Outcomes of Pyeloplasty in Very Poorly Functioning Kidneys: Examining the Myths

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OBJECTIVE To assess the perioperative complications and functional midterm outcomes after pyeloplasty for poorly functioning kidneys due to ureteropelvic junction obstruction.

PATIENTS AND METHODS We retrospectively analyzed patients who underwent pyeloplasty for primary ureteropelvic junction obstruction in very poorly functioning kidneys in terms of split renal function of ≤20% or estimated glomerular filteration rate of ≤20 mL/minute. Perioperative complications and postoperative outcomes in terms of symptomatic improvement and functional stabilization or recovery were assessed.

RESULTS A total of 32 patients with estimated glomerular filteration rate ≤20 mL/minute or split function ≤20% underwent pyeloplasty since January 2010. All patients were followed for a mean period of 26.8 months and none required reintervention for obstructive drainage, deteriorating function, or intractable pain. One patient had persistent pain requiring analgesics and overall success rate (defined as nonobstructive pattern, no deterioration in split function, and no persistent symptoms) was 93.7%. Thirteen patients (40.6%) showed significant improvement in renal function (>5% over preoperative), and in all except 1 (3.1%) case there was no further deterioration of function.

CONCLUSION Pyeloplasty provides high rates of morphological and functional success even in very poorly functioning renal units. There is a possibility of functional recovery in one-third of patients, and in most of the rest, there is no further deterioration. UROLOGY 92: 132–135, 2016. © 2016 Elsevier Inc.

Ureteropelvic junction obstruction (UPJO) is characterized by obstructed flow of urine from renal pelvis to ureter. Despite its presumed congenital origin, a large number of cases present in adolescence, adulthood, or even in elderly age group. Many of these cases may present at a stage when the renal function is already significantly compromised. This delay and loss of renal function may be related to asymptomatic nature of the disease in some, delayed onset of symptoms, inaccessibility to healthcare system, rapid decline in function due to complication such as infection, etc. Ideal management of patients with poorly functioning kidneys with UPJO is debatable, more so if the patient is an adult with split renal function (SRF) of <20% or estimated glomerular filteration rate (eGFR) of <20 mL/minute. Unlike the pediatric population, especially infants, where function of the affected renal unit is considered to be potentially recoverable,[1-3] no such follow-up studies are available for the adult population. Whatever little is available, the literature considers an SRF of <30% as a poorly functioning system and largely there are no focused studies in very poorly functioning renal units.[4,5] From these studies, it is generally believed that in patients with poorly functioning kidneys, the functional recovery after pyeloplasty is suboptimal, and the poorer the preoperative function, the poorer is the postoperative recovery.[4] There is also a possibility that below a certain threshold renal function, renal failure resulting from obstructive nephropathy may become self-progressing, and functional deterioration continues despite the relief of obstruction.[6] Once a certain degree of renal atrophy and functional loss has taken place, particularly if the contralateral unit is normal, there is a possibility that the normal unit will take up most of the excretory function and undergoes compensatory hypertrophy, resulting in disuse atrophy of affected unit.[7] This theory of disuse atrophy has earlier been used to decide clinical treatment modality for unilateral renal obstruction with poor function.[7,8] Also in these poorly functioning units, not only the functional recovery but also morphological success of reconstructive

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surgery is considered to be at risk. Factors such as poor urine volume available for flow across the anastomosis, persistent stasis related to residual hydronephrosis, nephromegaly with nongravity drainage of lower pole, amorphous urates or phosphates precipitating in static urine, etc, may contribute to this perceived poor morphological success of reconstruction.[5] Also, the probability of reintervention and persistence of symptoms are thought to be higher and thus nephrectomy is considered a feasible option in such patients. However, in the current era of nephron preservation, this strategy needs to be relooked. Also, the procedure of nephrectomy carries with it much more risk of surgical complications and morbidity to the patient than pyeloplasty. In this background, the goal of this study was to assess the perioperative and midterm follow-up functional and morphological outcomes after pyeloplasty in patients with primary UPJO with very poorly functioning kidneys.

PATIENTS AND METHODS

We retrospectively analyzed the records of all patients who underwent pyeloplasty for UPJO in poorly functioning kidneys (ie, eGFR <30 mL/minute, or SRF <30%) from January 2010 onwards at our center. The data were furthermore scrutinized specifically for patient subgroups with very poorly functioning kidneys (SRF ≤20% on F "0" diuretic L-ethyl cysteine renogram or eGFR ≤20 mL/minute). Patients with previous surgery for UPJO other than urinary diversion (DJ stenting or percutaneous nephrostomy), solitary kidney, ectopic or anatomically abnormal kidney, bilateral UPJO, or chronic renal failure were excluded. Function of renal unit was assessed 6 weeks after urinary diversion, if any. Urinary diversion (double J [DJ] stent or percutaneous nephrostomy) was done only if there was suspicion of pyonephrosis, and postdiversion SRF and eGFR were used for analytical purposes. All patients underwent standard evaluation as per our institute protocol with an ultrasonogram, intravenous pyelogram, and diuretic renogram and eGFR. UPJO was diagnosed on F "0" diuretic L-ethyl cysteine renogram with obstructed pattern defined as T1/2 >20 minute. Noncontrast computed tomography was obtained if renal pelvis was not visualized on intravenous pyelogram or to better localize secondary stones whenever they were reported on ultrasonogram. eGFR was calculated using Modification of Diet in Renal Disease formula in preoperative period and at the last follow-up. Patients underwent either open or laparoscopic or robotic pyeloplasty depending on surgeons' or patient's preference. All operating surgeons had long experience of doing pyeloplasty and were past their learning curve. The indications for surgery were the presence of symptoms (pain), obstructive pattern, or deteriorating renal function on diuretic renogram or secondary stone or recurrent urinary tract infection. All open procedures were via flank approach and laparoscopic and robotic procedures were transperitoneal. In most patients, Andersons-Hynes dismembered pyeloplasty was performed. For laparoscopic or robotic procedures, after excision of ureteropelvic junction segment and reduction (if required), ureteropelvic anastomosis was made in a single-layer continuous nature using either 3-0 or 4-0 Vicryl suture. If the procedure was open, the anastomosis was made in interrupted fashion using the same 3-0 or 4-0 Vicryl. During pyeloplasty, antegrade DJ stenting was performed in antegrade fashion in all cases. Stent was removed after 6 weeks. Decision of reduction of pelvis was made as needed on case-by-case basis. All patients were followed up at 6 weeks after DJ removal for symptomatic assessment and diuretic renogram. If renogram showed nonobstructive clearance, the patient was kept on follow-up with annual diuretic renogram and serum creatinine. Clinical success was defined as improvement in symptoms, absence of obstructive drainage pattern on diuretic renogram, no further decline in renal function, and no need of secondary intervention. A change of >5% split function on either side was considered significant. Functional and morphological surgical success meant no further decline in renal function and no need of secondary intervention. A serially declining eGFR in 3 or more follow-up visits irrespective of the percent change on diuretic scan was also considered a functional failure but considered as a morphological surgical success if patient suffered no residual pain or complications and did not require nephrectomy. Renal dynamic scan and serum creatinine at last follow-up were used for analysis.

RESULTS

A total of 63 patients with ipsilateral split function <30% were included. Thirty-two cases had very poorly functioning renal units (eGFR ≤20 mL/minute or SRF ≤20%). Of these 32 patients, 25 (78.1%) were males, mean age was 26.8 years (10-52 years). and 24 (75.0%) had left-sided UPJO. Preoperative urinary diversion was performed in 5 patients (percutaneous nephrostomy in 4 and DJ stent in 1). Mean preoperative SRF was 20.3% (range: 10%-30%) and mean preoperative eGFR was 17.0 mL/minute (Range: 9.3-26.0 mL/minute). All patients underwent pyeloplasty (open—6, laparoscopic—6, robotic—20) with antegrade DJ stenting. Five patients (15.6%) had complications in perioperative period (fever—2, raised total leukocyte count—1, hematuria—1, failed antegrade DJ stenting—1) which were mostly Clavien grade II and managed conservatively. In one patient, antegrade DJ stenting during pyeloplasty failed and he required retrograde stenting in postoperative period in a separate sitting (Clavien grade 3A).

Postpyeloplasty, all these patients were followed for a mean period of 26.8 months (Range: 3-60 months). Mean postoperative SRF was 25.0% (10%-52%) and mean postoperative eGFR was 21.2 mL/minute (10.2-43.5 mL/minute). One case (3.1%) had persistent flank pain often requiring analgesics. He remains under regular follow-up as there is no evidence of obstruction on diuretic scan and the renal function remains stable. Another one (3.1%) had single episode of afebrile urinary tract infection requiring short course of oral antibiotic. Out of 32 patients, 13 (40.6%) showed improvement in split function (mean improvement, 11.8%; and mean increase in eGFR, 10.1 mL/minute). One (3.1%) patient showed deterioration in split function with nonobstructive clearance