Temporary Transverse Colostomy vs Loop Ileostomy in Diversion

A Case-Matched Study

Yasuo Sakai, MD, PhD; Heidi Nelson, MD; Dirk Larson; Laurie Maidl, RN; Tonia Young-Fadok, MD, MS; Duane Ilstrup

Hypothesis: For temporary fecal diversion, transverse colostomy (TC) has superior safety, but loop ileostomy (LI) has superior management qualities.

Methods: Of patients with TC or LI seen between 1988 and 1997, 63 patients were matched for diagnosis, operative procedure, and date of surgery. The 2 groups were then compared for hospital/postoperative mortality and morbidity and stoma complications.

Results: Mortality rates were 6.3% for the TC group and 1.6% for the LI group (P = .25). Morbidity rates for stoma creation and for stoma closure were 47.6% and 10% (P = .19), respectively, for the TC group, and 36.5% and 6.3% (P > .99), respectively, for the LI group. Most morbidity events were minor, and neither procedure-related nor other medical complications showed a significant difference between the groups. However, patients with a TC were significantly more likely to experience skin trouble around the stoma (TC vs LI, 15.9% vs 3.2%) and leakage around the stoma (TC vs LI, 12.7% vs 1.6%).

Conclusions: Regarding safety, TC and LI should be considered equivalent options for temporary fecal diversion. We recommend further study comparing the 2 procedures with regard to patient perception and quality of life.

Arch Surg. 2001;136:338-342

Fecal diversion is often required for the treatment of diseases affecting the large intestine. While options may be limited for technical or therapeutic reasons, in many circumstances the surgeon is at liberty to select a site according to his or her preference. Preference biases should be influenced by objective data based on the ease of construction, the ease of the reversal procedure, and minimizing rates of morbidities. Equally important are the patient's perception regarding ease of use, management, and quality of life. For left-sided colonic diseases and procedures, the 2 most common stoma options include the loop transverse colostomy (TC) and loop ileostomy (LI).

Historically, the loop TC was widely adopted for the convenience of exteriorization. However, the placement of the stoma between the costal margin and waistline and its relative bulk make it difficult to manage. Further, the waste matter from the TC is both wet and odoriferous. In contrast, the LI can be placed below the belt line, away from bony prominences, and although the effluent is liquid, it typically has a less feculent odor. Current reports suggest a conflict between quality of life outcomes, which favor LI, and morbidity results, which favor the loop TC. Because previous studies have been based on small sample sizes, we chose a larger sample of patients and made further comparisons using matching criteria to ensure equivalent groups of patients.

RESULTS

The total analysis sample consisted of 126 patients, 63 of whom had temporary TC and 63 of whom had LI. The matching variables of the 2 groups are presented in Table 2. There were 54 loop (85.7%) and 9 end-temporary TCs, and 63 LIs identified. Fifty-two patients (83%) in each group underwent elective operations, with preoperative stoma site marking performed by an ET nurse. The median ages for the TC and LI groups were 64 years (range, 35-96 years) and 64 years (range, 28-79 years), respectively (P < .12). There were almost equal numbers of men and
women in this study. 62 and 64, respectively; however, there were more women in the TC group than in the LI group (43 and 21, respectively [P<.001]). The median body mass index (calculated as weight in kilograms divided by the square of height in meters) of the TC group was 25.4 kg/m² (range, 17.7-37.6 kg/m²), and that of the LI group was 25.9 kg/m² (range, 17.6-57.2 kg/m²) (P=.38).

No significant difference was identified in the proportion of obese patients in each group, with 16 of the TC patients (25.4%) and 15 of the LI patients (23.8%) having a body mass index of 30 kg/m² or higher.

Five patients died (4 from the TC group, 1 from the LI group) during the hospital stay after their stomas were created, but none as a result of the stoma or the procedure directly. In the TC group, 3 patients died of pulmonary complications (1 of respiratory failure with chronic obstructive pulmonary disease, and 2 of pulmonary edema), and 1 died of bowel dysfunction after poor appetite and severe uncontrolled diarrhea resulted in general malaise and nutritional failure. One patient in the LI group died of adult respiratory distress syndrome with acute renal failure. All 5 cases were associated with distinct pelvic abscess prior to the primary surgery. No deaths were observed after stoma closure in either group. Hence, overall mortality rates for stoma creation were 6.3% for the TC group and 1.6% for the LI group (P=.25), and for stoma closure, 0% for each group.

Operative and perioperative results are presented in Table 3. There was a significant difference between the groups in the days to the first bowel movement after stoma creation (P<.001). No statistically significant differences were found between the 2 groups with regard to median postoperative hospital stay for both stoma creation (P<.29) and stoma closure (P<.43), or median interval days between stoma creation and closure (P<.88). Seventy percent of 40 patients with TC and 70.9% of 48 patients with LI underwent stoma takedown within 6 months after stoma creation, with a median of 96 days in the TC group and 97 days in the LI group; 42.3% of patients with TC and 39.6% of patients with LI had stoma closure, with the most frequent interval between 1 and 3 months. Neither the operation time (P>.22) nor the estimated blood loss (P>.99) with stoma closure showed significant differences between the groups.
The overall incidence of complications in stoma creation, excluding overlapping cases (ie, those patients with more than 1 complication were included only once), was 47.6% (30/63) in TC (95% confidence interval [CI], 34.9%-60.6%) and 34.9% (22/63) in LI (95% CI, 23.3%-48.0%); this was not found to be a statistically significant difference (P>.13). Overall complications after stoma closure were recognized in 10% of patients with TC (95% confidence interval, 2.8%-23.7%) and in 6.3% of patients with LI (95% CI, 1.3%-17.2%) (Table 6). All but 1 of the complications were procedure-related, such as wound infection and small-bowel obstruction. Transient small-bowel obstruction occurred in 2 patients with TC but was not related to the anastomosis. No anastomotic leakage, intra-abdominal infection or abscess, nor postoperative bleeding were observed in either group.

Forty TC patients (63.5%) and 48 LI patients (76.2%) had stoma closure (P>.18). Furthermore, no significant differences were identified in procedure-related complications and medical complications (P>.99 and P=.18) (Table 4). Abdominal wound infection was the most common operative complication in both groups. Intra-abdominal infection/abscess was the next most common, and occurred more often in the TC group, but the comparison was not statistically different. No stoma wound infections were observed in the stoma creation procedure. Small-bowel obstruction was seen in 3 patients with LI and 2 with TC. One of the 3 patients with LI required surgery owing to adhesions around the stoma that resulted in kinking of the proximal limb.

Overall rates of stoma-related complications showed no significant difference (P>.48). Skin trouble around the stoma and leakage of the appliance were significantly more common in TC than in LI (P=.04, P=.04) (Table 5). Because of the high output and excessive electrolyte loss through the stoma, prolonged intravenous infusion therapy, orally administered drugs, and diet therapy were required in 4 patients with LI (P>.12). Two patients with TC experienced retraction of the stoma resulting in skin trouble and leakage of the appliance, and 1 patient with LI developed a parastomal hernia and required surgery later. Other complications such as bleeding or hematoma requiring treatment, prolapse, and fistula were not seen in either stoma group.

Forty TC patients (63.5%) and 48 LI patients (76.2%) had stoma closure (P>.13). Overall complications after stoma closure were recognized in 10% of patients with TC (95% confidence interval, 2.8%-23.7%) and in 6.3% of patients with LI (95% CI, 1.3%-17.2%) (P>.9) (Table 6). All but 1 of the complications were procedure-related, such as wound infection and small-bowel obstruction. Transient small-bowel obstruction occurred in 2 patients with TC but was not related to the anastomosis. No anastomotic leakage, intra-abdominal infection or abscess, nor postoperative bleeding were observed in either group.

The overall incidence of complications in stoma creation, excluding overlapping cases (ie, those patients with more than 1 complication were included only once), was 47.6% (30/63) in TC (95% confidence interval [CI], 34.9%-60.6%) and 34.9% (22/63) in LI (95% CI, 23.3%-48.0%); this was not found to be a statistically significant difference (P>.18). Furthermore, no significant differences were identified in procedure-related complications and medical complications (P>.99 and P=.18) (Table 4). Abdominal wound infection was the most common operative complication in both groups. Intra-abdominal infection/abscess was the next most common, and occurred more often in the TC group, but the comparison was not statistically different. No stoma wound infections were observed in the stoma creation procedure. Small-bowel obstruction was seen in 3 patients with LI and 2 with TC. One of the 3 patients with LI required surgery owing to adhesions around the stoma that resulted in kinking of the proximal limb.

Overall rates of stoma-related complications showed no significant difference (P>.48). Skin trouble around the stoma and leakage of the appliance were significantly more common in TC than in LI (P=.04, P=.04) (Table 5). Because of the high output and excessive electrolyte loss through the stoma, prolonged intravenous infusion therapy, orally administered drugs, and diet therapy were required in 4 patients with LI (P>.12). Two patients with TC experienced retraction of the stoma resulting in skin trouble and leakage of the appliance, and 1 patient with LI developed a parastomal hernia and required surgery later. Other complications such as bleeding or hematoma requiring treatment, prolapse, and fistula were not seen in either stoma group.

Forty TC patients (63.5%) and 48 LI patients (76.2%) had stoma closure (P>.13). Overall complications after stoma closure were recognized in 10% of patients with TC (95% confidence interval, 2.8%-23.7%) and in 6.3% of patients with LI (95% CI, 1.3%-17.2%) (P>.9) (Table 6). All but 1 of the complications were procedure-related, such as wound infection and small-bowel obstruction. Transient small-bowel obstruction occurred in 2 patients with TC but was not related to the anastomosis. No anastomotic leakage, intra-abdominal infection or abscess, nor postoperative bleeding were observed in either group.
Results from this study did not identify any statistically significant differences in the incidence of complications between TC and LI in both stoma creation and closure. The present study was not a randomized trial but a retrospective case-matched study, which was controlled for the variables of diagnosis, operative procedure, and date of surgery. It consisted of a total of 126 cases in the 2 matched cohorts and compared the 2 temporary stomas in terms of morbidity and mortality experienced during the hospital stay. Results suggest that from a surgical standpoint (ie, parameters of recovery and complications) the 2 stoma procedures are equivalent.

Past studies have not been in agreement as to whether LI or TC is preferable for temporary fecal diversion. Some authors have advocated that LI is best for temporary diversion because of its ease of construction and management and the infrequency of complications. Others support routine use of TC, claiming fewer complications from this procedure. The lack of agreement between these studies may be due to any number of variables regarding patient background (diagnosis, general conditions) and operative factors (procedures and timing of surgery). Furthermore, several studies either failed to directly compare the 2 options or compared the techniques but did not assure equal surgeon experience with both. The reports that did provide direct comparisons contained relatively small numbers of patients in each group. This case-matched study was undertaken to help resolve this conflict. Because our findings indicate little difference between TC and LI in terms of complications and safety, surgeons should select the procedure with which they are most familiar. Alternatively, the stoma should be chosen because of the stoma-related complications. Data from this study demonstrate significantly more problems with skin trouble and leakage around the stoma for the TC procedure. Both of these procedures can seriously impair a patient’s lifestyle and therefore, these issues should seriously be considered.

Stoma closure was not indicated in 30% of the patients in each group because of poor general health, limited life expectancy, recurrence of neoplasm, or patients’ preference. It is said that at least 15% of intended temporary stomas will turn out to be permanent. If the surgeon chose a position for the stoma during surgery without the benefit of discussion with the patient and stoma site marking, poor stomal positioning could have related to the significantly higher incidence of stoma complications and resulted in adversely affecting the patient’s quality of life. Preoperative stoma therapy education by a certified ET nurse should have a positive effect on the outcome.

Having established the procedures as equally safe, we are now in the process of scrutinizing quality of life issues. Survey instruments are being developed to examine in a reproducible fashion the patients’ perceptions of each stoma type. Classically, the TC has been less desirable owing to the feculent odor factor and the subcostal location. The location of the TC is particularly challenging for patients with a narrow width of the costal margin, with previous incisions, or with irregularities or concavities of the upper abdominal wall. In contrast, the convexity of the subcutaneous tissues around the right lower quadrant is often ideally suited for appliance adherence. The literature suggests that TC may be superior in maintenance of hydration status based on the additional absorption capacity of the right colon. We did not find a significant difference between TC and LI in the frequency of high-output dehydration, there were no episodes in the TC group but 6.3% of patients in the LI group did experience episodes, suggesting a trend. The fact that differences in the occurrence of high-output dehydration were not detected between the 2 groups could represent under-reporting, since detailed measurements were not prospectively collected. Relying on recall would underestimate such events. Furthermore, this article cannot comment on long-term risks of hydration problems, since these were all temporary stomas.

Both TC and LI were associated with surprisingly few complications in stoma closure. A few reports have described such high rates of stoma closure complications to discourage the use of fecal diversion for protecting low rectal or coloanal anastomosis. In this study, neither operation time nor estimated blood loss revealed significant differences between both groups at stoma closure, although 5 of 48 patients with LI closure and no patients with loop TC closure required an approach through midline incision because of extensive adhesions. These acceptably low rates of morbidity for both procedures in our study suggest that stoma closure is safe. However, reversal of the stoma, especially an LI, is not always just a local procedure. Current techniques, greater familiarity, and attention to detail contribute to the ac-

<table>
<thead>
<tr>
<th>Complication</th>
<th>TC (n = 63)</th>
<th>LI (n = 63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stoma retraction</td>
<td>2 (3.2)</td>
<td>0</td>
</tr>
<tr>
<td>Skin trouble around the stoma</td>
<td>10 (15.9)†</td>
<td>2 (3.2)</td>
</tr>
<tr>
<td>Leakage around the stoma</td>
<td>8 (12.7)†</td>
<td>1 (1.6)</td>
</tr>
<tr>
<td>Parastomal hernia</td>
<td>0</td>
<td>1 (1.6)</td>
</tr>
<tr>
<td>Dehydration due to high output</td>
<td>0</td>
<td>4 (6.3)</td>
</tr>
<tr>
<td>Total</td>
<td>12 (19.0)</td>
<td>8 (12.7)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage) of patients. TC indicates transverse colostomy; LI, loop ileostomy.†P < .04 vs LI; all other comparisons are nonsignificant.

<table>
<thead>
<tr>
<th>Procedure related</th>
<th>TC (n = 40)</th>
<th>LI (n = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal wound infection</td>
<td>1 (2.5)</td>
<td>2 (4.2)</td>
</tr>
<tr>
<td>Bowel obstruction treated</td>
<td>2 (5.0)</td>
<td>0</td>
</tr>
<tr>
<td>without surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>0</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>1 (2.1)</td>
<td></td>
</tr>
</tbody>
</table>

*Data are given as number (percentage) of patients. TC indicates transverse colostomy; LI, loop ileostomy.
ceptable complication rates for stomal reversal. Timing of closure is probably also important, and although not specifically examined in this study, we agree with the observations of other authors that closure after 3 months is preferable to earlier closure.11,13,19

Although TC was equivalent to LI when measuring parameters of safety, LI showed significant advantages in stoma management. Since both stomas are equally feasible as methods of fecal diversion, the selection process should be left to the surgeon and patient. Further studies examining the patients’ preferences are under way.

Presented at the annual meeting of the American Society of Colon and Rectal Surgeons, Boston, Mass, June 27, 2000.

Corresponding author: Heidi Nelson, MD, Division of Colon and Rectal Surgery, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (e-mail: nelson.heidi@mayo.edu).

REFERENCES