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Gastric tube transposition for cancer of the hypopharynx and cervical oesophagus

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Abstract

A study of 20 cases of gastric tube transposition following total laryngopharyngoesophagectomy during an eight-year period is presented. The site of the tumour was: hypopharynx in 13 cases (12 pyriform sinus, 1 post-cricoid); and cervical oesophagus in seven cases. There were nine (45 per cent) Stage III lesions and 11 (55 per cent) Stage IV lesions (UICC, 1987).

Post-operative morbidity rate was 15 per cent. Hospital mortality rate was 10 per cent (cause of death was myocardial infarction). Anastomotic fistula rate was five per cent. Excluding hospital mortality, the three year actuarial survival rate was 35 per cent for the whole series and 53 per cent for patients with hypopharyngeal cancer. The actuarial survival rate for patients with oesophageal cancer at one and two years was 41 and zero per cent respectively.

The transposition of a tubed stomach provided successful swallowing in two-thirds of the patients for a period of more than a year and these patients developed good neoesophageal speech.

Key words: Laryngectomy; Pharyngectomy; Oesophagectomy; Pharyngeal neoplasms; Speech, oesophageal

Introduction

The long-term survival rate for advanced cancer of the hypopharynx and cervical oesophagus is very poor. Radiotherapy alone offers little chance of a cure; post-radiation complications and sequelae add to the misery of the dying patient (Wara *et al.*, 1976). Surgical treatment offers a better chance of cure if it allows a radical ablation of the tumour with clear margins. In the case of extensive lesions of the hypopharynx and oesophagus, the effectiveness of surgery is limited. However, surgery could offer a better palliation if immediate reconstructive procedure allows a rapid restoration of swallowing without causing troublesome morbidity or mortality.

Taking into consideration the submucosal extensions superiorly and inferiorly from the tumour site (Harrison, 1970), a total oesophagectomy offers adequate inferior margins when the tumour is located in the post-cricoid region or in the cervical oesophagus. A total oesophagectomy in such situations eliminates the synchronous tumours in the oesophagus and provides also oncological safety by avoiding the risks of the occurrence of metachronous oesophageal lesions following laryngopharyngectomy. In addition, total oesophagectomy facilitates an easy transposition of the stomach into the neck through the empty posterior mediastinum.

Many reconstructive procedures have been developed during the past three decades but stomach transposition still remains the most reliable and appropriate method of reconstruction following a total laryngopharyngoesophagectomy.

Methods

This study evaluates 20 cases of reconstruction with gastric transposition following circumferential pharyngoesophageal resections carried out for cancer of the hypopharynx and cervical oesophagus, at Hôspital Bichat, Paris, during the eight-year period from 1985 to 1992.

All the relevant data including patient's age, sex, medical status, previous history of cancer in the head and neck area and treatment were recorded. The tumour extension was assessed by clinical, radiological and endoscopic examinations and tumours were staged according to UICC system (1987).

A two-team procedure was employed, with one team working in the neck and another team performing an abdominal dissection. In no case was the larynx preserved. A radical neck dissection was generally performed on the side where there was clinical evidence of lymph node metastasis, otherwise a conservative neck dissection was performed electively. The paratracheal nodes along the recurrent laryngeal nerves were dissected systematically. At least one thyroid lobe was preserved whenever possible, but a total thyroidectomy was performed systematically if the tumour arose from the cervical oesophagus. The oesophagus was mobilized from above through the superior mediastinum. The stomach was mobilized and a pyloromyotomy was performed. The oesophageal hiatus was enlarged and trans-hiatal dissection of the oesophagus was carried out. The cardio-oesophageal segment was resected and the oesophagus was removed from above in continuity with the laryngopharyngectomy specimen. The

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FIG. 1
Gastric tube before anastomosis.

stomach was tubed by resecting out the entire lesser curvature, including a part of the body and fundus parallel to the greater curvature, by a linear cutter and stapler from the pre-pyloric region to the top of the fundus (Figure 1). The stomach was then transposed through the posterior mediastinum and a pharyngogastric anastomosis was performed (Figure 2).

The post-operative course of all the patients was evaluated with regard to the occurrence of post-operative complications and post-operative deaths. The functional results were assessed in terms of restoration of swallowing and development of neo-oesophageal speech. The incidence of local and nodal recurrences and distant metastases was noted. The actuarial survival rates were calculated according to the method of Kaplan and Meier (1958).

Materials and methods

The patients were 17 males and three females. Their ages ranged from 41 to 72 years (mean: 52 years). In all cases the histological diagnosis was a squamous cell carcinoma. The site of origin of the tumour was the hypopharynx in 13 cases (65 per cent) and the proximal cervical oesophagus in seven cases (35 per cent).

Hypopharynx

Of the 13 hypopharyngeal lesions, 12 occurred in the pyriform sinus and one in the post-cricoid region. In two out of the 13 patients, the tumour was a recurrence arising from the pyriform sinus after a subtotal laryngectomy and post-operative radiotherapy in one patient, and after a total laryngectomy and post-operative radiotherapy in the other. The tumour was a second primary arising from the pyriform sinus in two patients; one of them had received a full course of radiotherapy for a primary tumour in the tonsil and the remaining patient underwent a supraglottic laryngectomy and post-operative radiotherapy for a primary in the epiglottis. The post-cricoid lesion was a third primary in a patient who had received a full course of radiotherapy for a first primary in the tonsil and a combination of surgery and brachytherapy for a second metachronous primary in the contralateral tonsil. Two out of 12 patients who had a pyriform sinus lesion, had a synchronous primary in the oesophagus; the tumour was located in the middle third of oesophagus in one patient and in the distal third in the other. According to the TNM classification of UICC (1987), three (23 per cent) had T_3 tumours, eight (62 per cent) had T_4 tumours and two (15 per cent) had rT_4 tumours. Two out of 13 patients (15 per cent) had clinical evidence of cervical lymph node metastasis. Thus two out of 13 patients (15 per cent) had Stage III disease and the remaining 11 (85 per cent) had Stage IV disease.

All 13 patients who had hypopharyngeal cancer had gastric tube transposition following a total laryngopharyngoesophageal resection. Cervical lymphadenectomy was elective in eight patients and therapeutic in two patients. The remaining three patients had previously undergone bilateral neck dissections during the resection of a laryngeal primary. Recurrent node dissections were performed in all 13 cases. One thyroid lobe was preserved in five patients but the remaining eight patients underwent total thyroidectomy. One patient received radiation treatment pre-operatively during the early years of our study. Post-operative radiotherapy was employed in seven patients (54 per cent) whereas five patients (38 per cent) had received radiation treatment previously with or without surgery for a pharyngeal or a laryngeal primary.

Oesophagus

Of seven patients who had a lesion of the proximal

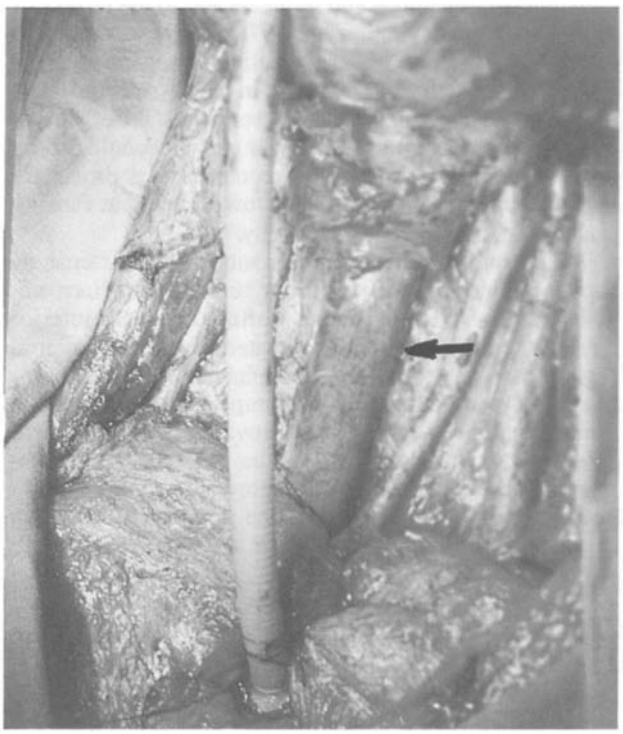

FIG. 2
Gastric tube after pharyngogastric anastomosis (arrowed).

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cervical oesophagus, the tumour was a second primary in one patient and occurred after a brachytherapy for a carcinoma of the tongue. Two patients (28 per cent) had T_3 lesions and five patients (72 per cent) had T_4 lesions. Two patients (28 per cent) had palpable cervical lymph nodes. Thus, all seven patients had Stage III lesions, (UICC, 1987). The tumour extended to the trachea in four cases (57 per cent) and the thyroid gland was involved in one case (14 per cent).

All underwent total laryngopharyngoesophagectomy followed by a gastric tube transposition. Manubrial resection was necessary in two patients who had a tumour invading the trachea and both underwent an anterior mediastinal tracheostomy, as described by Orringer and Sloan (1979). Cervical lymphadenectomy was elective in five and therapeutic in two patients. Total thyroidectomy and recurrent node dissections were carried out systematically. All seven patients received post-operative radiotherapy.

Results

Histopathology

The histological diagnosis was a squamous cell carcinoma in all the cases. Histological lymph node involvement was noted in 10 cases (five hypopharyngeal; five oesophageal). The inferior margins were negative in all 20 cases whereas superior margins at excision were positive only in two cases with hypopharyngeal lesions. The tumour extended to the trachea in six cases (two hypopharyngeal; four oesophageal) and the thyroid gland was involved in five cases (three hypopharyngeal; two oesophageal). The tracheal margins at excision were involved in three cases (one hypopharyngeal; two oesophageal).

Post-operative morbidity and mortality

The post-operative course was uneventful in fifteen patients. Complications occurred in five patients (25 per cent), and resulted in a post-operative morbidity in three patients (15 per cent) and a hospital mortality in two patients (10 per cent). One or more complications occurred in two of five patients (Table I). Systemic complications occurred in three patients (15 per cent) and included pneumonitis in one patient (five per cent) and myocardial infarction in two patients (10 per cent). Complications directly related to the operative procedure occurred in four patients (20 per cent), two of whom also had systemic complications. The operative complications included one anastomotic fistula (five per cent), one tracheal necrosis (five per cent), one neck wound sepsis (five per cent) and one abdominal wound sepsis (five per cent).

Anastomotic fistula occurred on the 15th post-operative day and the patient died of myocardial infarction eight weeks post-operatively, a week following surgical repair of the fistula. Tracheal necrosis occurred in a patient who had a lesion of the cervical oesophagus invading the trachea. Abdominal wound infection occurred in one patient and led to wound dehiscence and evisceration which required further surgical intervention.

All four patients who had complications related to surgery had T_4 lesions and the complication rate was greater when the patient had received radiotherapy previously than when he had not (40 per cent *versus* 14 per cent).

The post-operative mortality was zero as no patient in this series died in the early post-operative period but two patients died of myocardial infarction two months after surgery before having been discharged from hospital. These two deaths resulted in a hospital mortality rate of 10 per cent. One of these two patients had been operated on for a hypopharyngeal lesion and the remaining patient for a lesion in the cervical oesophagus. Both of them had had a poor cardiovascular status pre-operatively.

Late sequelae

Stenosis of the pharyngogastric anastomosis occurred in two patients (10 per cent); both of them had received radiation treatment previously for a pharyngeal primary. In one of the two patients the stenosis occurred eight months post-operatively and was successfully dilated, whereas it occurred in the other patient during the seventh post-operative month and required surgical repair.

Outcome and survival

Excluding the hospital mortality, 18 patients were available for evaluation of treatment outcome and survival. These patients included 12 who had been operated on for a hypopharyngeal tumour and six for an oesophageal tumour. Ten out of the 18 patients (55 per cent) died of their disease: one died of distant metastases, two died of local and nodal recurrence and seven died of local recurrence alone. All the deaths occurred within two years.

At the end of the study, eight patients (45 per cent) are alive; seven without disease and one with a local recurrence. Of these eight patients, five had a follow-up of eight months to two years, two had a follow-up of three years and the remaining one had a follow-up of five years.

Local recurrence occurred in 10 out of the 18 patients (55 per cent) with a local recurrence rate of 25 per cent for the hypopharyngeal and 100 per cent for the oesophageal lesions. Of the 10 patients with local recurrence, nine died of their disease within four to 20 months.

Distant metastases occurred in two patients who had a pyriform sinus lesion; one patient is still alive after three years with an isolated lung metastasis treated surgically but the other patient died of multiple metastases located in lung, skin and kidney, 20 months post-operatively.

The actuarial survival rate for the 18 patients at one and three years was 59 and 35 per cent, respectively. The survival rate for five years was not mentioned since only one patient in this series had a follow-up beyond three years. The actuarial survival rate for the patients, who had hypopharyngeal lesions, was at one, two and three years – 67, 53, and 53 per cent respectively; only one patient had a follow-up of five years. The rate for patients who had had

TABLE I
POST-OPERATIVE COMPLICATIONS

Systemic complications:	
Pneumonitis	1
Myocardial infarction	2
Complications directly related to surgery:	
Anastomotic fistula	1
Tracheal necrosis	1
Neck wound sepsis	1
Abdominal wound sepsis	1

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a lesion of the cervical oesophagus was at one year and 18 months – 41 and 20 per cent respectively and none of the six had a follow-up beyond two years. Five patients died of a local recurrence within two years and one patient is still alive with a local recurrence found at follow-up after eight months.

Functional results

Functional evaluation was possible in 18 patients who survived the surgical treatment. All the patients were able to swallow oral fluids during the early post-operative period. Ninety per cent of the patients were able to swallow soft foods for a period of more than six months, 66 per cent patients were able to swallow soft or solid foods for a period of more than a year. Seven of the eight patients still alive at the end of this study were able to swallow all types of food, whereas the swallowing is limited to oral fluids in the remaining one patient because of a local recurrence which occurred in the eighth post-operative month.

Of the 18 patients available for evaluation, 11 patients (61 per cent) acquired an excellent oesophageal speech and two patients (11 per cent) developed a speech of good quality. The overall success rate in speech acquisition was 72 per cent.

Discussion

Pharyngogastric anastomosis was first performed by Ong and Lee (1960) following a resection of an advanced laryngeal cancer extending to the post-cricoid region. Le Quesne and Ranger (1966) performed a gastric transposition with a pull-through oesophagectomy without thoracotomy and since then stomach transpositions have been carried out at various centres with variable success.

Harrison and Thompson (1986) emphasized the advantages of reconstruction with the stomach: it permits the total removal of the oesophagus thus providing adequate distal margins; it has a good vascularity; it necessitates only one anastomosis; and the procedure can be completed in one stage.

Myocutaneous flaps and free jejunal transplantations impose a limitation on the distal oesophageal segment and therefore prove to be unsatisfactory when a total oesophagectomy is necessary to achieve good surgical control. Colonic interpositions carry high mortality and morbidity and hence they are used for bypass of unresectable malignancy or when the stomach is not available due to a previous gastric resection.

Surkin *et al.* (1984) observed the highest success rate for gastric transposition in their comparative study of various reconstructive procedures but noted a high incidence of morbidity. The post-operative morbidity and mortality are, however, influenced by the patient's age, medical status, tumour site and extension (Spiro *et al.*, 1991). In our series, the hospital mortality rate was 10 per cent, but during the last three years this mortality rate has dropped to zero. The decrease in the mortality rate may be due to increased experience with stomach transpositions (Lam *et al.*, 1989) and proper selection of patients (Harrison and Thompson, 1986). The two hospital deaths in our series were in fact due to improper selection of patients for surgery as both the patients had a poor preoperative cardiovascular status.

A wide difference in the mortality rates, post-operative complications and anastomotic fistulae rates following gastric transpositions have been reported (Harrison and Thompson, 1986; Lam *et al.*, 1989; Peracchia *et al.*, 1990; Spiro *et al.*, 1991). In our series the overall incidence of complications was 25 per cent and we observed that the extent of the tumour and a previous history of radiotherapy may increase the operative risks. However, we could not establish any statistical correlation because only four patients in this series had complications directly related to the surgery.

In contrast to the observations of Lam *et al.* (1981), that previous radiation treatment increases the risks of anastomotic fistulae, we found no fistulae in patients who had previously received radiotherapy. Harrison and Thompson (1986) observed a fistula rate of two per cent and attributed this low fistula rate to the decrease in wound infection rate. In our series, a low fistula rate (five per cent) may be related to the quality of the technique itself; tubing of the stomach allows a gain in length to excess and least tension on the anastomosis even if the latter is carried out high in the oropharynx. There is no necrosis of the stomach in our series whereas an incidence of three to 12 per cent was reported previously in the literature (Lam *et al.*, 1981; Peracchia *et al.*, 1990). Moorehead and Wong (1990) stated that organ necrosis follows the twisting of the redundant pouch of the stomach, thus compromizing the blood supply. The compression of the redundant stomach in the narrow thoracic inlet may cause venous stasis and oedema of the bowel with subsequent ischaemia which may lead to gangrene. The tubing of the stomach leaves no redundant bowel and perhaps eliminates the risk of gangrene.

The success in the restoration of oral swallowing in our series was 90 per cent and is similar to that obtained with the gastric pull-up procedure (Schechter *et al.*, 1987). However, no patient in our study had a sensation of fullness and regurgitation of food or bile which frequently follows the gastric pull-up procedure (Harrison and Thompson, 1986).

In contrast to the poor quality of speech following gastric pull-up, 72 per cent of patients in our series developed a good neoesophageal speech. Lam *et al.* (1989) reported a speech acquisition rate of five per cent for 40 patients following a gastric pull-up and Harrison and Thompson (1986) found a poor quality of speech following gastric pull-up in their study and recommended the use of tracheogastric shunt procedures. Transposition of a narrow and tubed stomach allows easy injection of air transorally and thus facilitates the development of good speech in a large number of patients better than does a large and redundant pouch of the stomach employed in the gastric pull-up procedure.

In our series, excluding hospital mortality, the actuarial survival rate at three and five years was 35 per cent and there was a better survival rate in patients with hypopharyngeal lesions. The distant metastasis rate of 10 per cent in our study is comparatively less than that reported previously (Lam *et al.*, 1981). However, the most common cause of long-term failure was local recurrence in the majority of our patients. Survival not only depends on the intrinsic risks of the procedure but also on the resectability of the tumour which in turn depends on the site of the extension. Thus a total laryngopharyngoesophagectomy

offers an adequacy of distal margins for a resectable post-cricoid lesion, whereas the superior margins are limited for a lesion located in the pyriform sinus or posterior pharyngeal wall (Harrison and Thompson, 1986). In two out of our 13 patients with pyriform sinus tumours, the upper margins at excision were positive and in both, the tumour recurred locally. The outcome and survival were much worse in our series for the patients who had oesophageal cancer; local failure rate was 100 per cent and 83 per cent died within two years. We have performed radical circumferential excision and anterior mediastinal tracheostomy in two patients who had extensive lesions of the cervical oesophagus invading the trachea at the thoracic inlet and both died of stomal recurrence. Perhaps surgery should not have been undertaken for such unresectable lesions.

Gastric tube transposition in our series offered a good palliation in terms of swallowing and speech. However it is uncertain that it will obtain a good local control in cases of advanced hypopharyngeal and oesophageal cancer. Possibly the addition of chemotherapy to a combination of surgery and radiotherapy may improve the long-term results.

Conclusions

Cancer of the hypopharynx and cervical oesophagus has a poor prognosis and long-term results are poor when radiation treatment alone is used. Since the development of various reconstructive techniques during the past three decades, radical circumferential pharyngoesophageal ablations are being carried out with the aim of obtaining optimum local tumour control. The success of rehabilitation following such radical excision lies in the choice of reconstructive procedure which could provide immediate restoration of alimentary continuity without causing mortality or morbidity.

Gastric transpositions are highly reliable when a total oesophagectomy is necessary, but post-operative complications are not negligible. Recently, with increasing experience in gastric transposition and with proper patient selection, the post-operative morbidity and mortality have decreased.

Transposition of a tubed stomach has the following advantages: (i) it retains good vascularity and allows a viable anastomosis; (ii) it allows a gain in length to excess and therefore least tension on the anastomosis thereby decreasing the risk of anastomotic fistulae; (iii) there is no redundant stomach and hence there is less risk of twisting and no risk of compression at the thoracic inlet which might cause gangrene; (iv) it permits immediate restoration of swallowing; and (v) it facilitates the development of neoesophageal speech of good quality.

The present study has shown that the employment of a tubed, instead of a whole, stomach in our series, resulted in a low reconstructive complication rate and good functional results in terms of swallowing and speech.

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