LAPAROSCOPIC RADICAL CYSTECTOMY WITH INTRACORPOREALY CONSTRUCTED Y-SHAPED ORTHOTOPIC ILEAL NEOBLADDER USING NONABSORBABLE TITANIUM STAPLES EXCLUSIVELY

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ABSTRACT

Increasing evidence in published reports has suggested that titanium staples may be well tolerated inside the urinary tract. Recently, the Italian Group from Piedmont described an “easy, fast, and reliable” technique of a Y-shaped ileal neobladder that was created during open surgery with nonabsorbable mechanical staples. They observed an acceptable 6% rate of stone formation at a median follow-up of 20 months (range 8 to 47).

We describe our initial experience with laparoscopic Y-shaped orthotopic ileal neobladder constructed entirely intracorporeally using titanium staples exclusively in an attempt to mitigate the time-consuming and skill-intensive task of freehand suturing required during laparoscopic creation of continent reservoirs.


CASE REPORT

A 66-year-old man, with a body mass index of 30 and American Society of Anesthesiologists class I, was diagnosed with Stage T2G3 transitional cell carcinoma of the bladder. He had a negative metastatic workup. After laparoscopic radical cystectomy, pelvic lymph node dissection, and bowel work, previously described in detail elsewhere,2 a 45-cm-long isolated ileal loop was placed in a U-shaped position with both its extremities facing the patient’s head. A stay stitch was passed at the mid point of this isolated loop and pulled cephaled, placing it in a W-shaped configuration. Subsequently, a 2.0-cm incision was made at this mid point on the antimesenteric border, and the jaws of the Endo-GIA stapler were gradually accommodated into each side of the loop (Fig. 1). After this, the two central segments of the loop were carefully positioned, brought together, and detubularized at the antimesenteric border with two sequential firings of the 60 × 3.5-mm Endo-GIA stapler. The recently fashioned central part of the Y-shaped neobladder (two limbs of 12 cm for a total of 24 cm) was then unfolded back into the deep pelvis and its limbs (10

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cm each) were pulled cephalad (Fig. 2). This maneuver set up an excellent alignment for the subsequent anastomosis of the neobladder with the urethra and ureters, which were performed with intracorporeal freehand laparoscopic suturing.

The total surgical time was 10 hours, including 5.5 hours for the radical cystectomy and pelvic lymphadenectomy, 1.5 hours for the bowel work, 20 minutes to create the central part of the neobladder, 2.0 hours for the ureteroileal anastomosis and urethral-ileal anastomosis, and 40 minutes for specimen extraction and closure. The estimated blood loss was 350 mL. The patient did not require a blood transfusion. No intraoperative complications occurred. The patient resumed oral fluid and ambulation on postoperative day 3. A retrograde “pouchogram” was performed on postoperative day 14, showing a tiny leak at the urethral-intestinal anastomosis. It was managed conservatively with additional urethral catheterization (Fig. 3). Pathologic examination revealed pT2G3 transitional cell carcinoma with negative surgical margins and pelvic nodes.

In an attempt to decrease the overall surgical time associated with totally intracorporeally constructed continent reservoirs, we evaluated the feasibility of performing the Y-shaped ileal neobladder, as described by Fontana et al., laparoscopically. The major advantage of this technique when applied to laparoscopy is the use of nonabsorbable titanium staples to create expeditiously the actual pouch. Because laparoscopic absorbable staples are not yet available, the possibility of using titanium staples to construct an ileal neobladder intracorporeally has considerable appeal and would mitigate the time-consuming and skill-intensive task of laparoscopic freehand suturing.

Although it is an ongoing concern that the use of nonabsorbable materials inside the urinary tract may lead to stone formation, growing evidence in published reports has suggested that titanium is well tolerated in the urinary tract because of its corrosive resistant nature, low toxicity, and excellent tissue and fluid biocompatibility. This has been illustrated by the Washington University experience. They have been using nonabsorbable titanium staples to secure the bladder cuff reliably during laparoscopic nephroureterectomy. In a follow-up of more than 10 years, they have never observed stone formation at the staple line, even when the staples were not covered by the vesical mucosa. Similarly, the Washington University group has attested to the safety of using nonabsorbable titanium staples during reconstructive upper urinary tract procedures (pelvioplasty), with no stones observed at a median follow-up of 27 months.

Nonetheless, 3 to 7-mm stones have been reported to form on almost 50% of titanium staple lines during laparoscopic-assisted continent uri-
nary diversion (Mainz pouch II) in a porcine model.\textsuperscript{11} The discrepancy in stone formation rates in that study compared with the 0% stone formation rate in clinical and experimental studies using titanium staples to secure the bladder cuff may have been related to mucous production in the first study, which could predispose to a greater tendency for the staples to be coated, providing a favorable environment for stone formation. Moreover, although the bladder cuff staples remain in the adventitial layer with tight apposition of the urothelium, the staples in the urinary reservoir are exposed to the bowel mucosal layer. Furthermore, the presence of feces inside the pouch in contact with urine may have contributed to this high rate of stone formation at the staple line.\textsuperscript{8}

In the study of Fontana \textit{et al.},\textsuperscript{10} an acceptable 6\% rate of stone formation was observed in the neobladder at mean follow-up of 20 months (range 8 to 47).\textsuperscript{10} Nonetheless, the investigators reported that these stone cases were easily treated with an endoscopic approach. At our institution, we have used the Y-neobladder technique with titanium staples in the past three open cases. Encouraged by our initial results with this technique during open surgery and supported by our prior clinical experience with advanced laparoscopic pelvic surgery, we decided to perform an intracorporeally created ileal reservoir. Although our overall intraoperative time was quite long, approximately 10 hours, it was comparable to the 9-hour operative time reported by Gill and colleagues\textsuperscript{2} during their initial experience with laparoscopic orthotopic neobladder. Nonetheless, we believe that the use of the Endo-GIA stapler to detubularize the bowel and create the actual pouch saved considerable time, and we took only 20 minutes to fashion the central part of the neobladder. Moreover, the entire bowel work required 100 minutes, somewhat longer than that reported by the Italian group, which took a median of 90 minutes (range 70 to 110).

CONCLUSIONS

Laparoscopic creation of a Y-shaped orthotopic ileal neobladder using nonabsorbable staples is feasible and may reduce the overall surgical time required for this intricate operation. Longer follow-up on the use of titanium staples during reconstructive urologic procedures is necessary.

REFERENCES