Impact of jejunostomy during esophagectomy for cancer on health related quality of life

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Background: The aim of this study was to evaluate the impact of jejunostomy during esophagectomy for cancer on postoperative health-related quality of life (HRQL).

Methods: We evaluate all consecutive patients who underwent esophagectomy for cancer at the surgical oncology unit of the Veneto Institute of Oncology (IOV-IRCCS) between January 2008 and March 2014. The primary outcome was HRQL, which was assessed using nine scales of EORTC C30 and OES18 questionnaires. General linear models were estimated to evaluate mean score difference (MD) of each selected scale in patients with and without jejunostomy, adjusting for clinically relevant confounders. The secondary outcomes were morbidity, hospital stay, postoperative weight loss and postoperative albumin impairment.

Results: Jejunostomy was performed in 40 on 109 patients (41.3%) who participated in quality of life investigation. A clinically and statistically significantly worse eating at admission (P=0.009) became not clinically significant at 3 months after surgery (MD =9.1). Jejunostomy was associated to clinically and statistically significantly poorer emotional function (EF) at 3 months after surgery (MD =–15.6; P=0.04). Hospital stay was longer in jejunostomy group (median, 20 *vs.* 17 days, P=0.02).

Conclusions: In our series patients who had a jejunostomy during esophagectomy had been selected for their risk for postoperative complication. However, their postoperative outcome was actually similar compared to those without jejunostomy. Nevertheless, jejunostomy was associated to clinically and statistically significantly poorer EF at 3 months after surgery. Therefore, patient candidate to esophagectomy and feeding jejunostomy should receive additional psychological support.

Keywords: Health-related quality of life (HRQL); jejunostomy; esophagectomy; esophageal cancer

Introduction

Esophageal cancer incidence is steadily increasing in Western world (1) but its prognosis remains poor. Combined modality treatment protocols such as neoadjuvant radiation and/or chemotherapy followed by surgery is the current treatment option and meta-analyses of randomized trials have found some survival advantages (2,3), although only patients with a complete pathologic response to neoadjuvant therapy seem to enjoy a significantly better chance of survival (4,5). However, esophagectomy remains the standard treatment for patients presenting with resectable esophageal cancer but it is associated with a high risk of serious complications (6-11).

Alongside postsurgical survival, morbidity and mortality rates (6), health-related quality of life (HRQL) has recently become an important outcome parameter to evaluate esophagectomy for esophageal cancer (12). Risk factors for poor postoperative HRQL are now, in fact, evaluated carefully when clinical decisions are being made and patients are informed about long-term consequences of surgery. In a systematic review global HRQL and physical

function resulted significantly worsened during the 6-month following esophagectomy (13).

In our previous investigation on quality of life after esophagectomy (14,15) we had observed, but not reported, an unexplained and unexpected negative effect of jejunostomy placement during esophagectomy on postoperative quality of life. In a recent meta-analysis including 3,293 patients, jejunostomy tube feeding was effective in meeting short-term nutritional requirements after esophagectomy, but major tube-related complications necessitated relaparotomy in 0-2.9% of patients (16). However, the authors pointed out that data on patient satisfaction and quality of life were not found for any of the feeding routes investigated (16).

Therefore, the aim of this study was to evaluate the impact of jejunostomy during esophagectomy for cancer on postoperative HRQL.

Methods

Study design

All consecutive patients who underwent esophagectomy for cancer at the surgical oncology unit of the Veneto Institute of Oncology (IOV-IRCCS) between January 2008 and March 2014 were retrospectively evaluated for inclusion in the study. Information on quality of life was available in 109 patients who accepted to fill the questionnaires and they were included in the study analysis. Patients who received jejunostomy were compared with those who did not received jejunostomy. The primary outcome was HRQL. The secondary outcomes were morbidity, hospital stay, postoperative weight loss (at 3 months after surgery) and postoperative albumin impairment (at 2nd-3rd postoperative week). The study was conducted according to Helsinki Declaration principles and patients gave their consent to have their data collected for scientific purpose. This retrospective study was notified to the Ethical Committee of IOV-IRCCS.

Health-related quality of life (HRQL)

HRQL was assessed using the EORTC QLQ-C30 and OES-18 questionnaires (17,18) at admission and at 3 months after surgery. Specific aspects were selected a priori, whereas the remaining aspects were not analyzed. The selected aspects were global quality of life (C30 QL2), all C30 functional scales [C30 physical function (PF2), role function (RF2), social function (SF), emotional function (EF), cognitive function (CF)], fatigue (C30 FA), dysphagia (OES18 DYS) and eating (OES18 EAT). All scores range from 0 to 100, with a high score representing healthy status for functional scales and the global health status scale, but high level of symptomatology/problems for symptom scales (apart from dysphagia).

Treatment

Tumor staging was performed according to the criteria of the International Union Against Cancer (19). Patients with tumor staged above T3N0 or anyTN1 were offered neoadjuvant therapy as described elsewhere (14). Patients were considered resectable when staged below T3N0 or, after the termination of neoadjuvant treatment, when there was no evidence of distant metastases or locally advanced tumor with gross periesophageal involvement at restaging.

Surgical technique

Details concerning surgical techniques have been published elsewhere (20). Briefly, esophagectomy was performed using an Ivor-Lewis procedure, via a laparotomy and right thoracotomy, for tumors of the mid-lower esophagus and gastric cardia. A three-stage McKeown's procedure, with an additional left cervical incision, was reserved for tumors in the upper third of the esophagus. At least 6-8 cm of healthy esophagus was resected above the proximal edge of the tumor to avoid neoplastic involvement of the resection margins. In this group of patients en bloc lymph node dissection was performed, including the paraesophageal, sub carinal, posterior mediastinal and paracardial lymph nodes, as well as those located along the lesser gastric curvature, the origin of the left gastric artery, the celiac trunk, the common hepatic artery and the splenic artery.

Jejunostomy was performed using a standard approach before abdominal wall closure. The first jejunal loop beyond the ligament of Treitz was selected and a feeding tube (10 Fr duodenal tube; length, 125 cm) was passed through the abdominal wall, advanced 4 cm in a submucosal tunnel, and fed through the mucosa into the jejunal lumen. The catheter was advanced 20 cm and secured with an absorbable purse string suture. An additional seromuscular Witzel (21) tunnel was fashioned to overlap the catheter and the purse-string suture site. Subsequently, the jejunum was secured to the anterior abdominal wall with interrupted absorbable sutures. Nasogastric (NG) tubes were placed in all

Table 1 Patients' characteristics

Characteristics	No jejunostomy (n, %)	Jejunostomy (n, %)	P value
N	69	40	–
Male/female	58/11	34/6	0.99
Age[†] [years]	59 [51-67]	64 [58-71]	0.02
Histotype[‡]			0.0001
Adenocarcinoma	57 (52.6)	18 (46.2)	
Squamous cell carcinoma	12 (17.4)	21 (53.8)	
Tumor site			<0.0001
Cervical esophagus	0	6 (15.0)	
Thoracic esophagus	4 (5.8)	10 (25.0)	
Esophago-gastric junction	65 (94.2)	24 (60.0)	
Comorbidities			
Pulmonary	15 (21.7)	11 (27.5)	0.50
Cardiovascular	5 (7.3)	6 (15.0)	0.21
Renal	0	0	–
Liver disease	4 (5.8)	3 (7.5)	0.71
Neoadjuvant therapy	58 (84.0)	32 (80.0)	0.61
Anastomosis			<0.0001
Cervical	0	20 (50.0)	
Thoracic	69 (100.0)	20 (50.0)	
Pathologic stage			0.06
0	18 (26.1)	7 (17.5)	
I-II	31 (44.9)	12 (30.0)	
III-IV	20 (29.0)	21 (52.5)	

Data expressed as n (%) or [†], median (IQR); [‡], other histotype in one patient; IQR, interquartile range.

patients until the radiological assessment of the anastomosis.

Statistical analysis

Continuous data are expressed as median and interquartile range (IQR). Categorical data were compared between the two groups using Fisher's test and continuous data using Mann-Whitney test. The selected aspects of EORTC questionnaires were calculated according to the developers' instructions and were reported as mean score differences (MDs) between patients with and without jejunostomy. A MD of ten points or more was considered clinically relevant (22) and any

such difference was tested for statistical significance. A general linear model was estimated to evaluate the effect of jejunostomy on clinically relevant MD at admission adjusting for age, tumor site and pathologic stage. A general linear model was estimated to evaluate the effect of jejunostomy on clinically relevant MD at 3 months after surgery adjusting for age, tumor site, pathologic stage and morbidity. Statistical analysis was performed using SAS 9.1 and a P value less than 0.05 was considered significant.

Results

Sample characteristics

Among the group of patients who accepted to fill the questionnaires and thus were included in the study, a feeding jejunostomy was performed during esophagectomy in 40 on 109 patients (36.7%) and all jejunostomies were removed between 2 and 3 months. No jejunostomy related complication was observed in the study group. Patients with jejunostomy were older than those without jejunostomy (median, 64 *vs.* 59 years, P=0.02). In addition, jejunostomy was performed mostly in patients with SCC hystotype (P=0.0001) and upper tumor sites (P<0.0001). Patients' characteristics are shown in *Table 1*.

Health-related quality of life (HRQL)

At admission, patients with jejunostomy had similar functional scales than those without jejunostomy (*Table 2* and *Figure 1*), but they reported a clinically and statistically significantly poorer EF at 3 months after surgery (MD =–15.6; P=0.04). In addition, a clinically significantly poorer physical function was observed in patients with jejunostomy at 3 months after surgery (MD =–15.2; P=0.07).

Patients with jejunostomy reported a clinically and statistically significantly worse eating (EAT scale) at admission than those without jejunostomy (P=0.009; *Table 2*). However, this difference became not clinically significant at 3 months after surgery (MD =9.1; *Table 2* and *Figure 2*). In addition, a clinically significantly worse dysphagia was observed in patients with jejunostomy at admission (MD =–12.2; P=0.16), but it became not clinically significant at 3 months after surgery (MD =–0.4; *Table 2* and *Figure 2*).

Secondary outcomes

A similar morbidity rate was observed in patients with

Table 2 Health-related quality of life in patients with or without jejunostomy, assessed at admission and at 3 months after surgery

Variables	MD at admission		MD at 3 months after surgery	
	Mean (SD)	P value†	Mean (SD)	P value‡
Global quality of life C30 QL2	−9.7 (22.2)	NA	−0.9 (16.7)	NA
Functional scales				
C30 PF2	−5.8 (17.3)	NA	−15.2 (32.1)*	0.07*
C30 RF2	−9.2 (25.6)	NA	−1.6 (27.7)	NA
C30 SF	−4.1 (23.9)	NA	−8.4 (24.7)	NA
C30 EF	−6.1 (21.0)	NA	−15.6 (21.5)*	0.04*
C30 CF	0.5 (17.0)	NA	−6.8 (17.2)	NA
Symptom scales				
C30 FA	4.9 (21.9)	NA	9.8 (24.9)	NA
OES18 DYS	−12.2 (32.7)*	0.16*	−0.4 (31.1)	NA
OES18 EAT	13.1 (23.0)*	0.009*	9.1 (16.6)	NA

Data expressed as mean (SD). †, adjusted for age, tumor site and pathologic stage; ‡, adjusted for age, tumor site, pathologic stage, morbidity. A MD of ten points or more was considered clinically relevant (*) and any such differences was tested for statistical significance. NA, not applicable.
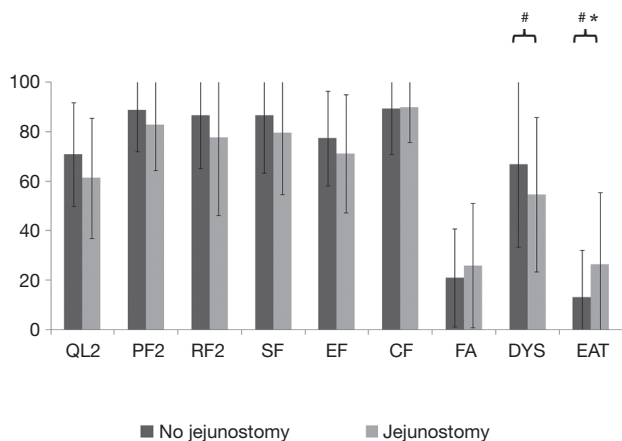

Figure 1 HQRL mean values (with SD bars limited in the 0-100 interval) in patients with or without jejunostomy at admission for surgery. #, clinically significant (MD ≥10). *, statistically significant (P<0.05). QL2: C30 global quality of life; PF2: C30 physical function; RF2: C30 role function; SF: C30 social function; EF: C30 emotional function; CF: C30 cognitive function; FA: C30 fatigue; DYS: OES18 dysphagia; EAT: OES18 eating; MD, mean score difference.
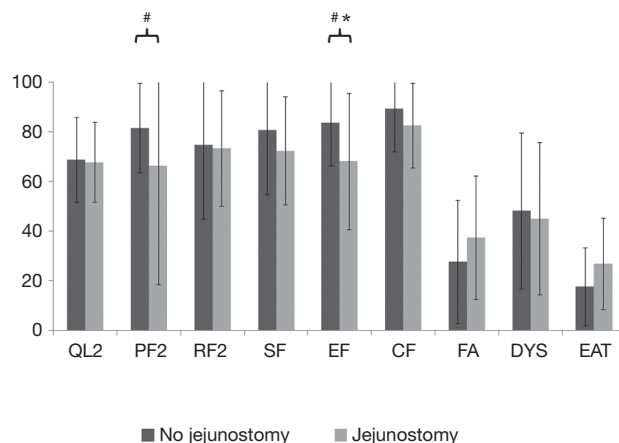

Figure 2 HQRL mean values (with SD bars limited in the 0-100 interval) in patients with or without jejunostomy at 3 months after surgery. #, clinically significant (MD ≥10). *, statistically significant (P<0.05). QL2: C30 global quality of life; PF2: C30 physical function; RF2: C30 role function; SF: C30 social function; EF: C30 emotional function; CF: C30 cognitive function; FA: C30 fatigue; DYS: OES18 dysphagia; EAT: OES18 eating; MD, mean score difference.

Table 3 Secondary outcomes in patients with or without jejunostomy

Variables	No jejunostomy (n, %)	Jejunostomy (n, %)	P value
N	69	40	–
Morbidity	15 (21.7)	14 (35.0)	0.18
Leak	4 (5.8)	4 (10.0)	–
Pulmonary complications	7 (10.1)	7 (17.5)	–
Hospital stay [days]†	17 [14-20]	20 [16-25]	0.02
Weight loss at 3 months after surgery [%]†	0 [0-7]	0 [0-7]	0.94
Albumin at 2nd-3rd postop week†	30 [28-35]	29 [28-32]	0.31
Albumin impairment (from admission to 2nd-3rd postop week)†	12 [8-15]	12 [9-15]	0.74
Data expressed as n (%) or †, median (IQR). IQR, interquartile range.			

and without jejunostomy (35.0% *vs.* 21.7%, respectively; P=0.18). Hospital stay was longer in jejunostomy group (median, 20 *vs.* 17 days, P=0.02; *Table 3*), whereas postoperative weight loss and albumin levels were similar in the two groups (P=0.94 and P=0.31; *Table 3*). In addition, patients with jejunostomy experienced a similar (P=0.74) postoperative albumin impairment (median 12, IQR 9-15) than those without jejunostomy (median 12, IQR 8-15).

Discussion

Esophagectomy remains the standard treatment for patients presenting with resectable esophageal cancer but it is associated with a high risk of serious complications and post-operative nutritional impairment (6-11). Few studies have assessed the potential benefits of continuing supplementary jejunostomy feeding after hospital discharge (23). In an institutional review of practice (24) comparing the historical practice of not providing home enteral support with the recent practice of home jejunostomy feeding, home enteral support was associated with better weight maintenance. Nevertheless, the effect of enteral nutrition on other outcome measures such as quality of life is not known. Therefore, the aim of this study was to evaluate the impact of jejunostomy during esophagectomy for cancer on postoperative HRQL.

In our series, patients who had a jejunostomy were significantly older than those without jejunostomy and their cancer was more often a squamous cell carcinoma and was more often located in the upper esophagus. These differences directly reflected the selection of patients who were candidate to have a temporary jejunostomy beside

esophagectomy. In fact, as pointed out by Srinathan *et al.* (25), it seems reasonable to adopt the practice of using feeding jejunostomy tubes in patients who the surgeon feels are at elevated risk for anastomotic failure, which will delay commencement of oral intake. Indeed, our patients who had jejunostomy clearly were more frail patients (i.e., patients with preoperative food intake impairment, patients who had upper esophageal cancer and elderly patients).

In our series, at admission, patients with jejunostomy had similar functional scales than those without jejunostomy, but they reported a clinically and statistically significantly poorer EF at three months after surgery. According to recent studies that prospectively analyzed quality of life after esophagectomy in British and Dutch patients, EF resulted significantly improved at the six month follow-up (26-28). Furthermore, Swedish patients reported significantly better EF even three years after esophagectomy (29). The worsening in EF observed in patients with a jejunostomy may be due to the subjective perception of still being ill caused by the feeding tube and the daily practice related to this unnatural way of feeding (30). Moreover, in patients with a jejunostomy the body image may be heavily impaired, thus affecting their EF (31). In our opinion, patients who need a jejunostomy because of substantial weight loss before surgery, advanced age or upper esophageal cancer, may possibly benefit of a dedicated psychological support to cope with this new body situation and to recover their EF.

In our series, in spite of a similar morbidity rate observed in patients with and without jejunostomy, hospital stay was longer in jejunostomy group. This data seem to be related to the general higher frailty of patients who had a jejunostomy, a longer time need to recover after a cervical

anastomosis and longer time need to organize home enteral feeding. On the other hand, postoperative weight loss, albumin levels and postoperative albumin impairment were similar in the two groups suggesting that jejunostomy, even if it did not completely corrected the physiological postoperative nutritional impairment, at least prevented further worsening in patients particularly at risk. In fact, in a previous study we had observed that patients after esophagectomy lose weight up to six month after the operation (32). Tube feeding provided a relief in those who might have lose much more weight.

Finally, a clinically significant poorer physical function was observed in patients with jejunostomy at 3 months after surgery. In our previous study (13), we had observed that in patients who had postoperative complications physical function tended to be worse than in those who had an uneventful recovery. From patient's point of view jejunostomy is a postoperative complication that limits his physical activity and thus recovery. Therefore, it seems reasonable to limit the practice of using feeding jejunostomy tubes in patients who the surgeon feels are at elevated risk for anastomotic failure, which will delay commencement of oral intake (25).

Conclusions

In conclusion, in our series patients who had a jejunostomy during esophagectomy had been selected for their risk for postoperative complication. However, their postoperative outcome was actually similar compared to those without jejunostomy. Nevertheless, jejunostomy was associated to clinically and statistically significantly poorer EF at 3 months after surgery. Therefore, patient candidate to esophagectomy and feeding jejunostomy should receive additional psychological support.

Acknowledgements

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