแทนหลอดอาหารด้วยลำไส้ใหญ่แบบต่อเส้นเลือดเลี้ยงเพิ่มในผู้ป่วยกลืนสารกัดกร่อนและการบาดเจ็บชนิด Boehave ประสบการณ์ในโรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ

สุรจิต อาวสกุลสุทธิ

เป็นการรายงานผลการรักษาผู้ป่วยจำนวน 7 คน ที่สูญเสียหลอดอาหารจากการกลืนสารกัดกร่อนและการบาดเจ็บชนิด Boehave ในโรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ ด้วยการผ่าตัดสร้างทดแทนหลอดอาหารด้วยลำไส้ใหญ่แบบมีการผ่าตัดต่อเส้นเลือดเลี้ยงเพิ่ม (Supercharge) ผลการรักษาไม่ป่วยชราขาด เลือกของรอยต่อวิ่งจากหัวในผู้ป่วยนั้นๆ ซึ่งสามารถหายได้เอง และจากการติดตามผลการรักษาไม่พบการดีขึ้นของรอยต่อระหว่างหลอดอาหาร แต่ศัลยแพทย์จำเป็นต้องมีทักษะความสามารถต่อเส้นเลือด และใช้วิธีการตัดเพิ่มขึ้น แต่ไม่ประยุกต์หลักการผ่าตัดในการลดอุบัติการณ์การรั่วและการติดตามของระยะต่อส่วนทดแทนหลอดอาหาร