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ORIGINAL ARTICLE

In which cases surgical gastrostomy and jejunostomy techniques are inevitable?

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Summary

Purpose: *This study investigated the surgical gastrostomy and jejunostomy procedures in cancer patients who needed nutritional support and endoscopy was unattainable.*

Methods: *Operation time and procedure, anesthesia and tube types, procedure-specific and surgical complications, and tube replacement at the follow up period were retrospectively analyzed.*

Results: *109 patients (44 female, 65 male, mean age 50.9 years, range 14-87) were subjected to surgical gastrostomy/jejunostomy. Ninety-three (85.4%) patients had head-neck and gastrointestinal cancers. In 94 (86.2%) patients endoscopy was impossible due to obstruction of the esophagus and stomach. Gastrostomy/jejunostomy was combined with other surgical procedures in 12 (11 %) patients. Procedure-related complications occurred in 22 (20.7%) patients. Early 30-day mortality occurred in 12 (11 %) cases. The median follow up period was 3.6 months (range 0-18).*

Conclusion: *Obstructing cancer, obesity or previous laparotomy make the use of endoscopic techniques impossible. For these patients, surgical gastrostomy/jejunostomy is safe with acceptable complication rates and improves the treatment outcomes with nutritional support.*

Key words: *cancer, enteral nutrition, jejunostomy, malnutrition, surgical gastrostomy, treatment outcome*

Introduction

Malnutrition is an important problem in patients who are unable to maintain oral nutrition. Protein caloric malnourished patients experience various difficulties such as poor wound healing, poor quality of life, reduced survival rate, susceptibility to infections and increased postoperative morbidity [1].

Cancer is frequently accompanied with inadequate nutritional levels. Malnutrition and weight loss caused by cancer have been widely reported, depending on the site of the primary tumor [2]. The treatment practice (chemotherapy and/or radiotherapy) for head/neck and gastrointestinal cancers is also influential on malnutrition, weight loss, dehydration, decreasing performance status and poor quality of life [3].

For short-term malnutrition or starvation, parenteral nutrition is widely recommended [2]. Enteral feeding, however, is tolerated better and probably sustains greater benefits following starvation for a long period, medication or insufficient parenteral nutrition, and in incurable cancer patients with normal gastrointestinal tract and function. Currently, there are numerous techniques for enteral nutrition like percutaneous endoscopic gastrostomy (PEG), percutaneous endoscopic jejunostomy (PEJ), percutaneous fluoroscopic gastrostomy (PFG) and surgical gastrostomy-jejunostomy [4,5].

Although percutaneous techniques (PEG/PFG) have become more frequent compared to surgical procedures, they may not always be eligible and safe in patients with obstructing head/

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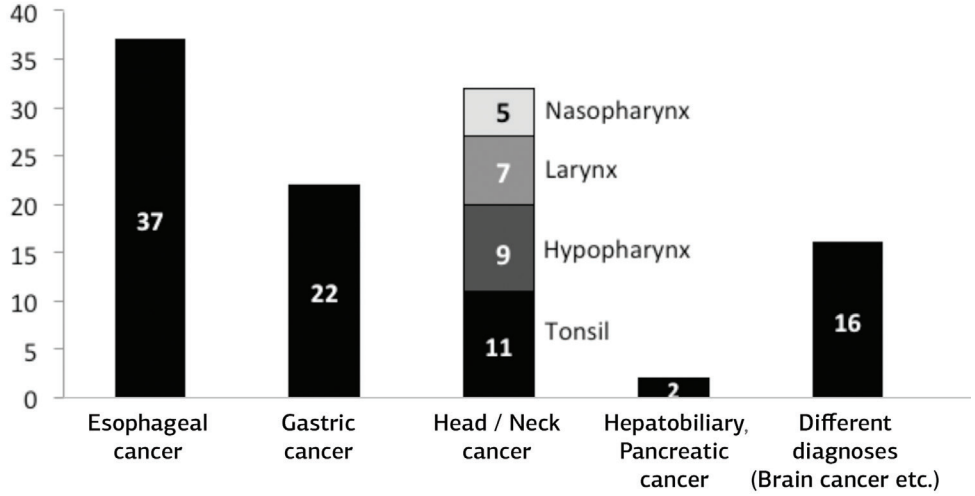

Figure 1. Distribution of primary cancers of the patients in this study.

neck, esophageal and gastric cancer and history of multiple abdominal operations or severe head/neck trauma. These patients can be managed by performing surgical ostomies like Stamm and Witzel's procedures. Gastrostomy or jejunostomy techniques can also be combined with other surgical procedures.

The aim of the present study was to investigate the place of surgical gastrostomy and jejunostomy procedures in cancer patients who needed nutritional support and where endoscopy was unattainable. Besides the feasibility, complications and outcomes of the surgical gastrostomy or jejunostomy procedures were registered.

Methods

The medical records of patients treated with surgical gastrostomy or jejunostomy between October 2001 and January 2010 were retrospectively collected. The data included patient age and sex, indications for the procedure, type of surgery (gastrostomy, jejunostomy or combined with other surgical procedures), number of previous abdominal operations, medical treatment protocols, anesthesia type, operation time, tube type, procedure-specific complications and surgical complications. The tube revision time and revision type as well as the follow up period were also recorded.

Surgical technique

All patients had preoperative radiological and laboratory evaluation (electrolytes, complete blood count, coagulation tests, chest radiograph, electrocardiogram) and had a consultation at the Department of Internal Medicine. Three types of anesthesia (local, regional and general) were used. All patients had antibiotic prophylaxis with a single intravenous dose of first generation cephalosporin. Stamm's procedure was used for gastrostomy/jejunostomy in all patients, either alone or during other surgical procedures. A purse string suture with 2-0 silk was placed around the tube entry site and outer sutures were inverted on the gastric wall for serosal lining for the tube tract. Gastric or jejunal serosa was affixed to the peritoneal surface of the anterior abdominal wall with 2-0 silk purse string to the skin to prevent leakage. After 24 hours the tube started to be used for feeding with liquid diet.

Results

One hundred and nine patients (44 female and 65 male) were analyzed. Their median age was 50.9 years (range 14-87). Cancer diagnoses were head/neck cancer in 32 (29.3%) patients, oesophageal cancer in 37 (33.9%), gastric cancer in 22 (20.1%), hepatobiliary/pancreatic cancer in 2 (1.8%) and different conditions (trauma/cerebral cancer/cardiac failure/neurological disease) in 16 patients (14.6%) (Figure 1). Head/neck cancer included tonsilar malignancy in 11, hypopharynx in 9, larynx in 7 and nasopharynx in 5 patients. The indications for enteral nutrition were malnutrition and inability of oral intake in 106 (97.2%) patients. In 12 (11%) patients with pancreatic and esophageal cancer, enteral nutrition techniques were combined with radical surgical procedures, including Whipple operation and esophagectomy. Gastrostomy was performed in 83 (76.1%) and jejunostomy in 26 (23.9%) patients. Thirteen (11.9%) patients had previous abdominal operations. Endoscopic techniques were not always attainable in cancer patients. In 94 (86.2%) patients PEG was not possible due to the prevalence of the obstructing cancer.

Anesthesia types are shown in Table 1. Cath-

Table 1. Types of anesthesia administered to patients

Anesthesia	*N*	*%*
General anesthesia (Endotracheal intubation)	39	35.7
General anesthesia (Laryngeal mask)	18	16.5
Thoracic epidural	30	27.5
Local	22	20.1

Table 2. Surgical complications

Surgical complications	*N*	*%*
Leakage	18	16.5
Infection at the tube site	12	11.0
Generalized peritonitis	2	1.8
Abdominal abscess	2	1.8

eter types used at the operation were Foley in 84 (77%) patients, mushroom in 23 (21.1%) and special feeding tubes were used in 2 (1.9%) cases.

Median operation time was 56.7 min (range 15–19). Morbidity rate related to the procedure was 20.7% (22 out of 109 patients). During the study period 18 (16.5%) patients had a minor complication due to tube leakage (Table 2). Ten (9.1%) patients had minimal tube leakage for a short period of time and required only local wound dressing and oral antibiotics. Eight (7.3%) patients had long term leakage and infections at the tube and incision, and hence required intravenous antibiotics, abscess drainage, and stopping the nutrition and gastric decompression for a while. Major complications related to the procedure occurred in 4 (3.6%) patients: abdominal abscess in 2 (1.8%) and peritonitis in 2 (1.8%) (Table 2). Four (3.6%) patients underwent reoperation due to complications. Early 30-day mortality occurred in 12 (11%) patients and was caused by peritonitis, septic shock and cancer progression.

Procedure-related complications were not significantly different with respect to age, tube types, anesthesia types and cancer diagnosis. The median follow up period was 3.6 months (range 0-18). Tube revision or replacement occurred once in 20 patients, twice in 6 patients, 3 times in 2 patients, 4 times in 2 patients, 5 times in one patient and 6 times in one patient during follow up.

Discussion

Malnutrition is a common and important problem in clinical practice, estimated to occur in 30-50% of hospitalized patients and 31-87% of all cancer patients [2,6]. The aim of feeding is to prevent patients from cachexia and starvation. Besides, early feeding improves recovery. In previous studies, enteral nutrition was found to minimize weight loss, sustain effective hydration, improve wound healing and provide a better quality of the life. Also cancer patients may suffer from some difficulties due to the illness itself and the treatment protocols. Cancer anorexia (loss of appetite) and radio-chemotherapy may cause side effects such as mucositis, taste alteration and esophagitis, which lead to decreased oral intake [7]. Nutritional support increases the ratio of the patients who complete their treatment with full dosage of chemotherapy, radiotherapy increasing at the same time the probability of attaining radical surgical resection [8].

Enteral nutrition is a safe, cheap and well tolerated means that decreases infectious and metabolic complications rates and avoids catheter thrombosis observed during total parenteral nutrition [9]. Besides, gastrostomy and jejunostomy help improve the patients' comfort, mobility and decrease the aspiration complications caused by feeding with nasogastric tubes. Surgical gastrostomy and jejunostomy are common procedures for nutritional support, and they are combined with other surgical procedures for drainage and decompression of the gastrointestinal system [4]. When the tube is used for gastric or bowel decompression and protection of the anastomosis, it is removed after the gastrointestinal functions return. Tube is also used for administration of alimentation and medication.

At the intensive care unit, trauma and neurological patients are usually fed with PEG and PFG. PEG is an effective and safe technique with low complication rates and low cost [10,11]. In the literature, the complication rates for gastrostomy types are reported as follows: 1-35% for surgery, 17-32% for PEG, and 3-32% for PFG [4,14]. Ljungdahl and Sundbom reported that PEG is a safe technique and they used surgery in patients with advanced-stage cancer where endoscopy was not feasible because of obstructions [11].

Enteral feeding is related with a variety of complications, i.e. gastric juice leakage, skin erythema, infection and tube dislodging and obstruction. Reported major complications are peritonitis, gastric wall necrosis, bleeding and intraabdominal abscess [12]. As the tube's length of stay becomes longer, the probability of witnessing minor complications increases. Tube obstruction and revision problems are also related with the length of tube stay and postoperative care. Tubes must be washed with water after feeding for protection from obstruction. Obstructed or damaged tubes may be removed by pulling and a new tube may

be placed. Gastric juice leakage and skin erythema are complications observed at the early periods of the procedure. The probability of leakage is decreased with smaller surgical incisions. Gastric serosal purse string sutures and affixed sutures between gastric wall and the anterior abdominal wall' peritoneal surface also limit the leakage [13]. The complication rate for our patients was 20.7 % and this figure is similar to that reported in the literature [4,10].

Early 30-day mortality occurred in 12 (11%) patients, and was caused by peritonitis, septic shock and progression of the primary cancer. Different ratios for early mortality have been reported in the literature (Ryan 3.8% [14], Dewald 5.8% [15], and Bergstrom 21% [16]). Surgical enteral gastrostomy tube placement tools are advised to be used in cases requiring enteral nutrition for at least 4 to 6 weeks and/or in patients that have a prognosis that necessitates nutritional support [17].

In unresectable or resectable head and neck carcinomas, surgery and concomitant radio-chemotherapy are practised routinely. To provide adequate nutrition and prevent the complications during radio-chemotherapy, prophylactic gastrostomy is used by many for improving the patients' quality of life [7,18]. In end-stage and terminal disease patients PEG is not feasible due to both pain and bleeding, as there is obstruction at the oropharyngeal and oesophageal region. In our experience PEG was not possible at 94 (86.2%) patients because of obstruction. The median follow up period, which for our group was 3.6 months (range 0-18), becomes shorter because of the patients' worse general condition and advanced cancer.

Moran et al. reported an average of 20 min (range 15-33) procedure time [19]. In our series the operation time was longer (median 56.7 min, range 15 – 190). The main reason was that in 11% of the patients the nutrition operation was combined with other resections leading to longer operation times.

Möller et al. reported that all of their surgical gastrostomy patients had general anesthesia [4]. Moran et al. used general anesthesia in 12% of the patients that underwent the PEJ [19]. In our series, we tried to use local, field block anesthesia or local anesthesia and sedation. Only 52.2 % of the patients underwent general anesthesia. Besides, 11% of the patients also had other surgical procedures, requiring the use of general anesthesia.

The necessity of a tube revision is similar for all techniques and is also related with the tube placement time. The replacement of the tube was easily performed through the tract at the hospital bedside or polyclinic conditions in case of repeated application. Some authors suggest using radiological contrast study in order to make sure that the tube was replaced properly [13].

Longer follow up was associated with the number of times the tube was replaced and the complications. The important and most frequent indications for tube revision were obstruction or tube damage. Leakage is another problem that causes infection and problems with feeding. In some cases, replacement of the tube by a larger one might help prevent leakage. Patients with surgical gastrostomy with longer follow up period may need tube revision or replacement 5-6 times. Our patients had 32 (29.4%) tube replacements with a median follow up of 3.6 months (range 0-18).

Surgical techniques for nutrition are important in patients who have PEG and PFG related complications. The changing technical success rates for PEG (77-99%) and PFG (94-100%) probably reflect the patient and illness characteristics as well as the doctor's experience. Patients require surgical support when the percutaneous practice is unsuccessful. The PEG and PFG techniques may also create some complications, such as major bleeding, gastric or jejunal perforation, peritonitis and tube displacement, which are only caused by percutaneous practice and which can be resolved by surgery [13,20].

This retrospective study, however, has some shortcomings in the sense that comparisons with other gastrostomy methods are missing. In the literature PEG and PFG have become gold standard owing to cost analysis, complication rates and operation time. Yet, in cases of obstructing cancers (i.e. head/neck, oesophageal and gastric), obesity or previous laparotomy, PEG and PFG are not feasible. Surgical techniques might be related with higher complication rates in patients that had previous laparotomy or major surgical resection. These surgical techniques must be taught at the surgical residence education program. Gastrostomy/jejunostomy is an easy method but must be practised under the surgical resident's observation. Complications such as tube obstruction, leakage as well as the revision or replacement of the tubes must be a part of the education. In conclusion, in this group of patients surgical gastrostomy and jejunostomy for nutritional support are safe with acceptable complication rates.

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