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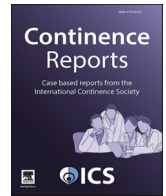
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Urinary undiversion reconstruction after bilateral long-segment ureteral transection during pelvic surgery: A case report

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ABSTRACT

Bilateral long-segment ureteral transection during colorectal surgery is an exceptionally rare and complex complication that demands immediate multidisciplinary management. When primary reimplantation is unfeasible, urinary diversion may serve as a temporizing measure to preserve renal function and stabilize the patient until definitive reconstruction becomes feasible. We report the case of a 43-year-old male who sustained bilateral ureteral transection exceeding 10 cm during laparoscopic sigmoid resection for an obstructing colonic mass. Given the high, proximal level of injury, direct ureteroneocystostomy with or without a Boari flap was not possible, and the patient underwent immediate urinary diversion with an ileal conduit using Bricker uretero-enteric anastomoses. The postoperative course was complicated by a colocutaneous fistula and ventral hernia, which were managed conservatively. After a period of eighteen months, comprehensive reassessment demonstrated preserved renal function, a healthy ileal loop, and a bladder with approximately five-hundred-milliliter capacity. A multidisciplinary reconstruction was performed to reconnect the ileal loop to the bladder dome, accompanied by simultaneous fistula takedown, sigmoidectomy, and abdominal wall repair using transversus abdominis release with mesh reinforcement. The postoperative cystogram was negative for leakage, and follow-up cystoscopy one year later confirmed a well-healed anastomosis. The patient has remained free of hydro-nephrosis or infection, reporting only mild nocturia and occasional elevated postvoid residuals managed conservatively. This case highlights that, in selected patients with bilateral ureteral transection, early ileal diversion may serve as a renal-preserving bridge to later functional undiversion when coordinated through multidisciplinary planning.

1. Introduction

Iatrogenic ureteral injury during colorectal or pelvic surgery is uncommon but carries significant morbidity [1]. Bilateral transection is exceedingly rare and presents a formidable reconstructive challenge. The extent of ureteral loss, especially when exceeding 10 cm, often precludes primary reimplantation with a psoas hitch or Boari flap, necessitating alternative strategies to maintain urinary drainage [1]. In these circumstances, urinary diversion using an ileal conduit can serve as a temporizing measure that preserves renal function, while allowing recovery of surrounding tissues and planning for future reconstruction. However, long-term diversion carries its own morbidities, including infection, renal deterioration, and psychological distress associated with external stomas [2]. Urinary undiversion (reversal) of ileal conduits has

historically been rare but is increasingly reported in motivated patients who retain adequate bladder capacity and function. This report presents a unique case of successful reversal of an ileal conduit following bilateral long-segment ureteral transection sustained during sigmoid resection, performed through a coordinated multidisciplinary approach involving urology, colorectal surgery, and abdominal wall reconstruction teams.

2. Case presentation

A 43-year-old man with hypertension and a twenty pack-year smoking history presented with abdominal pain and symptoms of bowel obstruction. Computed tomography revealed a ten-centimeter proximal sigmoid mass with evidence of obstruction. He underwent laparoscopic sigmoid resection, which was converted to an open

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procedure after intraoperative discovery of bilateral ureteral transection (Fig. 1). Both ureters had been transected high, with over 10 cm of segmental loss, rendering primary reimplantation unfeasible. After intraoperative consultation, the surgical team elected to proceed with urinary diversion using an ileal conduit. A twenty-centimeter segment of ileum, beginning 10 cm proximal to the ileocecal valve, was harvested and re-anastomosed in side-to-side fashion. The distal ureteral edges were refreshed, and bilateral Bricker ureteroenteric anastomoses were created. Bander stents and a pelvic drain were placed, and the patient was discharged home on postoperative day three.

On postoperative day six, he presented to the emergency department with dehiscence of the midline incision. Computed tomography demonstrated a colcutaneous fistula extending to the incision site with

an associated ventral hernia but no evidence of urinoma or hydro-nephrosis. He was managed conservatively with bowel rest, total parenteral nutrition, and local wound care and was discharged to a skilled nursing facility.

Two months later, a postoperative loopogram was negative for leakage, and bilateral stents were removed. The patient expressed a strong desire to have the diversion reversed to restore normal voiding. He was counseled extensively on the technical challenges of such a procedure, which would also necessitate takedown of the colcutaneous fistula and concurrent repair of the ventral hernia. Preoperative assessment included a computed tomography cystogram, which demonstrated an intact bladder with approximately five-hundred-milliliter capacity, and a loopogram confirming a healthy conduit with

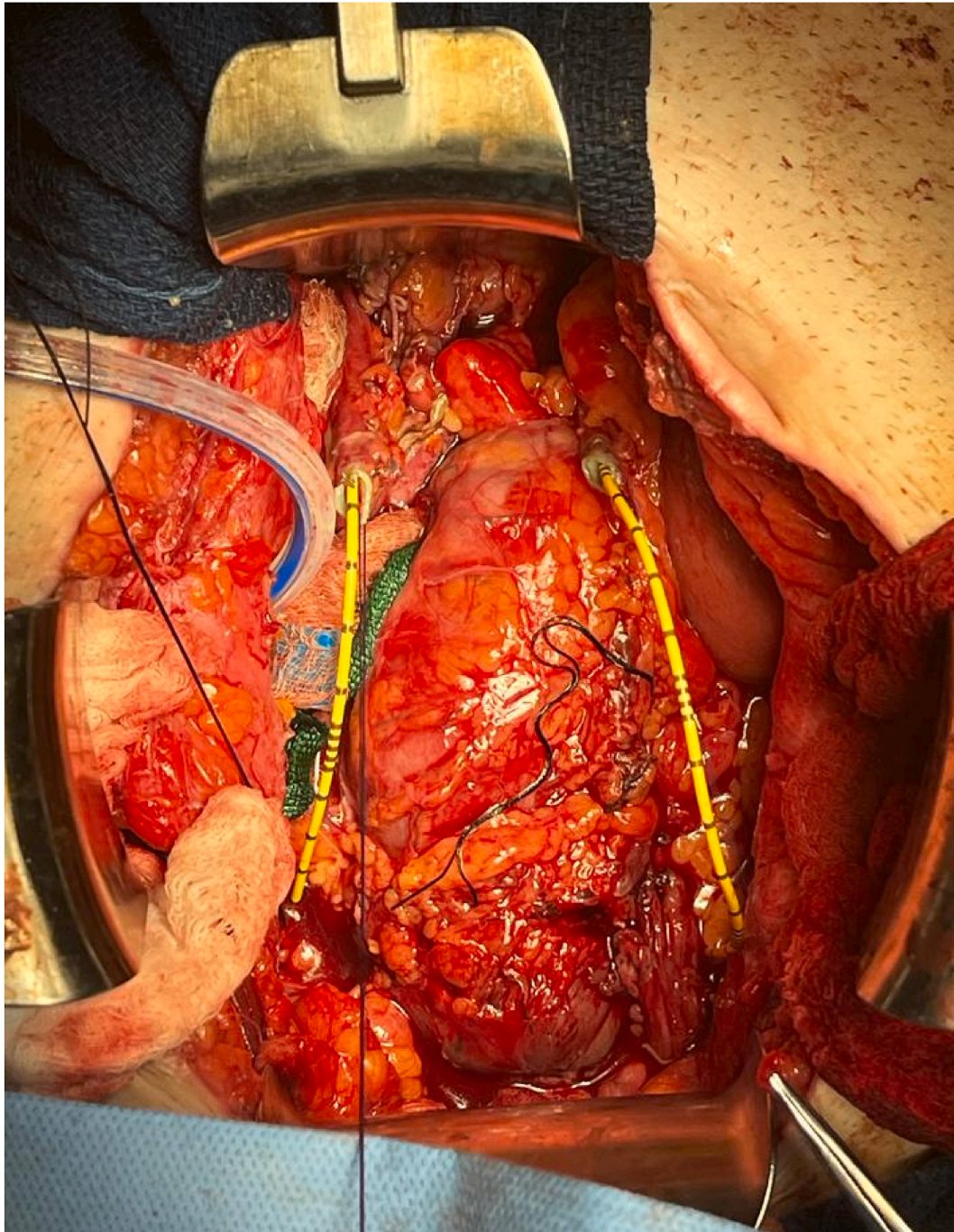


Fig. 1. Intraoperative view demonstrating the bilateral ureteral transections with both ureteral ends identified and stented.

physiological reflux into both kidneys and no significant hydronephrosis. Cystoscopy revealed a normal urethra and bladder mucosa with preserved orthotopic ureteral orifices.

After eighteen months, the patient underwent planned reconstruction. The ileal conduit was mobilized, and its distal end was dissected and re-anastomosed to the dome of the native bladder in a tension-free fashion. An intraoperative leak test was negative. Simultaneously, the colorectal surgery team resected the colocolic fistula and restored bowel continuity, while the minimally invasive surgery team performed a transversus abdominis release and ventral hernia repair using mesh.

Postoperatively, a CT cystogram confirmed the absence of leakage ([Supplementary Material](#)), and the Foley catheter was removed approximately one month later. The patient recovered uneventfully and was discharged home. At one-year follow-up, cystoscopy demonstrated a well-healed anastomosis without stenosis or leakage. The patient reported normal daytime voiding, occasional nocturia, and mildly elevated postvoid residuals managed with double-voiding techniques. He remained free of urinary tract infections or upper tract dilation on follow-up imaging.

3. Discussion

The concept of urinary undiversion was first established in the 1970s, with Hendren reporting successful undiversion of an ileal conduit to the bladder in both pediatric and adult populations ([Table 1](#)). In his 1974 series, patients who initially underwent diversion for hydronephrosis or infection achieved good continence and renal preservation after reversal, and subsequent follow-up in 1976 demonstrated durable bladder function after reversal of infected ureterostomies [[3,4](#)].

These early experiences demonstrated that ileal segments could be safely reused for delayed reconstruction, laying the groundwork for subsequent innovations.

The 1980s saw expansion of undiversion techniques to pediatric patients with neurogenic or obstructive etiologies. Sheehan and colleagues reported conversion of an obstructed conduit into a bladder patch in a young girl, resulting in continence with only mild stress incontinence [[5](#)]. Ahmed and coauthors, in a series of thirty-five children and young adults with neurogenic bladders, demonstrated satisfactory long-term bladder control in over ninety percent of patients following undiversion or augmentation, confirming the feasibility of reusing bowel segments to reconstruct the lower urinary tract [[6](#)].

Adult series soon followed, further validating the approach. Fishman et al. described an elderly male who achieved complete continence after reanastomosis of a six-year-old ileal conduit to the bladder dome and placement of an artificial urinary sphincter [[7](#)]. Gotoh et al. achieved similar success using a submucosal tunnel to reimplant the ileal loop into the bladder, with good function and only mild hydronephrosis [[8](#)]. Boyd and colleagues later demonstrated durable outcomes in post-cystectomy men who underwent orthotopic neobladder reconstruction or mobilization of Kock reservoirs for urethral anastomosis, achieving good urinary control in the majority of patients [[9](#)]. Together, these findings established that undiversion is both technically achievable and functionally rewarding, even years after the initial diversion.

The focus of undiversion has since evolved from necessity toward quality-of-life improvement. Gosalbez et al. reported the use of antireflux nipple valves to connect ureters and bladder, improving upper tract dilation in patients with congenital anomalies [[10](#)]. Castillo and colleagues performed a laparoscopic-assisted neobladder conversion in a man eight years after cystoprostatectomy, achieving full daytime continence [[11](#)]. Ramalingam et al. described augmentation cystoplasty using a prior conduit in a child with sacral agenesis, resulting in improved compliance and capacity [[12](#)]. In adult cohorts, Gonzalez and Fazlıoğlu each reported successful undiversion in patients motivated by body-image concerns and stoma-related discomfort, with satisfactory continence and quality-of-life improvement [[13,14](#)]. More recently, Shenot and colleagues reported continence restoration in patients with

neurogenic bladder who regained motor function and underwent ileo-cystoplasty [[15](#)]. Modern robotic and minimally invasive techniques have further expanded the reconstructive armamentarium, exemplified by Wang et al., in 2023, who reported over eighty percent success following bilateral robotic ileal ureter replacement [[16](#)]. Collectively, these studies reinforce that previously diverted bowel segments can be safely repurposed for functional reconstruction across diverse age groups and indications.

The current case adds to this body of literature by demonstrating the successful reversal of a diversion performed for bilateral iatrogenic ureteral transection, a context that remains sparsely reported. Unlike congenital or oncologic cases, the indication here was an acute intraoperative injury with complete loss of both ureters, rendering primary reimplantation impossible. The initial decision for diversion avoided the morbidity of nephrostomy tubes and preserved renal function. The subsequent undiversion, performed after optimization of abdominal wall integrity and resolution of the colocolic fistula, illustrates the feasibility of a single-stage reconstructive approach addressing both urinary and gastrointestinal continuity. The patient's excellent functional recovery, with preserved renal units and satisfactory voiding, parallels the best outcomes described in Fishman et al. (1987), Gotoh et al. (1990), and Fazlıoğlu et al. (2019), who each reported durable continence and stable upper tracts following conduit-to-bladder reanastomosis [[7,8,14](#)].

Although prolonged urine–bowel contact may theoretically predispose patients to metabolic abnormalities, the ileal conduit in this case functioned as a short, continuously draining segment rather than a reservoir, and the patient demonstrated preserved renal function without electrolyte disturbance during follow-up; nevertheless, long-term renal and metabolic surveillance remains essential.

From a clinical standpoint, this case underscores key principles. First, in the setting of extensive bilateral ureteral loss where immediate reconstruction is not feasible, ileal conduit diversion can be viewed as a renal-preserving bridge rather than a definitive endpoint. Second, successful undiversion depends on careful patient selection, including confirmation of adequate bladder capacity, preserved renal function, and resolution of concomitant abdominal pathology.

This case also emphasizes the critical role of multidisciplinary collaboration. The synchronized involvement of urology, colorectal surgery, and minimally invasive/abdominal wall reconstruction allowed comprehensive management of fistula, hernia, and urinary reconstruction in one operation. Such coordinated care minimizes morbidity and ensures optimal restoration of function. From the cumulative literature, several guiding principles emerge: diversion should be viewed as a reversible bridge rather than an irreversible endpoint; functional readiness, defined by bladder capacity and compliance, must guide timing; and collaboration among surgical specialties is essential to achieve safe and durable results.

4. Conclusions

Diversion at the time of bilateral ureteral injury can be a prudent, renal-preserving strategy when primary repair is impossible. This case demonstrates that ileal conduits need not represent permanent solutions but may instead serve as temporary bridges to later functional restoration. Successful undiversion is achievable through meticulous patient selection, preoperative evaluation, and multidisciplinary coordination. In this patient, reconstruction restored orthotopic voiding, preserved renal function, and provided long-term satisfaction, illustrating that even devastating bilateral ureteral injuries can culminate in excellent functional outcomes.

CRedit authorship contribution statement

Muhammed A.M. Hammad: Writing – review & editing, Writing – original draft, Investigation, Data curation, Conceptualization. **Gustavo**

Table 1

Literature summary of pediatric and adult patients undergoing reversal or revision of urinary diversions. The table details initial diversion type and indication, time to undiversion, reasons prompting reversal, reconstructive methods used, and resultant functional outcomes. The current case is shown at the bottom for comparison with existing evidence.

Study (Author, Year)	Patient/ Age	Initial Diversion Type and Age	Indication for Diversion	Delay to Undiversion	Indication for Undiversion	Reconstruction Technique	Outcome Summary
Hendren, 1974	Pediatric and adult cases	Ileal conduit at ages of 2 mo. to 18 y.o.	Urinary tract obstruction; hydronephrosis; pyelonephritis; renal calculi	Variable	Hydronephrosis, pyelonephritis, stone formation, QOL, bladder function preservation, preparation for kidney transplantation	Conduit tapering with anastomosis to bladder; high pyelo-ileal conduit in 2 cases; transureteroureterostomy in one case	Good urinary control; absence of infections
Hendren, 1976	2.5 y.o. male	Ureterostomy at 8 mo. followed conversion to ileal loop	Stenotic and infected ureterostomy	~18 months	Pyocystis	Anastomosis of R ureter to renal pelvis with resection of ileal loop; urethral valve resections	Normal bladder capacity; no urethral obstruction; bladder neck hypertrophy
Sheehan et al., 1984	Pediatric female	Ileal conduit (age unknown)	Lower urinary tract obstruction	Unknown	Stomal obstruction and loop enlargement	Conduit converted to bladder-augmenting patch accompanied by ileostomy closure (ileocystoplasty)	Good urinary control with mild stress incontinence
Ahmed et al., 1987	Pediatric and adult; male and female	Ileal conduit before age 3 in 25 pts and between ages 3 and 5 in 10 pts	Neurogenic bladder	variable (3-17 years)	Ureterohydronephrosis	Variable: ureteroureterostomy, ureteroneocystostomy, ileocaecocystoplasty, OR colocystoplasty	Stable kidney function; satisfactory bladder capacity; 12 pts void normally and 22 void with CIC; Good bladder control for 31 of 35 pts
Fishman et al., 1987	73 y.o. male	Ileal conduit at age 67	Incontinence d/t urethral and prostate surgeries	6 years	Urinary leakage with secondary ulceration; peristomal hernia; stomal retraction	Anastomosis of ileal loop to dome of bladder; implantation of artificial urinary sphincter	Complete continence; no challenges with artificial sphincter
Gotoh et al., 1990	17 y.o. female	Ileal conduit at age 5	Unknown	12 years	UTIs and urinary reflux	Ileal loop reimplanted to bladder with submucosal tunnel	Good bladder function; mild hydronephrosis
Boyd et al., 1994	Adult males (avg 58 y.o.)	Ileal conduit in 6 patients; Ileal Kock reservoir in 3 patients	Cystoprostatectomy	Variable	Stomal complications, renal deterioration	Orthotopic neobladder reconstruction or mobilization of Kock reservoir for urethral anastomosis	Good urinary continence; conversion to Kock reservoir and catheterization in 2 patients; artificial urethral sphincter in some patients
Gosalbez et al., 1998	12 adult and pediatric; 6 male and 6 female	Ileal conduit in 6 patients	Neurogenic bladder; ureteral reflux; bladder exstrophy; ureterocele; prune belly syndrome	Variable	Short or dilated ureter	Antireflux nipple as intermediate connection of ureters and bladder	Upper urinary tract dilatation improved in most patients; nipple pathologies in 3 patients
Castillo et al., 2006	57 y.o. male	Ileal conduit at age 49	Cystoprostatectomy	8 years	Desire for urethral voiding; ureteral reflux; stoma prolapse	Conversion to orthotopic neobladder via lap-assisted approach	Full daytime continence; no upper tract deterioration
Ramalingam et al., 2013	10 y.o. male	Ileal conduit at age 5	Unstable bladder with small capacity secondary to sacral agenesis; not CIC compliant	5 years	Desire for urethral voiding	Augmentation cystoplasty utilizing ileal conduit	Stable upper urinary tract; increased bladder compliance and capacity; voiding with CIC
Gonzalez et al., 2018	Adult cohort, male and female	Ileal conduit at variable age	Cancer of pelvic organs	Variable	Body image distortion, bag discomfort, urine leakage	Orthotopic neobladder reconstruction	Complete or satisfactory continence; one patient stable with CIC
Fazlıoğlu et al., 2019	60 y.o. male	Ileal conduit at age 58	Cystoprostatectomy	2 years	QOL considerations	Orthotopic neobladder reconstruction	Continence preserved; successful surgical transition
Shenot et al., 2022	30 and 32 y.o. males and 61 y.o. female	Ileal conduit from bladder	Neurogenic bladder from SCI	Unknown	Return of motor function to facilitate CIC	Ileocystoplasty	Full continence in all 3 patients; low-pressure urine storage w/o overactivity at 6 mo.; absence of vesicoureteric reflux; no changes to upper urinary tract; use of clean

(continued on next page)

Table 1 (continued)

Study (Author, Year)	Patient/ Age	Initial Diversion Type and Age	Indication for Diversion	Delay to Undiversion	Indication for Undiversion	Reconstruction Technique	Outcome Summary
Wang et al., 2023	Adult cohort (some bilateral)	No diversion - Ileal ureter as temporary bridge	Replacement of strictured ureter	N/A	N/A	Robotic bilateral ileal ureter replacement (BIUR)	intermittent catheterization 83% success; improved drainage, no hydronephrosis
Current Case	43 y.o. male	Ileal conduit for bilateral ureteral transection	Iatrogenic ureteral injury	~18 months	Desire for urethral voiding	Ileal loop re-anastomosed to bladder; colocolic fistula and hernia repaired	No UTIs; mild nocturia managed conservatively

M. Gryzinski: Writing – review & editing, Validation, Investigation, Data curation, Conceptualization. **Mackinnly T. Knoerzer:** Writing – review & editing, Validation, Investigation. **Gamal M. Ghoniem:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Conceptualization.

Informed consent

Informed consent was acquired from the patients before inclusion in the study. There is no material reproduced from other sources.

Consent statement

Informed consent was obtained from the patient for publication of this article, including any accompanying images. Every effort has been made to ensure anonymity and identifying details have been omitted where possible.

Ethical statements

Ethical standards were performed according to the 1964 Declaration of Helsinki and its later amendments.

Local institutional review board and ethics committee approval for this investigation was unnecessary since it only involved standard clinical practice. The study is not a Clinical trial, therefore is not reported the registration number.

Data availability

Data for this study is available in deidentified format for review upon request and the corresponding author has full control of the data.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

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Declaration of competing interest

The authors have nothing to disclose.

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Appendix A. Supplementary data

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