

## Enteral Access for Severe Acute Pancreatitis

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### Description

Acute pancreatitis (AP) is associated with a catabolic and hypermetabolic state. Approximately 20% of AP cases are severe, manifesting as the systemic inflammatory response syndrome (SIRS) associated with multiorgan dysfunction (MOD) and a 15% to 40% mortality [1]. Nutrition support is critical in severe acute pancreatitis (SAP). Early enteral nutrition is safe and beneficial in SAP and its use is linked to better glycemic control, reduced infectious complications, and reduced multiorgan failure and mortality. Enteral nutrition may be provided by the gastric or jejunal route in patients with SAP. The placement of feeding tube and route selection is the key to the implementation of enteral nutrition.

**Abbreviations:** AP: Acute Pancreatitis; MOD: Multiorgan Dysfunction; NG: Nasogastric; NJ: Nasojejunal; PEG: Percutaneous Gastrostomy Performed Endoscopically; PEJ: Percutaneous Jejunostomy Performed Endoscopically; PG: Percutaneous Gastrostomy; PG-J: PG With A Jejunal Extension; PJ: Percutaneous Jejunostomy; PLG: Percutaneous Gastrostomy Performed Laparoscopically; PRG: Percutaneous Gastrostomy Performed Radiologically; PSG: Percutaneous Gastrostomy Performed Surgically; PSJ: Percutaneous Jejunostomy Performed Surgically; SAP Severe Acute Pancreatitis; SIRS: Systemic Inflammatory Response Syndrome

### Methods for Establishing Enteral Access

Enteral route can be carried out by the nurse, endoscopist, radiologist or surgeon. There are four kinds of methods of feeding tube placement for patients with SAP.

#### Nasogastric (NG)/nasojejunal (NJ) tube

Bedside nasogastric or nasoenteric tube placement is the most common enteral access technique used in the patient with SAP. The nasogastric tube placement is simple and convenient, and can be operated by nurses, but the techniques of placing nasojejunal tube are more difficult and challenging, which are often accomplished by endoscope or fluoroscopical guide. The endoscopic technique as a more popular method is widely used in clinical practice. The obvious advantage placed under

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the endoscopic is that it can be performed at the bedside and has a high success rate. Recently, a novel method for placing nasojejunal tube at bedside with the monitoring of ultrasound in real time has been used in patients with SAP. The pylorus could be visualized in a large proportion of patients undergoing this method. At the same time, it solves the problem that no real-time controls of tip position while placing nasojejunal tube at the bedside and reduces time consuming and costs. The success rate can be up to 93.3% [2]. The meta-analysis study of Nally DM found that NG feeding is efficacious in 90% of patients in SAP [3]. Singh N [4] compared NJ and NG feeding in patients with AP found that NG and NJ did not lead to recurrence or worsening of pain.

The major advantages of NG tube placement were its simplicity and clinical applicability, obviating the need for NJ tube placement with endoscopic assistance. Nasogastric feeding was not inferior, well tolerated and not associated with any major complications compared with NJ feeding. The placement and use of NG and NJ tube are associated with complications. The longer the tube remained in placed the easier the complications occurred. Moreover, the uncomfortable feeling after prolonged use leads to the rejection among patients who is awake. In general, NG and

NJ tube are recommended in patients required enteral feeding for 4 weeks or less.

### Percutaneous gastrostomy tube placement (PG)

PG is the establishment of an artificial access using a catheter, between the stomach and the abdominal wall, which can be performed endoscopically (PEG), surgically (PSG), laparoscopically (PLG) or radiologically (PRG). Surgical gastrostomy is typically reserved for patients who are already going to performing another surgical procedure. The main advantage of the endoscopic method is that it can be done at the bedside. In addition, endoscopic examination avoids patient radiation exposure, and it can also reveal physiological abnormalities of the patients. Both PEG and PRG insertion techniques compare favorably in terms of the majority of peri and post procedural complications, however, the rates of tube dislodgement were significantly higher in the PRG group compared with PEG [5]. A meta-analysis conducted by Joo Hyun Lim demonstrated that PEG compared to PRG is associated with a lower probability of 30-day mortality which is considered as the most important surrogate index for evaluating the safety and efficacy of percutaneous gastrostomy [6].

Gastrostomy tube dislodgement and catheter occlusion requiring tube replacement are the common associated complication occurring in PRG tubes because its smaller diameter than PEG tubes. So, PEG should be considered as the first choice if the patients were considered to have a long-term enteral tube feeding.

### Percutaneous jejunostomy tube placement (PJ)

PJ is the establishment of an artificial access using a catheter between the small intestine and the abdominal wall, which can be performed surgically (PSJ), laparoscopically (PLJ) or endoscopically (PEJ). Percutaneous jejunostomy placement has high clinical and technical success rates [7]. In generally, patients who are intolerant to gastric feedings and patients with stomach diseased or surgically absent will receive a surgical jejunostomy. Surgical jejunostomy is also a common procedure placed in trauma patients.

A pump must be used and continuous feed initially in enteral feeding through a jejunostomy. The big problem is that the patient might not tolerate eventual escalation to bolus feeding which have an adverse effect on the patient's quality of life. The most common complication of percutaneous jejunostomy is inadvertent placement of the jejunostomy tube into the peritoneal cavity or intraperitoneal leakage, which can cause peritonitis and death.

### Percutaneous gastrojejunostomy tube placement (PGJ)

In this procedure, a jejunal feeding tube is placed through an existing PEG tube. The jejunal tube is of smaller diameter than the PEG tube. This allows feeding through the jejunostomy tube

and suction through the PEG tube. The literature has several names for this tube system, but the most common used are PEG/J or jejunal extension tube through a PEG. PEG/J allows for gastric suction to reduce regurgitation and provides diet delivery beyond the angle of Treitz is still the better option for the patients in whom gastric emptying is usually lowered due to gastroparesis, particularly in patients with diabetes or with severe comorbidities. Gastrojejunostomy, placement of the feeding tube tip distal to the ligament of Treitz, prevents gastroesophageal reflux (GER) induced by Gastrostomy, which can lead to aspiration pneumonia and cause substantial morbidity [8].

Temporary or long-term nutritional support through PEG/J is a safe and common means of enteral feeding in adults and children and is very well tolerated [9]. Although the placement of a PEG-J is usually technically challenging, scholars have proposed many methods to solve these problems. For example, the modified technique of Ruiz RF is the positioning of the gastrostomy tube close to the pylorus while the jejunal extension is advanced through the duodenum to avoid the formation of a handle inside the stomach of the jejunal extension that usually complicates the procedure and prolongs the time of surgery [10].

## Selection of Enteral Access

The choice of enteral access must take into consideration the phase of the disease, the expected duration of enteral feeding and available experts. The patient must be clearly informed about the advantages and potential risks of each technique. During the early phase, resuscitation is the priority. Once the patient is believed to be stable, it is reasonable to initial try to conduct the enteral feeding. The first choice is placing a nasojejunal tube because it is not invasive and easy to perform. Some patients can be placed through blind insertion method. However, the most common technique used in clinical was placed feeding tube through endoscopic guidance. In the patients with gastroparesis, combined gastric decompression/nasojejunal feeding tube can be used. However, this kind of tube is more difficult to place and easy to dislodge. Patients who develop serious complications, such as pneumonia, and ARDS, may be candidates for PEG-J and PEJ. PEG-J is always preferable to PEJ because of the simultaneous gastric decompression and jejunal feeding. In some patients, PEJ is also a choice for enteral feeding. PSJ is suitable for AP patients who need surgical treatment. There are many methods of surgical jejunostomy, such as Witzel, Stamm, Marwedel, needle puncture and so on. The needle catheter jejunostomy is the most common method for short-term (<4-6 wk) use after operation in the operative patients. The Witzel or Marwedel jejunostomy with the large-bore tube (14, 16 or 18 F catheters) can be used for a long time after operation. The advantage of these catheters is the easy administration of both enteral feedings and medications.

Traditionally, enteral nutrition for patients with SAP was delivered through the jejunal route. It has been suggested that gastric route feeding results in pancreatic stimulation, which ultimately contributes to ongoing symptoms of pancreatitis. Recently, nasogastric tube feeding seems to be feasible in SAP. Comparing

nasogastric and nasojejunal feeding, three randomized controlled trials concluded that there were no differences between the two ways in the length of stay, surgery and mortality rate [4,11,12]. A meta-analysis involving 157 patients concluded that there were no significant differences between nasogastric and nasojejunal feeding in terms of mortality, exacerbation of pain, diarrhea, tracheal aspiration and meeting energy balance [13]. This evidence makes EN more feasible in clinical practice (no more need for endoscopic or radiologic placement of the feeding tube). Considering the limited quality of evidence, when tolerated, nasogastric nutrition appears to be safe. For the patient who can't tolerate nasogastric nutrition, nasojejunal route feeding is recommended. In the future, large-scale and high-quality randomized trials are still needed to determine whether

nasogastric or nasojejunal feeding should be the optimal initial treatment strategy.

In our institute, we tend to perform nasojejunal feeding in patients with high risk of aspiration. For patients who are not in the ICU or at low risk for aspiration, we consider a trial of nasogastric feeding. We will place endoscopic or ultrasound guide nasojejunal feeding-tube for enteral nutrition if the nasogastric feeding was not tolerated.

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