Definitive Management of Failure After Pyeloplasty

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Abstract

Introduction: Failure after pyeloplasty is difficult to manage. We report our experience managing pyeloplasty failures.

Methods: We retrospectively reviewed the case log of a single surgeon, from August 1996 to August 2014, to identify all patients undergoing a surgical procedure after failed pyeloplasty. We excluded patients without follow-up exceeding 1 year from initial postpyeloplasty procedure. Failure was defined as a need for additional definitive intervention.

Results: Of 247 laparoscopic pyeloplasties, 68 endopyelotomies and 305 simple laparoscopic nephrectomies reviewed, 41 were performed after previous pyeloplasty and had sufficient follow-up. Laparoscopic nephrectomy was performed in nine patients. All three secondary laparoscopic pyeloplasties were successful. Of 29 secondary endopyelotomies, 10 (34%) were successful. Of the 19 failures after secondary endopyelotomy, 12 patients had tertiary pyeloplasty (5 laparoscopic and 7 open surgical), 5 (26%) underwent tertiary endopyelotomy, and 2 (11%) required nephrectomy. Our overall endopyelotomy success rate was 38% (13/34) *vs* 100% (11/11) for secondary or tertiary pyeloplasty (4 patients lost to follow-up). Median time to failure was 5 months for endopyelotomy. Median follow-up for patients free from intervention was 40.2 months.

Conclusions: Secondary pyeloplasty (including both laparoscopic and open surgical approach) is more than twice as successful as endopyelotomy after failed pyeloplasty. Secondary pyeloplasty is an excellent alternative to endopyelotomy in select patients with failure after initial pyeloplasty.

Introduction

Introduced in 1993, laparoscopic pyeloplasty is an accepted first-line approach to the patient with ureteropelvic junction (UPJ) obstruction.[1] Laparoscopic pyeloplasty is associated with excellent success rates, 75% to 98%.[2–7] Failure can and does occur, however, and the options for management include observation, stent placement, percutaneous nephrostomy, endopyelotomy, repeat pyeloplasty, or nephrectomy.[8] These failures can sometimes be difficult to manage, and the decision, as to which procedure to perform, may not be clear.

Success rates of endopyelotomy for secondary UPJ obstruction have been reported as high as 70% to 87.5%.[6,9] Endopyelotomy is a popular secondary procedure after failed pyeloplasty, as compared to repeat pyeloplasty, given reluctance to perform the latter due to perceived technical difficulty. However, a recent study by Vannahme and colleagues[4] demonstrates greater success of pyeloplasty compared with endopyelotomy for secondary UPJ obstruction after failed pyeloplasty.

We reviewed our own case series to compare the outcomes of laparoscopic nephrectomy, laparoscopic pyeloplasty, and endopyelotomy as secondary operations after failed pyeloplasty, with the goal of further informing the management approach to these complicated patients.

Materials and Methods

Data source and subjects

We reviewed a prospectively maintained database that included a total of 620 endopyelotomies, laparoscopic pyeloplasties, and simple laparoscopic nephrectomies performed by a single surgeon between August 1996 and August 2014. We identified patients who underwent one of these surgical procedures as a result of a previously failed pyeloplasty. The initial pyeloplasties were not necessarily performed at our institution. Additionally, we included only those patients who had postprocedure follow-up of at least 1 year. Patients with a previously failed pyeloplasty who were managed with chronic ureteral stent exchanges were not included.

Data collected included patient demographics, operative details, laboratory data, and imaging studies, and the indications for reoperation. Nuclear medicine scans were obtained in only 13 patients before surgery (44%), and 15 (51%) after surgery (often different patients), so this parameter is

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not reported. Additionally, the degree of hydronephrosis was not consistently assessed on imaging, so this parameter was not reported.

Endopyelotomy was performed retrograde or antegrade. We employed a 2F electrocautery probe, a 200 μm Holmium: YAG laser fiber, cold hook knife or Acucise® device to incise posterolaterally. A 7F to 10F internal ureteral stent or externalized nephroureteral stent was left in place for 6 weeks. Imaging follow-up was with a nuclear medicine renal scan in most cases, but in some other modalities, intravenous urogram, CT scan, or nephrostogram, was used.

All laparoscopic pyeloplasties were performed transperitoneally, without robotic assistance. A closed suction drain was placed and removed before discharge, unless a urine leak was suspected. A 6F internal ureteral stent was left in place, and removed ~3 weeks after surgery. Follow-up imaging typically consisted of a nuclear medicine renal scan, however in some cases imaging consisted of an intravenous urogram (some patients early in the series) or nephrostogram (if a nephrostomy tube was left in place at the time of the pyeloplasty).

Primary outcome

Preoperative assessment included characterization of patient symptoms, physical examination, and review of imaging studies (including nuclear medicine diuretic renograms, CT scans, and ultrasounds) and laboratory results. Based on this clinical assessment, in a shared decision with the patient, it was decided if a salvage procedure was needed. The primary outcome was need for this secondary or tertiary procedure, which we defined as definitive intervention after endopyelotomy or pyeloplasty and was considered to be "failure." "Success" was the absence of failure, or in this case, no need for any further intervention. We decided upon this primary outcome, rather than one based upon radiographic criteria, as it is a "composite" outcome that factors in not only objective findings, but also the ultimate decision made

by the patient—what is important in real life. Temporary drainage (ureteral stent or nephrostomy tube) with subsequent removal of the drain was not considered failure.

Results

Of 620 procedures reviewed, 44 were performed after previous pyeloplasty (Fig. 1). Of these patients, 3 were excluded due to follow-up of <1 year, leaving 41 patients for whom we performed a definitive secondary or tertiary procedure (laparoscopic pyeloplasty, endopyelotomy, or laparoscopic nephrectomy) after failed prior pyeloplasty. Of these 41 failed pyeloplasties, 15 had been performed with open surgery, 19 had been performed with standard laparoscopy, 2 had undergone robot-assisted laparoscopy, and for 3 patients the exact procedure could not be discerned from the medical record.

The initial management in 29 of the 41 patients was secondary endopyelotomy. Table 1 describes the demographics and operative details of these patients.

Tables 2 and 3 summarizes the outcomes after secondary endopyelotomy. Following secondary endopyelotomy, 10 patients (34%) had long-term success, and did not have further intervention over a mean of 38 months follow-up (Table 2). Nineteen patients (66%) ultimately required further intervention. Median time to failure was 5 months. There were no obvious factors associated with endopyelotomy outcome, however, having a previous open pyeloplasty was nearly statistically significant ($p = 0.051$) (Table 3). Of these 19 patients with failure of secondary endopyelotomy, 12 (63%) underwent subsequent tertiary pyeloplasty (5 laparoscopic, 7 open). Of these 12 patients, 8 had follow-up for over 1 year and all were deemed successful. Of the 19 patients with failure of secondary endopyelotomy, 5 (26%) underwent another endopyelotomy ("tertiary endopyelotomy"). Of these five patients, three (60%) required no further surgical intervention for UPJ obstruction. This brought the overall
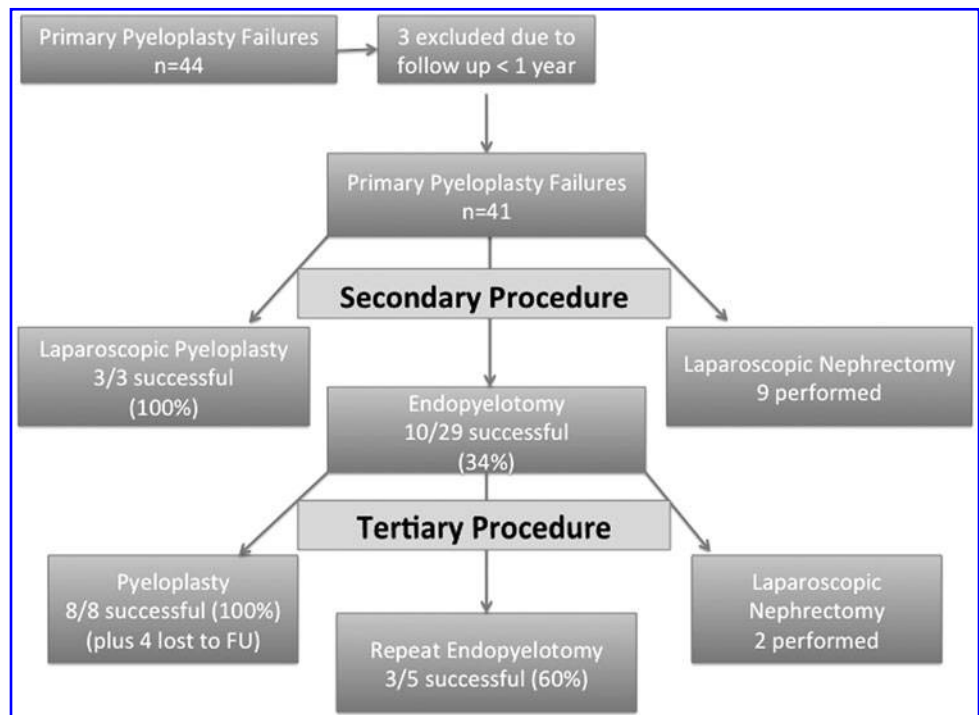

FIG. 1. Flowchart of operative success and failure in the management of pyeloplasty failures, based on operation.

TABLE 5. DEMOGRAPHICS/OPERATIVE DETAILS
FOR SECONDARY/TERTIARY PYELOPLASTIES
AFTER FAILED PRIMARY PYELOPLASTY

	Secondary pyeloplasties	Tertiary pyeloplasties
N	3	12
Mean age, years (SD)	51 (8)	29 (14)
Laterality		
Right	1	3
Gender		
Male	0	8
BMI, kg/m^2 (SD)	28.0 (9.8)	24.9 (3.2)
Type of previous pyeloplasty		
Robotic	1	0
NA	2	1
Open	0	7
Laparoscopic	0	4
Mean LOS, days (range)	1.3 (1–2)	3 (1–7)
Mean EBL, mL (range)	83 (25–175)	145 (25–600)
Mean OR time, minutes (range)	199 (123–315)	209 (135–270)
Median follow-up, months (range)	20 (15–21)	20 (1–75)
Success	3/3	12/12
Complications	None	CII—fever/ suspected UTI, treated with abx (2); CII—Cdiff/ UTI

UTI = urinary tract infection.

suspected or documented urinary tract infection (UTI) requiring antibiotics (two patients). The third patient had a prolonged urine leak (Clavien 1) and a febrile UTI and Clostridium difficile infection requiring treatment with antibiotics (Clavien 2). Complications in the endopyelotomy patients included one patient who developed pyelonephritis and required intraoperative stent placement (Clavien 3b). A second patient had a postoperative hemorrhage that did not require transfusion (Clavien 1). Complications associated with nephrectomy included one patient, who developed fever and concern for sepsis, requiring IV antibiotics (Clavien 2).

Discussion

Our overall success rate for secondary or tertiary pyeloplasty in our series was 100%, whereas the success rate was

34% for secondary/tertiary endopyelotomy. Our secondary pyeloplasty success rate is slighter better than that reported in the literature (83%–95%),[10,11] but our salvage endopyelotomy success rate is lower than that reported even in recent studies.[4] The median failure time for endopyelotomies was about 5 months, and with an overall follow-up of 38 months for successful endopyelotomies we are confident that we have captured most endopyelotomy failures. We have a similarly long follow-up of a median 19 months after the secondary and tertiary pyeloplasties. These data suggest long-term sustainability of the laparoscopic pyeloplasty operation.

It has previously been our practice, as well as commonly reported in the literature, to perform an endopyelotomy after failure of a pyeloplasty. Jabbour and colleagues[9] evaluated success rates for secondary endopyelotomy in 1998, and success rates were reported as high as 87.5% over 88 months. Given the minimally invasive nature of the procedure, this would seem to be a good option. However, more recent data seem to indicate that these results are not reproducible. Ng and coworkers[12] describe a lower success rate of 59% for secondary endopyelotomy, although it is noted that cases in this study were performed after both previous endopyelotomy and pyeloplasty failures. Park and colleagues[7] note a 70% success rate over a 47-month follow-up period. Patel and colleagues[13] describe an 84% success rate in antegrade secondary endopyelotomies. It is unclear as to why patients in these studies had higher success rates with endopyelotomy when compared to our group.

With regard to secondary laparoscopic pyeloplasties, recent data seem to mirror ours in terms of excellent success rates. Shadpour and coworkers[14] had similar results in terms of outcomes in revision laparoscopic pyeloplasties, with 10 of 11 successful cases in failed previous open repair. As noted previously, Sundaram and colleagues[11] also had success rates of 83% for salvage laparoscopic pyeloplasty for secondary UPJ obstruction. Most recently, Vannahme and colleagues[4] noted an 87.5% success rate for secondary UPJ obstruction. Their case series is notable for 41 patients with failed initial pyeloplasty (similar to our series), and 17 patients with previous failed endopyelotomy. Their final calculations took into account success rates of pyeloplasty after both procedures, although on review, it appears they also had 100% success in patients who underwent a laparoscopic pyeloplasty after failed primary pyeloplasty (10/10 patients, 11th patient lost to follow-up).[4] They also note 22 of the initial failed primary pyeloplasties were done open. In a 2015 study, Abraham and colleagues[15] showed results similar to our case series, with 15 of 16 patients (93%) who successfully underwent laparoscopic pyeloplasty as initial intervention for failed previous pyeloplasty. Follow-up was over a 30-month period. They did note

TABLE 6. OUTCOMES AFTER FAILED PRIMARY PYELOPLASTY

	Secondary endopyelotomy	Secondary pyeloplasty	Tertiary pyeloplasty	Secondary/ tertiary nephrectomy
Median follow-up, months (range)	30 (5–192)	20 (15–21)	20 (1–75)	1 (0–192)
Failures, N (%)	19 (66)	0 (0)	0 (0)	NA
Complications	CI—post operative bleed (1); CI— pyelonephritis needing stent placement (1)	None	CII—fever/suspected UTI, treated with abx (2); CII—Cdiff/UTI	CII—sepsis requiring IV antibiotics (1)

operative times were longer for revision pyeloplasties compared with primary procedures (145 minutes *vs* 191 minutes).

Limitations of our study include a small patient population, with a single surgeon performing the revision laparoscopic surgeries at a single institution. Secondary UPJ obstruction is not common, and even over the 18-year period we reviewed, we were limited in our number of subjects who required such intervention. While we did note success in all patients for whom a secondary laparoscopic pyeloplasty was performed, the series is small; with only 11 patients reviewed, one failure would decrease the success rate significantly.

Laparoscopic surgery also requires extensive training and, therefore, these results may not be expected in the hands of surgeons who are less experienced with laparoscopy. We did not base success and failure upon objective imaging criteria. Although it could be argued that our clinical endpoint could be subject to bias, we feel that the decision to perform a repeat surgery is an endpoint that is most applicable to the real world. Finally, since we identified cases by procedure rather than by diagnosis, patients referred to the senior author who were referred to another provider for open surgical reconstruction were not included.

We were not able to determine any factors associated with the outcome of endopyelotomy, although our data are incomplete in this regard. Previous studies have suggested that poor renal function, longer stricture length, significant hydronephrosis, and etiology of the stricture contribute to failure of an endopyelotomy.[7,16] This may have been a contributory factor to our low success rate for endopyelotomy as compared to our pyeloplasty group. Selection bias may have also played a role.

Our results suggest that for initial management of a pyeloplasty failure, if technically feasible, one should consider a pyeloplasty as an alternative to endopyelotomy given the notably higher success rate. Situations where our results may not be applicable include an intrarenal pelvis, as well as a long ureteral stricture with a small pelvis. In this situation, alternative approaches to revision would be the preferred option.

Conclusion

In recent decades, endopyelotomy has been the most commonly reported secondary procedure after failed pyeloplasty. Our current study, as well as other recent published data, indicate that secondary pyeloplasty has a higher success rate than endopyelotomy in select patient given surgeon expertise. Secondary laparoscopic pyeloplasty should be considered an excellent alternative when technically possible.

Author Disclosure Statement

No competing financial interests exist.

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Abbreviations Used
CT = computed tomography
UPJ = ureteropelvic junction
UTI = urinary tract infection