

Surgical Technique

Localized Esophageal Resection - The Best Surgical Technique

António Gentil Martins^{1,2*}

¹Department of Pediatric Surgery, Children's Hospital de D. Estefania (Hospital of Lisbon's Central Hospitals), Lisbon, Portugal

²Department of Children's and Adolescents Oncology, Portuguese Cancer Institute Francisco Gentil, Lisbon, Portugal

Abstract

In some situations, as cancer or stenosis when a resection has to be performed, or in others like long gap esophageal atresia, there is the need to substitute a segment of the esophagus. With the standard techniques using the colon there is usually marked redundancy and kinking, as all the "graft" has to be used. We present a modified technique in which only the required length of the interposed colon is used, the remaining segment being separated and having its mucosa removed, the muscular and peritoneal layers remaining as the support of the blood supply (so precluding an eventual kinking of the vessels, and resultant graft necrosis). It has also the advantage of being a one stage operation.

Keywords: Esophageal Stenosis; Esophageal cancer; Long gap esophageal atresia; Thoracotomy; Cervicotomy

Introduction

The goal is to construct the graft using an iso-peristaltic segment of the transverse and right colon, based on the L colon vessels. This technique was first used for cases of long gap esophageal atresia, trying to avoid the colon redundancy and kinking resultant when using the classical Waterston's technique [1-3]. Later it was used for caustic stenosis of the esophagus and certainly it has its place when one needs to resect an esophageal lesion localized at any level, namely localized cancer [4,5].

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Under general endotracheal anesthesia, in long gap esophageal atresia, the surgical approach is made through a left sided thoracotomy. In those cases thoracoscopy correction is not adequate. In other esophageal lesions, a laparotomy associated either with a left cervicotomy or a thoracotomy (depending on extent and the level of the lesion may be a better choice). And obviously, for upper thoracic esophageal lesions, the right thoracotomy may be indicated (Figure 1) [6-9].

In the technique we are about to present the Right colon is used, based on the Left colonic vessels. After evaluating the required length, having localized the place of the upper esophageal required section, the ascending and proximal transverse colon is mobilized to reach the upper Esophageal segment, after ligating of the mid colic artery (Figure 2) [10,11].

Schemes showing the technique is a case of Long gap Esophageal atresia, but which is not restricted to it, as it is useful whenever a segmental portion of the esophagus as to be replaced, namely in

cancer surgery (Figures 3 and 4) [12].

The colon is sectioned exactly at the level where should be sutured to the lower esophageal segment, normally the main problem being due to its reduced dimensions [13-16]. In this way only the exact length of the colonic graft is used. One has to be particularly careful, not to damage the vascular arcade when sectioning at the level of the distal colonic tubular graft (Figure 5).

The remaining and more distal portion of the colon graft is opened at its anti-mesenteric border and denuded of mucosa, so that the muscular and serosal layers will remain to support the colonic vascular pedicle (artery and vein) on its way up to the chest through the esophageal hiatus, thus avoiding a dangerous twisting while the graft segment maintains its tubular structure [17]. We carefully try to avoid lesion to the vagal nerves at the time of dissection and distal anastomoses. A tunnel is dissected bluntly beneath the splenic vessels and the tail of the pancreas, behind the stomach, opening a hiatal tunnel through which the colon graft will later be transferred to the chest. The right and left colon segments are re-anastomosed in two layers of interrupted sutures, before the graft is transferred to the chest and placed in the posterior mediastinal bed (Figure 6) [18-20].

Then one proceeds with suturing the upper Esophageal stump to the colon graft by a two layers separate resorbable stitches closure (in long gap esophageal atresias at the mediastinal level and in other situations, like extensive stenosis or high or medially localized tumors), at cervical level [21-23].

The opening of the lower stump, in long gap esophageal atresias, usually involves the need to slightly enlarged it, by an oblique or a small complementary incision, so that a good end to end interrupted suturing can be accomplished (what is not the case in strictures or tumors). On the other end, in severe caustic burns, the lower esophageal end is usually preserved so that the distal anastomoses may have to be performed directly from the graft to the stomach.

The mesenteric defect is closed over the vascular pedicle before the abdomen is closed at completion of the operation. Finally takes place the suture of the surgical wound in a routine fashion (Figure 7) [24].

Discussion

The classical techniques used in esophageal surgery tend to have

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***Corresponding author:** António Gentil Martins, Department of Pediatric Surgery, Children's Hospital de D. Estefania (Hospital of Lisbon's Central Hospitals), Av. Almirante Reis 242 4^o Dto. 1000-057, Lisbon, Portugal, Tel: 351 939555162; E-mail: agentilmartins@gmail.com



Figure 1: Surgical approaches: Thoracolaparotomy in Long gap esophageal atresia.

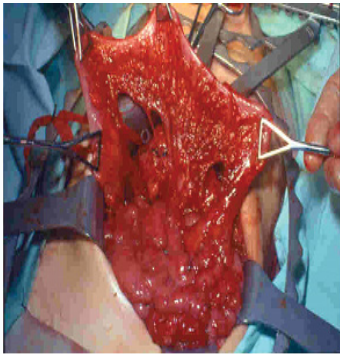


Figure 2: Ligation of the middle colic artery.



Figure 3: Schemes showing the technique is a case of Long gap Esophageal atresia.

some redundancy and kinking of the colon graft. That was the reason to look for a better solution. By removing the mucosa of the “non usable” colon, we avoid the production of mucous.

The graft is obviously isoperistaltic. On the other end, by keeping the muscular and serosal layers, we protect the vascular left colon pedicle from twisting inadvertently when the graft is pushed up into the chest to replace the missing part of the esophagus. One obvious advantage is that the esophago-cardio junction is not involved and can maintain its normalcy [25].

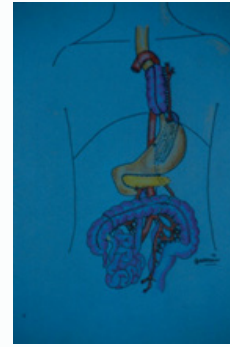


Figure 4: Schemes showing the technique is a case of Long gap Esophageal atresia.

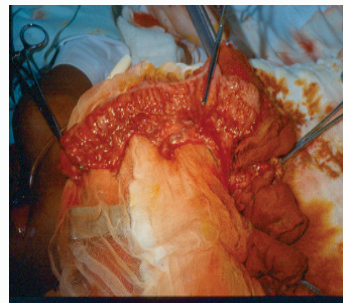


Figure 5: The colon is sectioned exactly at the level where should be sutured the lower esophageal segment. In this way only the exact length of the colonic graft is used. The area between forceps is the one to be striped of the mucosa.

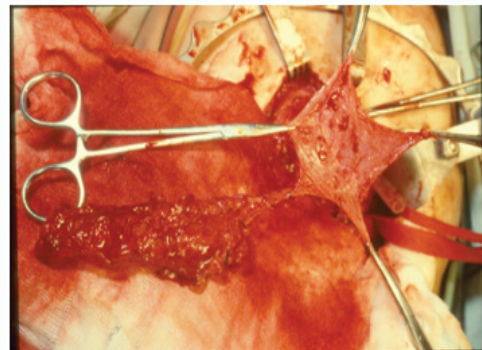


Figure 6: Striping of the mucosa completed and showing the colon segment to be used for esophageal replacement.



Figure 7: Radiological picture: Esophageal atresia patient.

Also no “artificial” anastomoses are made between esophagus and stomach, thus preventing cardio-esophageal reflux. We do not advise “elongation” trials as good solutions in esophageal atresias. Also we contraindicate Ivor Lewis esophagogastrectomy in esophageal cancer (with the stomach being used for replacement), tube gastrostomy (as in Dan Gavriiliu’s technique) or the use of a jejunal loop in lower esophageal lesions [26,27]. We know that about 40% of oesophageal cancers are located in the thoracic esophagus: it is in fact in those patients that we believe our method is particularly useful, and not so much for the other 50% localized at the lower esophagus or esophago-gastric junction [28,29].

It is true that the colon is known to be a frequent site of diverticula or intestinal polyps in old age, but we do not believe it to be a reasonable contraindication as, at least polyps, can certainly be easily removed through esophagostomy and diverticula are certainly extremely infrequent [30-33]. Also eventual arteriosclerosis of the vascular pedicle is, for us, not a reasonable reason to be afraid of the long run results (as some seem to feel). In colonic transposition we do not use the retrosternal approach. Also we never perform gastrostomy, another significant advantage of our one-stage technique [34-36].

A similar approach can be used for other esophageal problems, like extensive stenosis or tumors, as we have already stated (Figures 8-10) [37,38].

Conclusion

With this technique, which has the enormous advantage of being just a one-stage technique, we can avoid the kinking of the classical Waterston’s technique or the problems of the gastric tubes. On the



Figure 8: Stricture of the colon.



Figure 9: Scheme showing the technique (joining esophagus to stomach).



Figure 10: Radiological picture: caustic stenosis patient.

other end we use only the required segment of an iso-peristaltic colon loop to maintain a straight esophageal tube in all cases in which esophageal replacement, either partial or even total, is required.

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