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Free jejunal flap for pharyngoesophageal reconstruction in head and neck cancer patients: An evaluation of donor site complications

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Abstract

Background—Free jejunal transfer for pharyngoesophageal reconstruction has often been criticized for its associated donor site morbidity. Conversely, the same argument has been invoked to support use of fasciocutaneous flaps, given their low incidence of donor site complications. The purpose of the current study was to document donor site complication rate with free jejunal flaps for pharyngoesophageal reconstruction, in the hands of an experienced surgeon.

Methods—A retrospective chart review was performed of consecutive patients who underwent free jejunal transfer between 1992 and 2012 by the senior author. Demographic data, abdominal complications, surgical characteristics of small bowel anastomoses and postoperative bowel function were specifically noted.

Results—Ninety-two jejunal flap reconstructions were performed in 90 patients. Mean follow up time was 29 months. Twelve (13%) patients had prior abdominal surgery. Donor site complications included ileus (n=2), wound cellulitis (n=1), wound dehiscence (n=1) and small bowel obstruction (n=1). Mean time to initiation of tube feeds after reconstruction was 5 days. Seventy-seven (86.5%) patients were discharged on an oral diet. The perioperative mortality rate of 2% was not associated with any donor site complication.

Conclusion—Free jejunal transfer is associated with minimal and acceptable donor site complication rates. The choice of flap for pharyngoesophageal reconstruction should be determined by the type of defect, potential recipient site complications and the surgeon's familiarity with the flap. Potential donor site complications should not be a deterrent for free jejunal flaps given the low rate described in this study.

Introduction

A variety of surgical procedures have been described for pharyngoesophageal reconstruction. Although a gastric pull-up was the predominant reconstructive method in the

1970s and 1980s, with the advent of microsurgical techniques, jejunal (FJT) as well as other forms of free tissue transfer have supplanted previous techniques. Isolation of the abdominal cavity from the neck resection and avoidance of the transthoracic approach may be contributory factor to the reduced morbidity and mortality of pharyngoesophageal reconstructive surgeries over time.¹⁻⁹ The principal goal of pharyngoesophageal reconstruction is to restore continuity of aerodigestive tract while improving quality of life by maximizing speech and swallow function. The jejunum has unique advantages that make it an ideal choice in this situation. It is a lubricated, tubular structure similar to esophagus with peristaltic activity similar to the native pharyngoesophagus. The jejunum can be removed with no functional gastrointestinal sequelae, lacks intrinsic disease and does not require bowel preparation prior to surgery.

More recently, the use of skin and fasciocutaneous flaps (e.g. radial forearm flap and anterolateral thigh (ALT) flap), have been popularized for pharyngoesophageal reconstruction.^{3,10-14} Few studies in the literature have compared outcomes between FJT and other flaps for cervical esophagus reconstruction.^{3,5} This is most likely due to an institutional preference for one type of reconstruction. A recent study by Yu et al. compared clinical and functional outcomes between ALT flaps and FJT for pharyngoesophageal reconstructions at a single institution.³ They reported no significant difference in overall complication rates (recipient and donor site) between the two and noted that the tracheoesophageal speech and swallowing was better with the former. A similar study by Chan et al. compared outcomes of FJT with ALT flap and Pectoralis Major (PM) flap for reconstruction of circumferential pharyngectomy defects. Higher overall complication rates were reported in the ALT and PM group than FJT group. Additionally, a higher proportion of patients resumed oral diet in the FJT group than ALT and PM groups.⁵ None of these studies specifically addressed short and long term complications of the jejunal donor site.

Despite a body of literature supporting equivalent functional outcomes of jejunal and other free flaps, one of the most frequently cited disadvantages of jejunal transfer is the need for laparotomy with potential abdominal complications. In contrast, the ALT flap is felt to have low donor site complications; however the diameter of the ALT flap required for circumferential pharyngoesophageal reconstruction is 9 cm, thereby may necessitate skin grafting of the donor site. A systematic review of ALT flap donor site morbidity reported that of the 1558 studies mentioning use of skin graft for closing the donor site, 230 (14.8%) used skin grafts.¹⁵ Skin grafting may require prolonged bed rest after surgery to allow for healing which can be particularly problematic in the elderly or obese who require early postoperative mobilization to lower the risk of DVT and pulmonary complications. This is not the case with harvest of jejunal flaps where there can be immediate resumption of ambulation following laparotomy.

The senior author (PGC) has an extensive experience with reconstruction of the cervical esophagus using jejunal flaps. The hypothesis of the current report is that jejunal free flaps are associated with low complication rates. The specific aim was to retrospectively review all jejunal free flap reconstructions over a two-decade period to specifically measure the donor site morbidity.

Methods

A retrospective chart review was conducted to identify patients who underwent free jejunal transfer for pharyngoesophageal reconstruction performed by the senior author (PGC) at Memorial Sloan-Kettering Cancer Center between 1992 and 2012. Demographic data including age and gender of the patients along with history of any previous abdominal surgery were noted. All potential donor site complications were evaluated including wound infection, wound dehiscence, ileus, small bowel obstruction, intussusception, small bowel anastomotic leak and intra-abdominal hemorrhage. Return of bowel function was assessed by evaluating time to initiation of tube feeds or PO diet. Technical details such as type and technique of small bowel anastomosis were noted. Mortality data was also recorded. Fisher's exact test was used to evaluate associations between type or technique of bowel anastomosis and abdominal complications. Since the focus of current paper is on donor site complications, other related data such as recipient site complications and functional outcomes were not specifically assessed.

Operative Technique

All jejunal flaps were harvested by the senior author (PGC). After standard preoperative procedures, the jejunum was exposed through an upper midline abdominal incision. The loop of bowel chosen was a minimum of 30 to 40 cm from the ligament of the Treitz in order to minimize the chances of developing complications relating to proximity to the duodenum. The usual technique for harvest of the flap began with transillumination of the mesentery to evaluate the arcades that were longest and most favorable for the reconstruction. Meticulous care during dissection of the mesentery was taken both to maximize length of the mesentery and also to minimize the chances of hematoma, which could potentially cause postoperative ileus. The principal vessel feeding the appropriate arcades was carefully dissected. The bowel was divided using an intestinal stapler at both ends and the jejunum was allowed to perfuse prior to ligation of pedicle vessels. The flap was transferred to the neck region and subsequent microsurgical anastomosis was performed by the plastic surgery team. The abdominal closure and small bowel anastomosis were performed by several different general surgeons based on availability at the time of surgery. A variety of different techniques were used for anastomosing the small bowel, including end-to-end hand sewn anastomosis and side-to-side stapled anastomosis. The abdominal wound was also closed by the general surgeons using a variety of different techniques.

Results

Ninety patients underwent 92 jejunal free tissue transfers. In two patients a second surgery was done for partial flap failure. Mean patient age was 63 years (range 12 – 82 years). Sixty-two (69%) were male and 28 (31%) were female patients. Twelve patients (13%) had a history of previous abdominal surgery. Mean length of stay was 18.5 days (range 6 – 66 days). Mean follow up time was 29 months (range 0 – 15 years). The overall 30-day mortality for the procedure was 2% (n = 2). None of the mortalities were related to an abdominal complication.

Donor site complications (Table 1)

Donor site complications occurred in 5.4% of FJT surgeries (n = 5). The most common abdominal complication was ileus (n = 2). Other complications included wound cellulitis (n = 1), wound dehiscence (n = 1) and small bowel obstruction (n = 1). All five complications occurred within 30 days of surgery. The wound dehiscence and small bowel obstruction required return to the operating room for management.

Surgical Characteristics (Table 2)

There were 28 (33.3%) end-to-end small bowel anastomoses, and 56 (66.7%) side-to-side bowel anastomoses. Thirty-two procedures (38.1%) utilized a hand-sewn anastomosis and 52 (61.9%) reported use of a stapling device. There was no association between type or technique of bowel anastomosis and abdominal complications (i.e. ileus and small bowel obstruction) [p = 0.54 and 0.28 respectively].

Postoperative bowel function

The mean number of days between surgery and initiation of tube feeding was 5 days. Seventy-seven (86.5%) patients were discharged on an oral diet and 12 (13.5%) patients were discharged on tube feeding. One patient expired during his initial admission while on TPN. Of the patients discharged on an oral diet, 71 (92%) patients were on solid diet (regular/soft/puree) and 6 (8%) patients were on liquid diet.

Discussion

Replacement of the cervical esophagus using free jejunal transfer remains one of the principal techniques available to reconstructive surgeons today. Although there is much discussion in the literature with regard to choice of jejunal versus tubed-skin flap, one of the principal reasons for flap selection hinges on quality of speech and swallowing function.^{3,5,16-18} Tracheoesophageal speech following jejunal flaps is often described as 'wet' perhaps due to pooled secretions and dyscoordinated peristalsis with the remaining esophagus; however, voice restoration is easily achieved with either flap choice using a tracheoesophageal prosthesis.^{8,17} Other factors influencing flap selection include anastomotic leak and strictures within the neck.^{3,5,18} Some authors cite reduced stricture rates with the jejunum, relative to fasciocutaneous flaps, because of its robust vascularity which reduces ischemic events with subsequent scarring. Similarly, as a hollow viscus, the jejunum lacks a longitudinal suture line, which is a potential leak source in tubularized fasciocutaneous flaps. Most often flap selection is dependent on the surgeon's familiarity with its harvest and use.

Most published studies of jejunal flaps focus on the recipient, not donor site complications, with some additional emphasis on functional outcomes.¹⁻⁹ The current cohort of patients is the largest described in the literature from the US within the last decade. Two patients in our series had an ileus that responded to conservative management. Ileus is a common complication after any type of bowel manipulation, but even more so in patients with large resection of advanced cancers and those on narcotics. Thus, it is not necessarily wholly due to small bowel resection and anastomosis. We demonstrate that the incidence of abdominal

wound complications is also extremely low with only one case of cellulitis and one dehiscence. This was likely related to the extremely poor nutritional status and history of significant obstructive airway disease in these patients. The one case of small bowel obstruction, on exploration was found to be due to a distal ileal stricture most likely secondary to patient's prior abdominal surgery. Meticulous attention to detail of the bowel anastomosis should minimize if not eliminate this type of problem. Anastomotic leak, a potentially very significant complication of this procedure did not occur in our series.² Interestingly, all five of the patients who had an abdominal complication were part of the first twenty consecutive patients operated between 1992 and 1995. There were no donor site complications in any patient after 1996. This may be attributable to a learning curve, as there was no change in operative technique. Two patients died within 30 days after surgery. One patient was a 77-year-old male with no significant comorbidity who died on postoperative day 9 from pulmonary embolism. The other patient was a 70-year-old male patient with hypertension, hyperlipidemia and hypothyroidism. He was discharged on postoperative day 14 in stable condition and subsequently expired two days later while at home. None of the deaths appeared to be directly related to abdominal flap harvest.

Most patients in this study were started on tube feedings early postoperatively upon return of bowel sounds. Gastrostomy tube placement is not routinely performed in our institution, rather nasogastric tubes are used for immediate postoperative feeding.¹⁹ Mean duration to start of tube feeds after surgery was 5 days. The principal limitation to a normal diet in all patients at the time of discharge was secondary to chewing and swallowing deficits, since all these patients had significant head and neck resections. In no case was delay related to an abdominal surgery or complication. The proportion of patients discharged on an oral diet i.e. 86.5% (77/89) in our series is similar to patients who had an ALT flap (and no abdominal surgery) i.e. 91% (91/100) in another recent study.¹³ Thus jejunal harvest and intra-abdominal anastomosis does not create a delay in starting tube feeding after surgery.

Patients undergoing pharyngoesophageal reconstructions often have advanced cancers with limited survivorship. The jejunal flap reconstitutes the aerodigestive conduit without adding additional significant donor site morbidity as compared with other available options. This leads to an improved quality of life by avoidance of prolonged tube feeding and some restoration of speech function.

Conclusion

The abdominal complication rate of free jejunal harvest for head and neck reconstruction in experienced hands can be extremely low. Given the benefits of this particular flap for certain defects of the head and neck, it remains an excellent choice. Flap selection should be dictated by the type of defect, potential recipient site complication rates, its reconstructive utility, and most importantly the surgeon's familiarity with harvest of the flap.

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Table 1

Donor site complications.

Abdominal Complication	n (%)	Management
Ileus	2 (2%)	Conservative
Wound cellulitis	1 (1%)	Conservative
Wound dehiscence	1 (1%)	Closure in operating room
Small bowel obstruction	1 (1%)	Exploratory laparotomy and lysis of adhesions

Table 2

Surgical characteristics of small bowel anastomoses.

Type [*]	n (%)
End-to-End	28 (33.3%)
Side-to-Side	56 (66.7%)
Technique ^{**}	
Hand sewn	32 (38.1%)
Stapler	52 (61.9%)

* Data missing for 'Type': n = 8

** Data missing for 'Technique': n = 8