Primary Placement Technique, Usefulness, and Complications of Jejunostomy

Yasushi Rino
Departments of Surgery
Yokohama City University, Japan
1 Introduction

Enteral feeding via insertion of a percutaneous endoscopic gastrostomy (PEG) tube is standard procedure in many institutions and is the recommended procedure for long-term maintenance of good nutrition in patients with disorders that involve severe dysphagia and generalized weakness or immobility. Esophagectomy or total gastrectomy results in reduction of food intake, leading to malnourishment and weight loss (Derogar et al., 2012; Sacki et al., 2008). It is therefore important that enteral feeding is established at an early stage, in order to minimize further malnutrition, and jejunostomy is now regarded as the standard treatment. Jejunostomy is performed in patients undergoing esophagectomy to improve their nutrition status in many institutes, and if complications, including leakage and stenosis of anastomosis, recurrent nerve palsy, pneumonia etc, occur after esophagectomy, the patient cannot take anything by mouth over the long-term. In such cases, jejunostomy tube placement is performed in order to improve their nutrition status and quality of life (QOL).

Rino et al. (2011) developed the skin-level jejunostomy tube (SLJT) placement to improve nutrition in patients undergoing esophagectomy since March 2008. They selected the Entristar™ skin-level gastrostomy tube (G-tube) for jejunostomy due to their familiarity with its use in gastrostomy. The G-tube is a short 20 Fr diameter tube with internal and external retention bolsters to secure its position and minimize movement. The feeding and/or decompression ports are fitted with an antireflux valve that may be closed with a cap when it is not in use. As with all skin-level devices, the Entristar™ device is normally inserted as a replacement tube, when a mature tract has already been established during a previous percutaneous endoscopic gastrostomy (PEG) procedure. The technique is simpler than the standard jejunostomy. The rapidity with which it can be introduced, and the multiple benefits derived from its use, suggested its adoption for simple, as well as complicated, surgical problems.

In Japan, G-tube for gastrostomy is recognized in the insurance. But we have no problem in the insurance until October, 2012. The enteral route is considered more physiologic – the liver is not bypassed and the hepatic ability to take up, process, and store the various nutrients for subsequent release upon nervous or hormonal command, is maintained. It is often said that enteral nutrition is more safe and efficacious than the parenteral route (Sabiston Jr. et al., 1997). The use of a jejunostomy tube was first described in 1891 by Witzel (Witzel., 1891). Liffman and Randall reported the jejunostomy placement of a small plastic catheter with a Witzel tunnel (Liffman & Randall, 1972). However, previous jejunostomy methods (Witzel., 1891; Kader., 1896; Stamm., 1894; Delany et al., 1973) have utilized a long catheter out of the abdominal wall, which can be inconvenient in daily life. Some authors have reported methods of jejunostomy (Witzel., 1891; Kader., 1896; Stamm., 1894; Delany et al., 1973). SLJT utilized the G-tube. Due to the technical steps required for the creation of a standard jejunostomy, most surgeons resist using this procedure as a routine adjunctive measure (Delany et al., 1973). However, SLJT procedure requires less than five minutes for completion. It adds very little time or trauma to the surgical procedure, and intestinal manipulation is not required.

2 SLJT procedure

2.1 Jejunostomy techniques of using G-tube (20Fr)

A G-tube (20Fr) (Entristar; Tyco Healthcare, Mansfield, Mass) is used for the SLJT. The G-tube consisted of external and internal retention bolisters (Figure 1A, 1B, 1C and 1D).
During the procedure, the patient is placed in a supine position. The jejunostomy is performed during the abdominal procedure at the end of the esophageal cancer or gastric cancer operation. Nishi et al. reported jejunostomy placement from the Treitz ligament to about 20cm on the anal side (Nishi et al., 1988). The G-tube is also inserted at the jejunostomy 20 cm from the Treitz ligament on the side opposing the jejunomesenterium. A single purse string jejunostomy stitch is made using a 4-0 absorbable suture (Figure 1E). The stitch length is about 10mm and four stitches are performed in a square shape around the jejunostomy site.

![Figure 1: Skin-level gastrostomy tube (Entristar; Tyco Healthcare, Mansfield, Mass). (A) The Measuring device. (B) The Obturator. (C) Gastrostomytube comprised of external and internal retention bolisters. (D) The Gripstar Jejunostomy technique; (E) A purse string suture of the jejunostomy tube using a 4-0 absorbable suture. (F) Insert the Stoma Measuring Device through the abdominal wall into the abdominal cavity. (G) Measure the abdominal wall thickness.](image)

A skin incision, about 8mm in length, is made at the left upper quarter of the abdomen. Forceps are then used to pierce the abdominal wall and the Stoma Measuring Device is inserted through the abdominal wall into the abdominal cavity (Figure 1F). Based on the measurements obtained, a G-tube length is selected that allows for forward and backward-movement of the Entristar™ device (Figure 1G).
This could help reduce complications as a consequence of continual or excessive pressure to either the jejunal mucosa or the skin.

The surgeons open the G-tube tethered cap, load the GripStar Insertion/Removal Device by sliding the lower curved prongs of the GripStar device beneath the external retention portion of the G-Tube, and use the finger grips on the GripStar Device for retention during obturation and insertion (Figure 2A).

**Figure 2: Jejunostomy technique.** (A) Use the finger grips on the GripStar Device for retention during obturation and insertion. (B) Insert the obturated G-Tube into the stoma tract until the internal retention portion can be seen perfectly in the abdominal cavity. (C) The center of the purse string suture of the jejunum is cut using an electronic knife. (D) Pierce using forceps.

The obturator is inserted into the G-tube without lubricating jelly. The surgeons obturate until moderate resistance is felt to reduce the diameter of the internal retention bolster. The obturated G-Tube is then inserted into the stoma tract until the internal retention portion can be seen perfectly in the abdominal cavity (Figure 2B). If excessive resistance is encountered during insertion, the procedure is stopped and the tract is dilated.

The center of the purse string suture of the jejunum is cut using an electronic knife (Figure 2C) and pierced using forceps (Figure 2D). The surgeons reduce the diameter of the internal retention bolster us-
ing the obturator and insert the internal retention bolster into the jejunal lumen via the small incision (Figure 3A). A purse string suture is tied tightly to the tube (Figure 3B). The intestine adjacent to tube is anchored to the peritoneum by a single stitch (Figure 3C).

Proper placement of the G-Tube (Figure 3D) should be confirmed through the injection of 20ml of air. Feedings should commence only after proper placement and patency have been confirmed.

**Figure 3:** Jejunostomy technique. (A) Use obturator and insert the internal retention bolster into the jejunal lumen through the small incision. (B) Purse string suture thread is tied tightly to the tube. (C) The intestine adjacent to the tube is anchored to the peritoneum. (D) Proper placement of the G-Tube after operation.

A step-up spacer is placed beneath the external portion of the G-Tube. The entire procedure requires less than five minutes to perform, and it adds very little time or trauma to the overall surgical procedure nor does it require significant intestinal manipulation.

### 2.2 How to use SLJT

100ml liquefied standard diets and 50ml air is administered through the SLJT to confirm that there is no leakage or obstruction on the first day after the operation. Liquefied standard diets can be subsequently
administered via the SLJT. The starting dose of the liquefied standard diet is 20 ml/hr and is increased in 10 ml/hr daily increments to a maximum dose of 60ml/hr.

2.3 Patient Follow-up and Complications

Complications were characterized and were recorded as early (those occurring < 24 hours after the procedure) or late (those occurring ≥ 24 hours after the procedure). Those complications arising after the procedure were further defined as minor (abdominal pain, wound infection, fever, peristomal leakage, dislocation, tract disruption, and catheter dislocation or fracture) or major (hemorrhage requiring blood transfusion, pneumoperitoneum, peritonitis, aspiration, and any complication of the tube insertion requiring radiologic intervention or surgery). Patient follow-up was assessed monthly, by the surgeons in all cases, to document subsequent complications. The occurrence of death was recorded and assessed to determine whether it had any relationship with the jejunostomy procedure.

The patients were followed up until removal of the G-tube for 19 – 906 days (median: 106 days) after tube insertion. The duration of administration of the liquefied diet was 7 – 905 days (median, 69 days) after tube insertion. In five out of 41 SLJT cases, the tubes were not removed. SLJT placement was performed successfully in all 41 patients. There were no procedural failures as a consequence of the tube insertion technique; all tubes were correctly positioned. Of the 41 patients, 20 (48.8%) used home enteral nutrition support through SLJT.

There were no early complications; i.e., no obstruction of the jejunal lumen and no tube failure as a result of tube fracture, displacement, or dislodgement. There were complications, including peristomal leakage, dermatitis, and ulceration, when the SLJT was used for more than three months. There were 6 cases of peristomal leakage (14.6%), 1 case of dermatitis and 1 case of peristomal ulceration as late complications in 6 patients. There are 4 cases of peristomal granuloma (9.8%). No tube-related death or long-term major morbidity occurred as a consequence of the SLJT procedure.

This is the first study of jejunostomy using G-tube for esophageal cancer. There are no reports to compare with this study. Exchange of the G-tube under radiologic guidance was effective in patients with peristomal leakage. As a rule, the G-tube is generally removed after confirming the amount of postoperative oral meal intake and is performed postoperative removal of the G-tube one month later. Bleeding was observed after removal in some cases. However, the bleeding usually ceased within a short time. The fistula was generally closed within one or two days. But the tract was closed at about 3 weeks after removal of the G-tube in only one case of 36 removed cases (2.8%).

3 Conclusion

This SLJ placement technique using the G-tube is a safe procedure in patients with EC that allows the creation of a long-term feeding jejunostomy.

Reference


