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Original article

Gastric pull-up reconstruction after treatment for advanced hypopharyngeal and cervical esophageal cancer

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ABSTRACT

Objectives: In advanced hypopharyngeal and cervical esophageal carcinoma, the choice of reconstruction technique after total circumferential pharyngolaryngectomy (TCPL) remains controversial. We studied results of digestive tract reconstruction using gastric pull-up, concomitant or secondary to TCPL or after failure of reconstruction.
Material and methods: Twenty-four patients treated by gastric pull-up after TCPL for advanced hypopharyngeal or cervical esophageal carcinoma between December 1998 and January 2011 were retrospectively reviewed.
Results: Two-year survival was 37.5% ($n = 9$). Thirty-day mortality was 4.1% ($n = 1$), but 3 more patients died before discharge. Perioperative morbidity was 54.1% ($n = 13$), including 9 fistulas (37.5%). Seventeen patients (71%) recovered oral feeding.
Conclusion: Gastric pull-up is an interesting reconstruction technique after TCPL with invasion of the esophageal mouth, allowing comfortable oral feeding, but with non-negligible morbidity and mortality. Long-term survival is not high, partly due to the unfavorable prognosis of advanced hypopharyngeal and cervical esophageal tumor. The present high rate of fistula raises doubts for this surgery as second-line reconstruction after primary failure.

1. Introduction

Treatment for advanced hypopharyngeal and cervical esophageal carcinoma is based on surgery with concomitant radiation and chemotherapy. In extensive lesions involving either the esophageal mouth and posterior pharyngeal wall or the retrocricoid region, the only option is total circumferential pharyngolaryngectomy (TCPL), including at least cervical esophagectomy.

This procedure leaves severe sequelae, with loss of the natural voice and separation between the airway and digestive tract. Pharyngeal reconstruction is often difficult, as patients tend to be weak and malnourished, with alcohol and nicotine addiction, and have frequently undergone radiation therapy.

Several reconstruction techniques have been described, using tubularized pectoralis major musculocutaneous, latissimus dorsi or radial free forearm flap. Alternative techniques to restore digestive tract continuity include coloplasty, jejunal free flap, gastroepiploic free flap and gastric pull-up (gastric tube interposition).

The main objective in oncology is to maximize survival, and this depends particularly on resection quality. The secondary objective is to optimize quality of life. Reconstruction techniques seek to minimize morbidity and mortality, while conserving satisfactory feeding comfort. Gastric pull-up seems to meet these criteria, restoring continuity with well-vascularized tissue without need of vascular anastomosis, and achieving good quality filling of the cervical defect.

The present study assessed this technique and its place in the current armamentarium for the treatment of hypopharyngeal and cervical esophageal carcinoma.

2. Materials and methods

A retrospective study included 24 patients managed by gastric pull-up to restore digestive continuity following TCPL for advanced hypopharyngeal or cervical esophageal carcinoma, in a single or secondary step, at the Caen University Hospital Center

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(Caen, France) between December 1998 and January 2011. The TCPL and gastric pull-up surgeries were performed conjointly by the head and neck and digestive surgery teams, to perform both steps in a single operative time when appropriate.

Statistical analysis used Chi^2 tests, with a significance threshold of $P \leq 0.05$.

The patients comprised 2 women (8%) and 22 men (92%), with a median age of 57 years (range, 42–76 years). Risk factors for aerodigestive cancer were present: 95% of patients were smokers, and 54% consumed alcohol.

In 66.7% of cases, surgery followed radiation therapy, including 41.7% of cases with radiation and chemotherapy. Gastric pull-up was concomitant to TCPL in 66.7% of cases; in 33.3% of cases ($n = 8$) it was secondary, at a mean 15.8 months' interval (range, 4–54 months), with 3 cases of failure of primary reconstruction by pectoralis major flap and 5 of local postoperative failure.

Seven patients had had prior head and neck surgery: 3 glossectomies and 4 partial pharyngolaryngectomies. Fifty percent of the patients had undergone prior neck dissection.

Ten patients were in recurrence, at a mean 39.1 months (range, 7–124 months). Primary treatments comprised isolated radiation therapy in 3 cases and concomitant radiation and chemotherapy in 7 cases, including 2 with associated surgery: 1 partial pharyngectomy and 1 isolated lateral neck dissection.

All patients had oral feeding preoperatively when possible, or else were fed by gastrostomy ($n = 9$), jejunostomy ($n = 2$) or parenterally ($n = 2$). All had preoperative assessment by cervical CT scan and bronchial and esophagogastric flexible endoscopy.

The gastric pull-up technique was based on techniques for restoring continuity in esophageal lesions, and Akiyama's technique in particular.

The first phase was abdominal, consisting in gastrolysis, conserving the gastroepiploic anastomotic loop, and especially the right gastroepiploic artery. The short vessels and left gastroepiploic artery were ligated, sparing the spleen, then the small curve was released by left gastric artery ligation; right gastric artery sectioning was sometimes needed to raise the stomach.

Phase 2 comprised gastric tubularization, using a GIA stapler. Our policy is to conserve a wide tube with maximal vascularization (right gastric artery). Duodeno-pancreatic release was systematically performed by Kocher's maneuver, completed by Castaing's maneuver and/or right parietocolic release if transplant ascension was required. Finally, extramucosal pylorotomy was performed.

Phase 3 comprised trans-hiatal esophageal dissection with sectioning of the right pillar, after preferably left presternocleidomastoid incision. The TCPL specimen was removed in case of 1-step surgery.

Phase 4 consisted in esophagectomy by stripping, removing the esophagus via the cervical approach and raising the transplant using a plastic skirt fixed to the top. Ascension was via the posterior mediastinum, avoiding any torsion.

The final phase was gastropharyngeal anastomosis by resorbable 3/0 separate total suture, with transanastomotic positioning of the gastric tube. Anastomosis should be without tension, using well-vascularized tissue. Jejunostomy was systematically performed before closure.

In TCPL, bilateral II, II and IV neck dissection was systematic, given the initial tumor location.

Postoperatively, all patients except 1 were transferred to intensive care. The nasogastric tube was removed after anastomosis had been checked on opacified digestive radiograph to confirm the absence of fistula or stenosis. Resumption of oral feeding was then begun, with enteral nutrition in the meantime. Thyroidectomy was systematically performed, given the impairment of thyroid function by irradiation and the risk of neoplastic invasion, with postoperative thyroid hormone supplementation.

Table 1
Complications following gastric pull-up.

Complications	Patients	%
Intraoperative		
Difficult pull-up	6	25
Anastomosis refection	1	4
Need for covering flap	7	29
Anastomosis unachievable, fistula left	1	4
Postoperative (0–30 days)		
Fistula	9	37.5
Thrombosis	3	12.5
Hemorrhage	2	8
Pneumopathy	3	12.5
Hypocalcemia	1	4
Abdominal pain	3	12.5
Late (> 30 days)		
Reflux	9	37.5
Dysphagia	2	8.3

Complications during pull-up, during the first 30 days and later.

3. Results

Surgically, gastroplasty with pharyngogastric anastomosis was successful in all 24 cases. In 1 case, the fistula had to be left, with drainage, because of undissectible tissue. In 7 cases, skin defect due to radiation therapy and/or previous surgery required a covering flap, systematically provided by the pectoralis major. Mean operative time was 276 min (range, 190–420 min). 52% of patients required transfusion.

Oncologically, 3 patients showed pT3pN+ anatomopathology (12.5%) and 20 showed pT4pN+ (83.3%). Resection margins were clean (R0) in 54% of cases.

Mean stay in intensive care was 13.1 days (range, 0–118 days) and mean total hospital stay 33.3 days (range, 8–118 days).

One patient (4.1%) died during the first 30 postoperative days, following carotid rupture on D8. Two other patients died before they could be discharged home (Table 1):

- one at 3 months, from status epilepticus without identifiable lesion but with multiple complications, including subphrenic abscess requiring revision surgery at 1.5 months, multiple thromboses and severe pneumopathy;
- one after 4 months' intensive care following multiple complications with arrhythmic cardiopathy, superior mesenteric vein thrombosis, hydrocholecyst and fistula caused by hematoma on the anastomosis; the death was attributed to the arrhythmic cardiopathy.

Thirteen patients had postoperative complications (54.1%), including 9 anastomotic fistulas (37.5%), 3 of which required revision surgery with lavage-drainage and 1 of which required a pectoralis major covering flap after wound care; the other 5 fistulas were successfully managed by directed healing. Three of these 9 patients recovered normal feeding, at 30, 60 and 120 days.

Two patients required revision laparotomy, 1 for subphrenic abscess drainage at D44, and 1 for lymphorrhea due to duodenopancreatic detachment at D20.

Table 2 presents the cases of anastomotic fistula, with associated risk factors and progression. Risk factors comprised prior radiation therapy (8 out of 9 patients, versus 8 out of 15 patients without fistula: 88% vs. 55%), surgery on previously dissected tissue (7 out of 9 versus 5 out of 15 patients: 77% vs. 33%), and need of pectoralis major covering flap (5 out of 9 versus 3 out of 15 patients: 55% vs. 20%); only prior dissection was significant on Chi^2 test ($P < 0.05$).

In terms of feeding comfort, 7 patients were unable to recover oral feeding (29%): 1 died in the postoperative period, and 6 had open fistulas. Fourteen of the other 17 patients recovered normal

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