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Esophageal Replacement for Caustic Stricture-A Brief Review

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Abstract

Multi-disciplinary management, early diagnosis and treatment are the keys of success in patients with digestive severe caustic injury. Endoscopic dilations are the first treatment of esophageal stricture .Reconstructive surgery is an alternative option when the dilatations fail and which the objective is to restore the gut continuity and swallowing function with acceptable mortality and morbidity. Gastric and colon reconstruction are the two most used surgical procedures however the choice of procedure is based on anatomic conditions of patient and the surgeon experience. Sub strnal route and posterior mediastinum are the most employed approaches. The operative mortality has been increasingly decreased however the morbidity is still slightly higher. In this brief report, we review the preoperative assessment choice of graft organ, route of reconstruction and surgical outcome.

Keywords: Caustic stricture; Reconstructive surgery; Surgical outcome

Introduction

Digestive injury and complications resulting from caustic ingestion is the most challenging clinical situations encountered in gastroenterology. The commonest chemicals implicated in gastrointestinal caustic injury are alkaline and acid agents. The caustic ingestion is voluntarily and in suicidal intent in the most situations in adult .In fact, successful management of these patients requires multidisciplinary therapeutic approach including psychiatric support. Early diagnosis and adequate treatment are the keys of success particularly in severe injury which can lead to death resulted from complications [1,2]. Ct scan abdomino-thoracic has an important value to diagnose and precise the trans-mural character of the esophageal lesion thus reducing excessive esophageal excision and digestive complications. Stricture formation is inevitable in some cases and the first treatment of this stricture is the dilations. Every effort should be made to retain the native esophagus and reconstructive surgery is required for ineffectiveness, complications or lack of the dilations. The objective of surgery is to establish both digestive continuity and swallowing function. Establish the gut continuity needs the use of an abdominal digestive organ. The time of surgery for caustic stricture is still under controversy. However authors suggest that the most beneficial time for surgery is not less than 3 months for the esophagus and 6 months for the pharynx [3]. Despite the reduction in operative mortality, the morbidity rate is still high. The accuracy of the surgical technique and the experiences of surgeon are the most important factors that may impact outcome in esophageal reconstructive surgery.

Preoperative evaluation

Preoperative colonoscopy is recommended to explore colon in patient for whom a colonic interposition was planned. Mesenteric angiography is recommended for patient older than 60 years and for patient with prior intestinal resection or peripheral vascular disease. Angiography is very was helpful in outlining the vascular arcade of the intestinal segment to be interposed in patient who had previous colonic resection. Patients candidate for esophageal surgery are at high risk to develop malnutrition. Therefore the preoperative evaluation of the nutritional status of these patients is primordial. Poor nutritional status is associated with high rate of postoperative complications. The nutritional improvement of patient prior to surgery is highly recommended and peri-operative introduction of nutritional supports have a direct impact on postoperative

results [4,5]. Both parenteral and enteral nutrition can be used however the enteral nutrition is the preferred one to treat malnutrition and to improve patient nutritional status. The mechanical bowel preparation is so performed 48 hours before time of surgery.

Choice of replacement organs

The Decision of which organ to use for esophageal reconstruction is based on multiple factors: esophagus disease, length of reconstruction, digestive organ available and surgeon experience and preference. Stomach, colon and jejunum are used to restore digestive continuity after esophagectomy or to bypass malignant and benign esophageal stricture.

Jejunal interposition is seldom used because of the difficulty for operation since blood vessels of jejunum are too thin and easier to be affected after anastomosis. Furthermore, the jejunum is fragile to the erosion of acid in a long run, so the jejunum should not be the first choice. Therefore the best indication for free jejunal graft is the reconstruction of the cervical esophageal portion .Some authors considered that gastric interposition was the procedure of choice to establish digestive continuity for patient with both benign and malignant esophageal disease [6-9]. The gastric reconstruction is widely employed because of its simplicity and it requires less time to achieve the procedure as compared to colon reconstruction. However, stomach has the disadvantages of long term gastro esophageal reflux which can lead to complications such esophageal ulceration and anastomotic stenosis [10]. In case of diffused injuries with pharyngo-esophageal stenosis, the stomach is not sufficiently long to reach the basis of the tongue in order to perform a pharyngoplasty. In other hand, the stomach is often injured during massive caustic ingestion and its use as an esophageal substitute is often impossible.

The colon is the first digestive organ used to replace diseased esophagus and many authors have suggested that the colon is the best conduit to construct the esophagus and to restore swallowing function because mainly of an increased incidence of aspiration and reflux with gastric conduit [11-19]. Preference of authors who the colon reconstruction lies on the anatomic and physiologic features of colon , including its relatively straight mesentery, increased length that can be mobilized on its vascular pedicle, its low incidence of disease, its resistance to chronic gastric reflux and the long-term good functional results of colon reconstruction. However the completion of colon reconstruction requires more time to achieve the procedure as compared to gastric reconstruction. Both right and left colon can be used however the left colon is more preferable and this preference lies on the near-invariability of the left colonic artery (which has been present in all the patients of our series except in one patient, it had too reduced size and unusable) in contrast with the vascular pattern of the right colon and its smaller lumen which matches perfectively with the esophageal lumen. Isopéristaltique left colonic graft based on the left colic artery is our first choice in our institution. When performed by experienced surgeons, substernal left isioperistaltic colon reconstruction is the surgical procedure of choice to reconstruct the scarred esophagus with low mortality, acceptable morbidity and good functional results.

The route of reconstruction

During esophageal reconstruction, there are three placement sites of graft namely the posterior mediastinum, the substernal tunnel and the subcutaneous space. The subcutaneous route is the longest and has strong angulation at its cervical and abdominal extremity, so this route is at high risk of graft necrosis. As reported, the high incidence of graft necrosis associated with the subcutaneous route suggests that only when other routes are not available or suitable; the subcutaneous route should be used [20]. The posterior mediastinum and the substernal route are the two most commonly route used in esophageal reconstruction. The posterior mediastinum is the shortest and most direct route, thereby relaxing tension to the cervical anastomosissite and reducing thus the kinking and twisting risk of graft vascular pedicle [21]. The use of the posterior mediastinum needs the ablation of the native esophagus. In some situations, the access to the posterior mediastinum is difficult ortechnically not possible [22]. This route also has a high rate of mortality if graft necrosis or anastomotic leakage occurs, and it is naturally not indicated for palliative cases because the posterior mediastinum is a tumor bed.

The disadvantages of the posterior mediastinal route have prompted some surgeons to advocate the substernal approach [23]. The substernal route has been an alternative for delayed esophageal reconstruction or when access to the posterior mediastinum is difficult or technically not possible [22,23]. It is easy to achieve the substernal route without need to thoracic approach. Substernal route is an ideal indication for esophageal palliative surgery. This route is widely employed in caustic stricture because the scarred esophagus is often left in place and its ablation is associated with high risk of operative complications. The substernal route has a biggest disadvantage of potential risk of compression of the graft at the thoracic inlet leading mechanical graft ischemia. To ensure there is no risk of compression, enlarging the thoracic inlet by inlet by removing the left half of manubrium and internal third of clavicle is highly suggested when the substernal approach is considered [9,14,24-27]. This procedure allows to easy access to the left internal thoracic vessels which can be useful for supercharge of graft by performing microvessel anastomosis.

The posterior mediastinal and retrosternal routes are associated with similar rates of immediate postoperative complications [28]. Compared to posterior mediastinum, the substernal route is associated with a slightly higher rate of cervical anastomotic leak related partially to the compression of the graft at the level of thoracic inlet. However, the opening of the thoracic inlet may reduce the incidence of cervical leak [29] and its enlargement is suggested by many surgeons performing

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esophageal substernal reconstruction [9,24-27,29-31]. Regarding to functional results, both posterior mediastinal and retrosternal routes are associated with similar long-term outcomes [28]. The posterior mediastinum is preferred for immediate reconstruction after esophagectomy and the substernal route for delayed reconstruction .However the selection of the pull-up route should be based on the nature of disease, benign or malignant and the functional aspect. Regardless of the route used for reconstruction, it is important to take care of checking constantly the position of the graft vessels to ensure there is no mechanical compression that may impair the vascular supply of the graft, and to select a graft with sufficient length avoiding thus tension at the anastomotic site.

In our institution, we use the substernal approach for esophageal malignant conditions considering the possibility of médiastinal recurrence and for caustic stricture when the diseased esophagus is left in place. However, when using the substernal approach, we feel it is essential to enlarge the thoracic inlet by removing the left half of the manubrium and the sternal head of the left clavicle to ensure there is no compression on the interposed grafted . Although and when necessary the excision should be extended to the medial end of the first and second rib in order to perform a vascular supercharge of the graft.

Mortality and Morbidity

The mortality for esophageal reconstructive surgery was increasingly improved over time and the decrease of mortality rate was related to operative technique improvement and anaesthetic progress. The main cause of death was graft necrosis, followed by sepsis and adult respiratory distress syndrome [21,32-35]. Regarding to pulmonary complications, the incidence has been recently decreased by improvements in preoperative management. The most severe complication is the graft necrosis which is associated with high rate of death in absence of early diagnosis and adequate management. This disastrous complication is more frequent after colon interposition and the incidence of necrosis in gastric and colonic reconstructions was 1% and 2.4 respectively [17,20,36-50]. Compared to gastric interposition, colon reconstruction is surgical procedure with slightly high risk of graft necrosis. The difficulty is how to complete further digestive re-reconstruction which requires a panel of complex surgical procedures. The precautions are the rule to prevent graft necrosis, so meticulous dissection, selection of an optimal graft and avoiding twist by checking the position of the graft vessels are highly recommended. In other hand, cervical leakage is the most common complication encountered in esophageal reconstruction surgery and is comparable in both gastric and colon reconstruction [11-17,36-50]. Its incidence varied largely in published reports [36-51]. The leakage heals spontaneously and surgery is exceptionally needed. Many factors influence the occurrence of leakage however the most important factor is the poor nutritional status of patient which impacts negatively the anastomotic healing process .Therefore improving nutritional conditions may reduce the risk to develop anastomotic leakage. Anastomotic stricture was less observed than leakage and high percentage of stricture resulted of healed leakage [15,21,32,33,36,39,40,42,44,48-50,52-54]. The anastomotic stricture should be treated conservatively and the first treatment is endoscopic balloon dilatation. Therefore the surgery is indicated after lack of dilatation. The main late complication of colonic interposition is the redundancy of the interposed colon graft [9,32,36,39,44,48,50]. Redundancy leads to retention of food and liquid in the graft, causing dysphagia, regurgitation and nocturnal aspiration and surgery is frequently needed to treat redundancy

Conclusion

The most severe caustic injuries are caused by Strong acid or alkali ingestion especially in suicide attempts. The early endoscopic evaluation of patients provides accurate diagnosis and permit to define an appropriate therapeutic strategy to prevent complications (early operation). The dilations constitute the first treatment of esophageal stricture. Esophageal reconstructive surgery is indicated when stricture is so severe and after failure of dilations. The goal of this surgery is to restore digestive continuity and good swallowing function with acceptable mortality and morbidity. Both gastric and colon reconstruction procedures can be used to establish digestive continuity after esophagectomy or to bypass diseased esophagus .The selection of the surgical procedure essentially depends on the anatomic conditions of patient and the surgeon preference.

Conflict of Interest

The authors declare that they do not have conflict of interests.

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