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# Outcomes after laparoscopic gastrostomy suture techniques in children

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ABSTRACT

*Background:* There are various suture techniques used during laparoscopic gastrostomy to secure the stomach to the anterior abdominal wall. However, it remains unclear whether temporary fixation or subcutaneous absorbable sutures predispose pediatric patients to fewer postoperative complications. Our goal was to determine if a particular suture technique resulted in an increased risk for the development of postoperative complications.

*Materials and methods:* A retrospective cohort analysis was performed for patients less than 18 y of age who underwent laparoscopic gastrostomy at a tertiary Children's Hospital between 2012 and 2016. Children were grouped according to suture techniques for laparoscopic gastrostomy placement: temporary sutures or subcutaneous absorbable sutures. Postoperative outcomes at 30 d were defined as major complications (tube dislodgement, unplanned reoperation, readmission) and minor complications (stitch abscess, surgical site infection, emergency department visit). The chi squared test was used to determine if an association existed between the suture techniques and 30 d postoperative complications.

*Results:* We identified 682 pediatric patients who underwent laparoscopic gastrostomy. There were 301 (44%) patients with subcutaneous sutures placed and 381 (56%) with temporary sutures placed. The overall rate of major and minor complications was 8.3% and 22%, respectively. We observed a significant difference in the occurrence of major postoperative complications between the subcutaneous and temporary suture techniques (11% *versus* 6.3%, $P = 0.029$). There was no significant difference in the development of minor complications between subcutaneous and temporary suture techniques.

*Conclusions:* Children who receive subcutaneous sutures during laparoscopic gastrostomy are at an increased risk for developing a major postoperative complication.



## Introduction

Gastrostomy tube placement is a routine surgical procedure among children who require long-term enteral access for various reasons, including failure to thrive, swallowing disorders, and malnutrition.[1] Studies have reported that approximately 11% to 26% of children with gastrostomy tubes will experience complications during the course of their

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treatment, placing great financial burdens on the health care system and caregivers alike.[2] It's been reported that caregivers will spend approximately $37,232 annually on their gastrostomy tube–dependent child as compared with parents with nongastrostomy tube–dependent children who will spend about $15,004 a year.[3] Given the combination of high volume, high complication rate, and high cost, gastrostomy placement and care is an excellent target for value improvement.

Historically, gastrostomy placement has involved securing the stomach to the anterior abdominal wall in a Stamm-like fashion.[4] With the advent of laparoscopic gastrostomy, several methods have been described to mimic the Stamm technique in using a minimally invasive technique, including the use of subcutaneous transfascial abdominal wall sutures and temporary sutures.[5-7] However, it is relatively unknown whether the operative technique, specifically the suture method used, impacts the rate of complications among pediatric patients undergoing gastrostomy tube placement.

Previous studies have compared the various gastrostomy techniques, including open gastrostomy and laparoscopic gastrostomy,[8-12] but relatively few studies have been conducted to compare the various suture techniques used to secure the gastric wall to the anterior abdominal wall. Therefore, it is unclear which suture technique predisposes pediatric patients to the fewest postoperative complications after a laparoscopic gastrostomy. One method of suturing during gastrostomy placement is the use of temporary sutures that remain easily accessible, such as those fastened directly on top of the skin or tied securely atop the gastrostomy button, allowing for removal within a few days of the procedure. Results from published literature suggests that this technique decreases the risk for surgical site infection but increases the risk of tube dislodgment (complication rate of 1.5%), two common complications faced by gastrostomy patients.[7] Conversely, other studies report that the opposite is true for the use of subcutaneous sutures.[13] Subcutaneous sutures are transfascial absorbable sutures that are tunneled beneath the skin and left undisturbed until being completely absorbed within a matter of months. According to the literature, subcutaneous sutures theoretically decrease the risk of tube dislodgment (complication rate reported as low as 0%) but increase the risk of infection.[5,6,13-15]

The goal of our study was to determine if a particular gastrostomy suture technique resulted in an increased risk for the development of postoperative complications or resource utilization. We describe the techniques used among our cohort and compare the rate of complications among each technique after laparoscopic gastrostomy tube placement.

## Materials and methods

We conducted a retrospective cohort analysis of patients under the age of 18 y who underwent laparoscopic gastrostomy placement surgery at a tertiary children's hospital from 2012 to 2016. Children were identified based on current procedural terminology code 43653 for laparoscopic gastrostomy. Patients were excluded from our study if the desired data were incomplete or recorded incorrectly in their charts. The medical records were reviewed and patients were grouped according to the different suture techniques used for gastrostomy placement, either subcutaneous absorbable sutures or temporary sutures.

### *Operative technique for laparoscopic gastrostomy*

Initial peritoneal access and insufflation is achieved by inserting a 5-mm trocar through an umbilical port. An additional 5-mm trocar is placed in the left upper quadrant at the future gastrostomy button site. A selected site on the greater curvature of the stomach is grasped and brought up to the anterior abdominal wall. Two separate sutures are placed through the anterior abdominal wall into the anterior gastric wall as traction sutures. In the subcutaneous technique, the sutures are then tunneled subcutaneously out the site of the future gastrostomy button. The gastrostomy button is placed via a Seldinger technique. Temporary fixation involves either securing the traction sutures over the wings of the gastrostomy button for a period of 24 to 48 h postprocedure or the sutures are removed in the operating room immediately after insertion of the gastrostomy tube (Fig. 1). In the subcutaneous group, the sutures are secured to the fascia through the gastrostomy wound and left to spontaneously dissolve (Fig. 2).

### *Data collection*

Patient demographic characteristics (age, gender, and race/ethnicity), comorbidities, procedure level factors (concurrent operative procedures, suture technique, type of sutures placed, and gastrostomy tube size) were abstracted from the electronic health record.

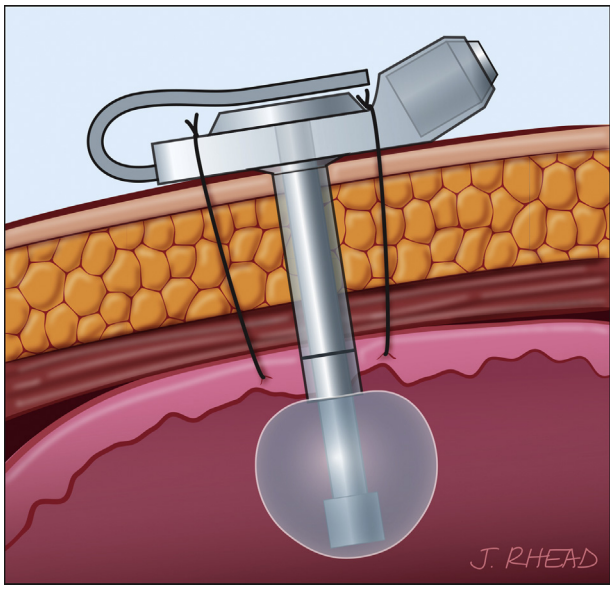


**Fig. 1 – Temporary sutures. Externally fixed sutures that are fastened directly over the wings of the gastrostomy button for a period of 24 to 48 h postprocedure to secure the gastric wall to the anterior abdominal wall. (Color version of figure is available online.) © 2018 Intermountain Healthcare. Used with permission.**