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**Original Research Article**

# Single purse string suture feeding jejunostomy technique for enteral nutrition following corrosive ingestion

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## ABSTRACT

**Background:** Maintaining nutrition in a corrosive poisoning patient is a challenging job. Despite other methods of enteral nutrition like nasogastric/naso jejunal tube, feeding gastrostomy –jejunostomy tube (JT) is most suitable for patients where esophagus and/or stomach is not available for enteral nutrition like esophageal carcinoma/gastric malignancy/ corrosive stricture esophagus.
**Methods:** A single institution review of patients who underwent open JT placement between 2019 and 2022 was performed. Retrospectively data collected included demographics, operative technique and clinical outcomes. complications were analyzed postoperative period (<30 days) and in a long-term follow-up (>30 days). The Chi-square test was used to compare.
**Results:** Operative time to create JT in single purse string is around average 26.96±3.22 minutes compared to double purse string is around 37.4±5.53 minute. During definitive surgery after approximately 6 month of history of corrosive ingestion easier and less time required to separate JT (14.96±3.03 minute) in single purse string compared to double purse string (20.48±3.88 minute) both result is significant. 8% (2 cases) JT site adhesion found in single purse string which is less compared to double purse string 36% (9 cases). Only 1 (4%) patient had JT site compromised bowel present in single purse string which is more in double purse string 10 cases (40%).
**Conclusions:** The technique described here is safe and simple, and the overall tube-related morbidity is low. This procedure can be recommended in cases at risk for major morbidity and nutrition support needs.

**Keywords:** Surgical feeding jejunostomy, Corrosive ingestion, Single versus double purse string

## INTRODUCTION

The first person to accomplish the feeding jejunostomy procedure was Bush in 1858 in a patient with Non operable cancer (Gerndt and Orringer, 1994).

Jejunostomy is an ideal route for administering nutritional support.[1,2] Advantages of a feeding jejunostomy over gastrostomy include reduced nausea, vomiting, and risk of pulmonary aspiration via gastroesophageal reflux. Surgical feeding jejunostomies are performed in malnourished patients with an anticipated lengthy postoperative course, in patients with pathology of the upper GI tract, including gastroparesis, malignancy, corrosive injury, fistula, and anastomotic leaks proximal to the potential jejunostomy site, and in patients who are not candidates for endoscopic, fluoroscopic, or laparoscopic insertion of feeding jejunostomies or who have failed these approaches.

The potential value of nutritional repletion in patients undergoing major operative procedures in order to minimize operative complications has been evaluated in numerous studies. Generally, a value of enteral nutrition support in this setting has been primarily demonstrated through preoperative or perioperative nutrition efforts

where feasible, while there is less evidence for benefits from routine postoperative nutrition support.[3-8] However, postoperative enteral nutrition may still be valuable in settings of major complications, benefit earlier discharge, lead to shortened recovery or improve the ability to undergo postoperative therapy.[9,10]

A previously described simplified technique of jejunostomy tube (JT) placement that is thought to be characterized by technical ease, minimal additional operating time, maximal safety and minimal device-related morbidity is now evaluated for circumstances of clinical use and related outcomes.[11]

Following study is aimed at comparing single versus double purse string technique for FJ performed on patients suffering from corrosive poisoning.

## METHODS

This retrospective study of consecutive 50 patients operated for feeding jejunostomy at two university linked teaching hospitals during 2019 to 2022. The data were collected from hospital records section and patients during their follow up visits. Statistical analysis of results was done with Microsoft Office - Excel 2013.

### *Clinical data analysis*

This retrospective comparative study is performed at the general surgery department in Government Medical College, Surat, Gujarat. Patients who suffered from corrosive poisoning and underwent surgical JT creation between 2019 to 2022 were included in the study. Patients other than corrosive ingestion and who lost to follow up were excluded from the study.

Total 50 patients were included in the study. They were divided into two groups. Group A (n=25) – in whom single purse string JT were done and group B (n=25) - in whom double purse string JT were done.

### *Feeding jejunostomy technique*

Key steps can be summarized as follows.

A 14-Fr Ryles tube is inserted through the abdominal wall at lateral border of rectus abdominis muscle.

Tunneling of the catheter through the abdominal wall musculature is directed in an oblique direction towards the pelvis to lengthen the ensuing abdominal wall tunnel. this ascertain aboard reentry direction, if the tube ever has to be replaced at a later point of time.

A circular seromuscular single purse-string suture using 2-0 silk on the antimesenteric jejunal border is placed at desired site-30 cm from the ligament of Treitz (Figure 1).

The Ryles tube is inserted into the jejunal lumen through enterotomy via diathermy in the center of purse string, and the single purse-string suture is tied (Figure 2).

Jejunal wall and parietal peritoneum approximated with interrupted four directional (12, 3, 6, 9 O'clock) suture with silk 2-0 (Figure 3).

The tube is sutured to the outside skin with 1-0 silk.

Feeding started on post-operative day 3 or until distention and ileus have resolved appropriately and amount was gradually increased to avoid hyperosmolar damage to intestine.

**Figure 1: A circular seromuscular single purse-string suture.**

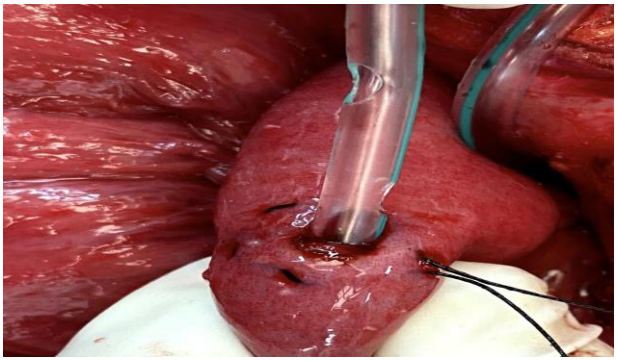

**Figure 2: The Ryles tube is inserted into enterotomy site.**

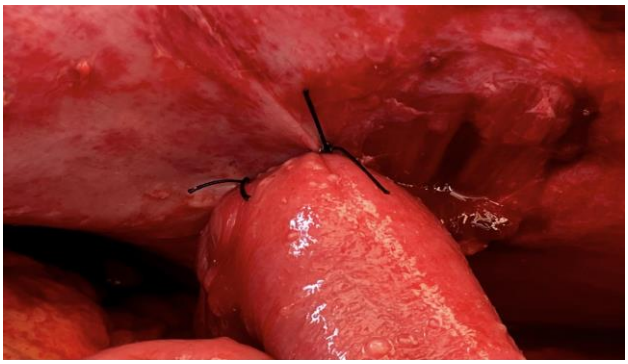

**Figure 3: JT fixed to peritoneum.**

## RESULTS

As per data suggest the average age of corrosive injury is around 26-27 years old. 47 cases (94%) had a history of acid ingestion compared to alkali 3 cases (6%). Majority of cases are with suicidal tendency 47 cases (94%). Operative time to create JT in single purse string is around average 26.96±3.22 minutes compared to double purse string is around 37.4±5.53 minute. During definitive surgery after approximately 6 month of history of corrosive ingestion easier and less time required to separate JT (14.96±3.03 minute) in single purse string compared to double purse string (20.48±3.88 minute) both result is significant.

8% (2 cases) JT site adhesion found in single purse string which is less compared to double purse string 36% (9 cases). Only 1 (4%) patient had JT site compromised bowel present in single purse string which is more in double purse string 10 cases (40%).

There are different complications of feeding jejunostomy such as leak into the peritoneal cavity, tube dislodgement, jejunal perforation, enterocutaneous fistula, abscess intra-abdominal/cutaneous, small bowel gangrene, peritubal leak, tube detachment, tube block, JT site intussusception, electrolyte imbalance, feeding intolerance not found in our study.

No intravenous medications were required for device-related infections or symptoms, 5 (10%) patients required suture placement at the cutaneous JT entry site after removal of the tube rather than the occluding adhesive paper strips otherwise used, all sites healed well without need for additional interventions.

**Table 1: Demographic data of patients.**

| Total n=50 | Group A (n=25) single purse string | Group B (n=25) double purse string | |
|---|---|---|---|
| **Age (years)** | Male/female | Male/female | **Chi square- 0.32, p value - 0.57, non-significant at p <0.05** |
| **<30** | 13 | 11 | |
| **>30** | 12 | 14 | |
| **Total** | 25 | 25 | |

**Table 2: Surgical outcome of patients.**

| Total n=50 | Group A (n=25) single purse string | Group B (n=25) double purse string | |
|---|---|---|---|
| **Acid ingestion** | 22 | 25 | **Chi square-5.66 p value-0.12 Non-significant at p <0.05** |
| **Alkali ingestion** | 03 | 00 | |
| **Suicidal ingestion** | 23 | 24 | |
| **Accidental ingestion** | 02 | 01 | |
| **Operative-related complications** | 00 | 00 | - |
| **Operative time to create JT (minutes, mean±SD)** | 26.96±3.22 minute | 37.4±5.53 minute | 0.00001 Significant at p<0.05 |
| **Operative time to separate JT during definitive surgery (minutes, mean±SD)** | 14.96±3.03 minute | 20.48±3.88 minute | 0.00001 Significant at p<0.05 |

**Table 3: Complication associated with JT.**

| Total n=50 | Group A(n=25) single purse string | Group B (n=25) double purse string |
|---|---|---|
| **Jejunal site infection** | 00 | 00 |
| **Surgical site infection** | 00 | 00 |
| **Accidental removal** | 00 | 00 |
| **Intestinal obstruction/ volvulus** | 00 | 00 |
| **Gastro intestinal discomfort** | 00 | 00 |
| **Leakage of intestinal secretion** | 00 | 00 |
| **Peritonitis** | 00 | 00 |
| **Abdominal distension** | 00 | 00 |
| **Adhesion at JT site** | 02 | 09 |
| **Compromised jejunum at JT site** | 01 | 10 |

## DISCUSSION

Enteral feeding is the preferred option over parenteral nutrition in patients with normal bowel function who require prolonged nutrition support, and in some cases, a JT feeding is necessary.[12,13] The techniques of constructing a feeding jejunostomy vary from surgical, laparoscopic, endoscopic, and radiologic techniques. Several studies have shown advantages to enteral over parenteral nutrition access, and have demonstrated that the use of intestinal postoperative feeds is feasible and safe.[6,14] Irrespective of the actual benefit of enteral nutrition support in the postoperative setting, feeding tubes can still be reasonably placed as prophylactic measures at the time of major upper gastrointestinal and pancreatic resections.[15-17]

Bowel obstruction distal to the site of tube implantation is absolute contraindication to a FJ. Relative contraindications are: abdominal wall infection at the placement site, severe ascites, peritonitis, history of bowel necrosis from the previous jejunostomy, systemic severe coagulopathy, hemodynamic instability requiring the use of vasopressors, and ventilatory dependence preventing transport to the operating room.[3,18]

As the stomach and duodenum are bypassed, there is the possibility of deficiencies of vitamin B12 and iron, absorbed through these two organs, respectively.

The described technique has been used in terms of absence of major morbidity, and has provided reliable access for enteral nutrition support whenever required.

It is concluded that the feeding JT technique described is a safe, simple and reliable procedure with minimal additional operative time requirements. Blocked tubes are easily replaced without guidewire or imaging support, the potential for long-term access is given and tube removal is generally uncomplicated. Avoidance of a Witzel tunnel is likely related to the fact that no intestinal obstructive events were observed.

The overall tube-related morbidity is limited and of low severity, with no cases of obstruction, volvulus or intra-abdominal leakage and therefore no need for any reoperation or interventional drainage. The technique can be recommended to surgeons who consider providing intraoperative enteral feeding access for the moderate to high nutritional risk patient.

Single purse string pros are shorter operation time, less adhesions, easy to separate during definitive procedure however larger study required to established definitive result compare to double purse string which is widely accepted procedure, longer operative time, more adhesions after JT and slightly difficult to separate from peritoneum from single purse string.

Double versus single purse string suture- as data suggest that better outcome is achieved by easier procedure like single purse string feeding jejunostomy with shorter operative time. In reference to definitive procedure especially in case of corrosive stricture of esophagus. It serves two purposes, one is to build patient for major definitive esophageal reconstructive procedures such as colon interposition and secondly, ease of doing abdominal portion of definitive procedure due to less adhesions and separation of jejunal loop with less injury.

Feeding jejunostomy pros are: maintains mucosal protection: provides nutrients, which are needed in the intestinal lumen to maintain the structural and functional integrity of GI tract. Enteral feeding prevents atrophy of intestinal mucosa; and maintains or preserves mucosal protein concentration, digestive enzyme function and GI lgA secretion. Intact mucus membrane prevents bacterial translocation, and therefore prevents possible risk of sepsis.

EN supplies· gut-preferred fuels (glutamine, glutamate and short chain fatty acids), unlike standard PN; more physiological - the liver is not by-passed. So hepatic ability to take up, process and store the various nutrients for later release on neural or hormonal command is maintained. Prevents cholelithiasis by stimulating gallbladder motility. Fewer serious complications and it also avoids known and potential complications of PN. Less costly and easier to maintain than PN. Because of potential advantages of EN, whenever possible, provision of even "token" enteral supplementation is recommended to patients receiving total PN support.

Cons are: procedure related complication: infection, bleeding, trauma, perforation; mechanical -tube blockage, dislodgement; infectious- tube site infection, abscess, food contamination; gastrointestinal-diarrhea, abdominal pain, bloating, abdominal distention; and metabolic-hyperkalemia, hyperglycemia, hypophosphatemia, hypomagnesemia, hypozincemia.

### *Limitation*

Larger study required to established definitive result.

## CONCLUSION

In summary, single purse string jejunostomy using a 14 Fr Ryles tube jejunal feeding tube is feasible, safe, and simple, with a high technical success rate. It is a potential practical alternative to the double purse string jejunostomy because less operative time, less operative site adhesions leads to easier to take down FT site during definitive surgery, minimal bowel handling with no specific complication related to method.

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