

ORIGINAL ARTICLE

Santulli Enterostomy is an Advantageous Technique in Stoma Closure

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Abstract

Introduction: There are many different indications for creating a stoma in general surgery practice. Although stoma take-down is considered as a minor surgical procedure, it may be associated with severe complications and prolonged length of hospital stay. The aim of the present study was to compare the postoperative outcomes after Santulli enterostomy and conventionally created stoma closure.

Methods: A total of 305 patients who underwent a stoma creation at the jejunal or ileal level between January 2008 and December 2016 were included in the study. Patients with Santulli enterostomy were classified in the study group, whereas others in the control group. Patient demographics, stoma takedown technique, time to oral intake, and length of hospital stay were recorded.

Results: There were 199 male and 106 female patients with a median age of 67 (17–83) years. Of the patients, 76.7% had loop stoma, 11.8% had double-barrel stoma, 6.2% had Santulli enterostomy, and 5.3% had end stoma. Time to stoma closure was similar between the groups (24.9 vs. 24.1 weeks, $p=0.73$). Stapler use was more common in Santulli enterostomy closure (63.2% vs. 34.6%, $p=0.01$). Oral intake after stoma takedown was earlier (2 vs. 4 days, $p<0.001$), and length of hospital stay was shorter (3 vs. 6 days, $p=0.001$) in the Santulli enterostomy group.

Discussion and Conclusion: It is well known that Santulli enterostomy is a good option for patients in whom proximally located stoma is unavoidable. The present study showed that it is also advantageous in stoma takedown.

Keywords: Ostomy; santulli enterostomy; stoma closure.

In general surgery, stoma is formed for many different indications. These stomas may be sometimes temporary and sometimes permanent. Even at a lesser frequency, some of the stomas have to be formed at the level of the small intestine. Surgical and metabolic problems are encountered more frequently in stomas created at the proximal level. Santulli's technique has been described by pediatric surgeons in the surgical treatment of intestinal atresia [1], but it can be safely preferred even in adult patients in whom

stomas have been created at this level because of the inability to perform anastomosis at the proximal level [2, 3].

The Santulli procedure can be described as the removal of the proximal intestinal end as a stoma and making an end-to-side anastomosis to the proximal intestinal loop just behind the stoma of the distal end of the intestine and immediately below the fascia (Fig. 1). This method is beneficial in the early postoperative period with effective fecal diversion and especially contributing to the reduction of metabolic

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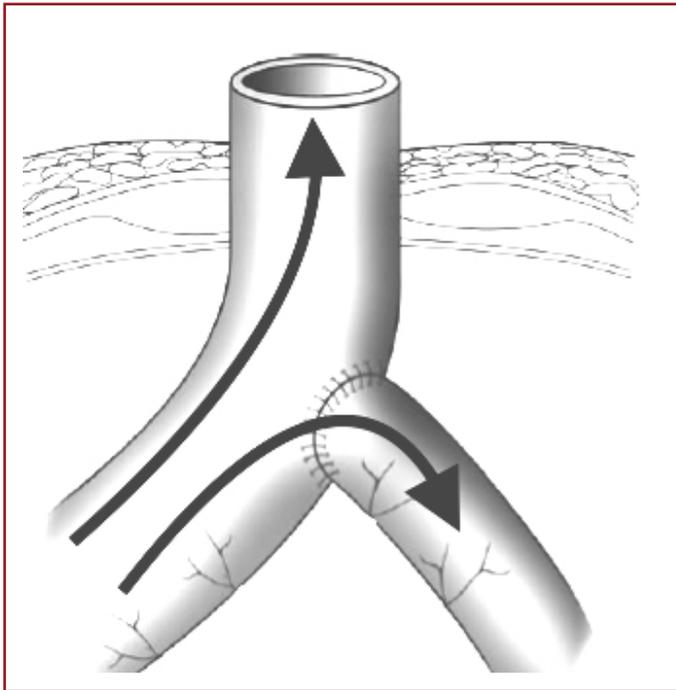


Figure 1. Schematic view of Santulli enterostomy.

problems. On the other hand, although considered as a minor surgical procedure, stoma closure may be associated with serious complications and prolong hospital stay. The aim of the present study was to show that this technique may have obvious advantages during stoma closure.

Materials and Methods

Stomata were created at the jejunal or ileal level between January 1, 2008 and December 31, 2016 in the General Surgery Clinic of Uludağ University Faculty of Medicine. Cases with closed stomas were identified retrospectively according to the International Classification of Diseases codes from the hospital electronic database. Surgical reports and files of these cases were scanned. Our study was designed in accordance with the Declaration of Helsinki. Consent for treatment and medical interventions was obtained from each case. Ethics Committee approval was not necessary since data used in our study were anonymized and retrospectively retrieved from patient files.

Patients who were >18 years old were included in the study. For various indications, in our clinic, we opened their stomas whose proximal ends were at the jejunal or ileal level and then closed at a later date. Patients with colostomies were excluded from the study. Patients who were included in the study were divided into two groups as Santulli enterostomy and other ostomy groups. Patients' characteristics, demographic data, time to stoma take-

down, closure technique, and postoperative results were examined.

Statistical analysis was performed using JMP v.12 (SAS Institute Inc., Cary, NC, USA). Categorical variables were expressed as percentiles, and continuous variables as mean±SD and median (min–max). Chi-square and Fisher's exact tests were used to analyze categorical variables, and Wilcoxon test was used to analyze continuous variables. A *p* value of <0.05 was considered statistically significant.

Results

A total of 305 (men, *n*=199 and women, *n*=106) patients were included in the study. The median age of the patients was 67 (18–83) years. Santulli enterostomy was performed in 19 cases. The indications of stoma formation were fecal diversion in 91.1% of the patients and stomas were created in the remaining 8.9% of the patients because the surgeon considered the formation of anastomosis as a contraindication.

The stomas were constructed as loop ileostomy (76.7%), adjacent ostomy (jejunostomy or ileostomy) (11.8%), Santulli enterostomy (6.2%), and endostomy (5.3%). The most frequent diagnosis in patients in whom stomas were created was rectal cancer (51.5%), followed by perforation (11.5%), ulcerative colitis (9.2%), mechanical intestinal obstruction (8.5%), ischemic pathologies (6.2%), polyposis syndromes (4.9%), colon cancer (1.6%), Crohn's disease (1%), and other pathologies (5.8%).

The majority of the patients with Santulli enterostomy (57.9%) were operated under urgent conditions, whereas 77.5% of the stomas in the other ostomy group were electively created (*p*=0.0005). Jejunal level stomata were present in 5.2% of all cases. However, Santulli enterostomy was performed in 26.3% of the cases in the Santulli enterostomy group and in only 3.8% of the cases in the other ostomy group (*p*=0.0015). The time from creation of stomata to their closure was comparable between the two groups (24.1±17.7 days vs. 24.9±17.8 days, *p*=0.73). Staplers were preferred for closure in 63.2% of the patients in the Santulli enterostomy group, whereas manual closure was used in 65.4% in the other ostomy group (*p*=0.01).

During the postoperative period, it was seen that oral intake was started earlier, and the length of hospitalization was shorter in the Santulli enterostomy group after stoma closure. Rates of postoperative complications were similar (Table 1). Mortality was not detected in the cases included in the present study.

Table 1. Postoperative outcomes after closure of stomas

	Santulli enterostomy group n=19	Other ostomy group n=285	p
Time to oral intake (days)	2 (1-4)	3 (1-11)	<0.001
Hospital stay (days)	3 (1-38)	6 (2-54)	0.001
Complications (%)			
SSI	1 (5.2)	9 (3.1)	0.48
ECF	1 (5.2)	2 (0.7)	0.17
Bleeding	0	1 (0.4)	>0.99
Ileus	0	6 (2.1)	>0.99
Leakage	0	10 (3.5)	>0.99

SSI: Surgical site infection; ECF: enterocutaneous fistula.

Discussion

Temporary intestinal stoma formation is frequently used to protect both distal anastomosis and to keep abdominal sepsis under control. Although closure of the stoma is considered as a minor surgical procedure, various complications may be encountered during the closure of the stoma. In our study, the duration of hospitalization and the time to oral intake after stoma closure were shorter in cases with Santulli enterostomies than in other stoma types, but there was no difference in terms of complication rates.

It has been reported that it is beneficial to ensure the functional integrity of the digestive system after the formation of the Santulli enterostomy because this technique provides effective diversion during the early postoperative period and later on allows partial passage toward distal segments [2]. Although it is not recommended to use it routinely for the purpose of diversion in the preservation of an anastomosis on the distal segment, it is known to be effective in reducing metabolic complications due to high-flow stoma in cases where proximal small bowel resection is required [2, 3]. When creating a stoma, the surgeon usually selects a stoma that may be technically easier to close. The rate of the inability to close temporary stomata ranges from 6% to 32%, which can be up to 50% after the Hartmann procedure [4]. Santulli enterostomies are superior over other conventional types of stomas in that they can be closed extraperitoneally or even under local anesthesia. Santulli enterostomy is frequently the preferred technique by pediatric surgeons for pediatric patient populations operated with the indications of meconium ileus, intestinal atresia, and necrotizing enterocolitis [5, 6]. There was a case series in which colostomy was performed after resection of obstructive colon tumor in the sigmoid or descending

colon in adults using a similar technique [7].

Our series is one of the largest series in the literature on the use of Santulli enterostomy in adult patients. In the study by Topgül et al. and in our previous study, in which we reported our first experiences, obvious advantages of this type of stoma in patients with high-flow stoma and their easier closure have been noted [2, 3]. In the present study, we were able to confirm these results by comparing them with conventional stoma types.

The most important limitation of our study is its retrospective structure. The scarce number of our cases in the Santulli enterostomy group is its another limitation. On the other hand, we believe that our study that reported the outcomes of this stoma technique in adults, which is often applied in pediatric surgery with limited information on its application in adult patients, will contribute to the clinicians. Earlier oral intake and shorter hospital stay are aimed after closure of a stoma. Since Santulli enterostomy can be closed via the extraperitoneal approach under local anesthesia, the patients can be started on oral intake in the very early postoperative period and also discharged from the hospital after a short follow-up period. The results we obtained in our study also support these data. On the other hand, the fact that the complication rates are similar confirms that Santulli enterostomies can be safely used in appropriate cases.

Ethics Committee Approval: Ethics Committee approval was not necessary since data used in our study were anonymized and retrospectively retrieved from patient files.

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