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How to deal with Gastric Graft Ischemia during Esophageal Reconstruction following Esophagectomy - Brief report

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ABSTRACT

The gastric graft is mostly used to establish the gastrointestinal continuity following esophagectomy. Graft ischemia is a feared surgical complication which occurs during esophageal reconstruction. Multiple methods have intraoperatively been used to evaluate the graft blood supply. The appropriate management of graft ischemia is conditioned by the timely diagnosis. Various strategies have been described to deal with graft ischemia. However the best way remains the prevention.

Keywords: Esophageal reconstruction, gastric graft, ischemia, managements

1. INTRODUCTION

Gastric graft is the first choice to establish the gastrointestinal continuity following esophagectomy. The colon graft is used when the stomach is scared or unavailable. Performing a successful esophageal reconstruction remains a greatest challenge for the surgeon. Gastric graft ischemia occurred during esophageal reconstruction procedure remains a feared advent which may affect the graft viability and surgical outcomes. The reported incidence of gastric graft ischemia varied from 0.5% to 10.4% [1-3]. The cause of gastric graft ischemia is principally arterial. A properly prepared gastric graft has a reduced blood flow which is more pronounced at the cranial tip [4, 5]. However this decrease in blood flow is transient without clinical significance. The causes of ischemia may be the injury to the graft feeding pedicle (right

gastroepiploic artery) during dissection and tube creation or injury of right GEA caused by previous abdominal surgery. Also, External compression of the graft blood supply (right gastroepiploic arcade) at the level of thoracic inlet or diaphragmatic hiatus may result in graft ischemia. The twist of the graft when it is pulled up to the neck may impair graft blood supply causing graft hypoperfusion .Persistent hypovolemia may cause a subsequent tissue hypoperfusion resulting in graft ischemia. Patient comorbidities such as arterial disease, low perioperative cardiac output, diabetes, chronic obstructive pulmonary disease and neoadjuvant chemotherapy were identified to be a risk factors [6, 7]. There is no difference in ischemia rate between short and long graft but the fundal tip is at high risk of ischemia.

2. MANAGEMENT STRATEGIES

The appropriate management of graft ischemia is conditioned by the timely intraoperative diagnosis. The diagnosis of ischemia can be evident without need to evaluate the graft perfusion. However, when ischemia is occult, the graft perfusion should be assessed to evaluate the adequacy of blood flow. Doppler ultrasound and SPY system (Fluorescence Imaging System) are the most used techniques to assess graft perfusion [8-10]. The sensitivity of combined use of these two methods was up to 60% [8, 9]. At the stage of ischemia, there are several strategies to deal with this clinical situation. Supercharging the graft to augment the arterial supply and venous drainage should be considered if feasible when the ischemia is due to poor arterial inflow or venous drainage. Both arterial and venous augmentation should be performed to improve graft vasculature [11]. However gastric conduits are not usually supercharged. The vascular augmentation techniques aimed to optimize arterial blood flow and venous drainage of the graft [11] and consisted to anastomose the right gastroepiploic artery (GEA) with the internal carotid artery, and the left gastroepiploic vein with internal jugular vein [11]. If the improvement of graft perfusion is obtained after supercharge, the surgical procedure of reconstruction can be completed.

When graft ischemia is due to consequence of local anatomy or vascular injury, it can be managed differently in hemodynamically stable patient. An alternative option by using another conduit can be considered. However factors as operative time and patient comorbidity should be taken in consideration. If the surgical procedure has taken many hours, defunctioning patient by performing cervical esophagostomy, venting gastrostomy, and feeding jejunostomy seems to be more beneficial for patient. However, if operative time is relatively short and in absence of severe comorbid factors, the reconstruction can be completed by using another conduit with removing the ischemic graft. When resecting the ischemic part of graft, it is advocated to preserve graft as much as possible that it can be eventually used in the second reconstruction. Both colon and jejunal graft are suitable for further combined reconstruction, however, supercharged free graft is more preferred in such situation.

If ischemia is resulted from persistent hemodynamic instability of patient, the damage-control strategy should be adopted. It consists to remove the ischemic part of graft and performing venting gastrostomy, cervical esophagostomy and feeding jejunostomy, and draining appropriately the patient before closure.

This approach allows transferring patient for optimization in the intensive unit. Consecutively; the further gastrointestinal continuity can be achieved by using colon or jejunal graft. When substernal approach was used, the opening of the thoracic inlet by performing the

resection of the left half of the manubrium, left sternoclavicular joint, and the medial portion of the first rib is recommended [6, 7].

3. PREVENTION

The prevention is the best way to reduce the risk of gastric graft ischemia during esophageal reconstruction. So risk factors and surgical skills should be considered in patient planned for esophageal reconstructive surgery. Neoadjuvant therapy, diabetes, chronic obstructive pulmonary disease, and peripheral arterial disease have been identified as the risk factors of graft ischemia [1]. Identification of these risks and optimization of patient conditions is highly required before performing surgery of reconstruction [1, 2]. Blood loss and hemodynamic changes are more common in esophageal surgery. Indeed optimizing the patient perfusion pressure is highly recommended. Blood transfusion, fluid administration and use of vasopressor agents can be very helpful to maintain a stable hemodynamic during the surgical procedure [12, 13]. However, clear communication between the surgical and anesthetic team is required to adopt a management strategy tailored to each patient. Meticulous operative technique when creating gastric graft, careful handling and pulling the graft through the reconstruction route avoiding twist and kicking of pedicle graft, and opening the thoracic inlet to reduce risk of graft compression [6, 7] are of primordial importance to decrease risk of ischemia. Operative blood supply assessment is particularly useful to guide intraoperative decision making when a complex esophageal reconstruction is considered [14, 15]. Therefore, assessment allows to decide whether the conduit blood supply is suitable or whether another conduit must be sought.

4. CONCLUSION

Gastric graft ischemia is a feared complication during esophageal reconstruction. Various approaches have been described to deal with such complication. However prevention based on identification of patient risk factors and surgical skills is the best approach to reduce risk of graft ischemia.

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