



EVALUATION OF FUNCTIONAL OUTCOME AFTER DISMEMBERED PYELOPLASTY IN PATIENTS WITH URETEROPELVIC JUNCTION OBSTRUCTION.

KEYWORDS

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ABSTRACT

Aims and objectives: To evaluate the functional outcome after dismembered pyeloplasty for ureteropelvic junction obstruction.

Materials and methods: A retrospective review of all cases who underwent dismembered pyeloplasty during January 2014 to January 2016 at Nizam's institute of medical sciences, Hyderabad was done. A Total of 71 cases with males and females were evaluated with respect to age at presentation, preoperative renogram and surgical details. All the cases were divided into three groups depending upon their Split renal function on DTPA renogram of the effected kidney as Group 1 with SRF of less than 30, (16 cases) Group 2 with SRF of 30-40 (26 cases) and Group 3 with SRF of more than 40 (29 cases). All cases were followed with maximum follow up period of 12 months with DTPA renogram at 3, 6, and at 12 months. Preoperative and postoperative split renal function on renogram has been compared to assess the outcome.

Results: Mean age of the patients was 27.04 years. Median age group was 23.5 years with a range of 2 to 70 years. **Mean pre op split function** is 33.69% and mean SRF% of group 1 (16), group 2 (26) and group 3 (29) patients were 20.76%, 34.99% and 45.33% respectively. P value among these groups was 0.01 which was significant. P value among these groups were 0.02, which was significant. Mean postoperative SRF was 38.62% (SD ±12.7). The **mean postoperative SRF%** are 24.83% in group 1, 41.05% in group 2 and 50% in group 3. t test showed a p value of 0.014, which is a significant increase in postoperative function.

Conclusion: We hereby, report that after pyeloplasty, significant improvement can be expected in most kidneys with impaired SRF, especially if the initial SRF is between 30 and 40%.

INTRODUCTION:

Pelvi-ureteric junction (PUJ) obstruction is defined as a partial or total blockage to urinary outflow from the renal pelvis into the proximal ureter causing dilatation of the collecting system and potentially progressive renal damage, if left untreated. Pelviureteric junction obstruction (PUJO) is the most common cause of pediatric hydronephrosis. Ureteropelvic junction (UPJ) is the most common site of obstruction in the upper urinary tract and account for 80% of cases. Although the malformation is believed to be congenital, its actual dysfunction may manifest at any time from intrauterine life to old age.⁽¹⁾ The UPJ obstruction does not represent a single anatomic entity, but rather a set of obstructive processes that result from multiple etiologic factors.⁽²⁾ It is common on left than right side is more common in male than female. Ureteropelvic junction obstruction can be congenital or acquired as a result of some diseases such as stone, urethelial tumours, or previous surgery. Neonates and infants usually present with palpable flank mass while older children and adults commonly present with intermittent flank or abdominal pain.⁽³⁾ Obstruction in the urinary tract effects all renal functional parameters depending on the pressure gradient across the obstructed site which affects the intrapelvic pressure.⁽⁴⁾ The decrease in renal function over time can be easily demonstrated by serial measurement of renal uptake and relative function using technetium 99m diethylenetriamine pentaacetic acid (Tc99m DTPA) scintigraphy. When intratubular luminal pressure increases in nephrons, there is increased reabsorption of salt and water and this leads to reduction in the flow of non-reabsorbable solutes like Tc 99m DTPA through the nephrons.⁽⁵⁾ This leads to prolongation of Tmax (time required for maximum activity). The surgical management of a kidney with obstruction at the ureteropelvic junction has many variations with respect to approach, degree of invasiveness and timing of surgery. The objectives of surgery remain

the same, i.e. to relieve the obstruction and thus preserve or improve overall renal function, and to maintain normal development, while lessening the morbidity to the patient but without compromising the surgical outcome.

Materials and methods:

A retrospective review of all cases who underwent dismembered pyeloplasty during January 2014 to January 2016 at Nizam's institute of medical sciences, Hyderabad was done. A Total of 71 cases with males and females were evaluated with respect to age at presentation, preoperative renogram and surgical details. All the cases were divided into three groups depending upon their Split renal function on DTPA renogram of the effected kidney as Group 1 with SRF of less than 30, Group 2 with SRF of 30-40 and Group 3 with SRF of more than 40. All cases were followed with maximum follow up period of 12 months with DTPA renogram at 3, 6 and at 12 months. Preoperative and postoperative split renal function on renogram has been compared to assess the outcome.

SURGICAL PROCEDURE : The patient was positioned in a lateral decubitus, 45° in relation to the horizontal plane, and was supported by cushions and fixed to the surgical table with a wide adhesive tape, the most popular anatomic approach to the UPJ is the extraperitoneal flank approach. We use this incision through the bed of the twelfth rib, it typically provides excellent exposure of the UPJ. Anderson-Hynes type dismembered pyeloplasty was performed retroperitoneally through a flank incision. The cases which involved the aberrant anterior crossing vessels were actually the lower pole segmental arteries, and these were preserved by placing them posterior to the reconstructed UPJ. In our institution, we primarily use ureteral stents to decrease the amount of extravasation, and thus limit the risk of secondary fibrosis. External drainage of the operative

field is crucial as it prevents urinoma formation, secondary fibrosis, and scarring. The double J stent was placed in an antegrade fashion after the posterior wall of the pyeloureteric anastomosis was completed. All patients had a perinephric drain placed. Foley catheter was removed on postoperative day 1 or 2, and if the perinephric drain output remained minimal, it was removed on the next day. Removal of the ureteral stents was done cystoscopically 6 weeks postoperatively. Trimethoprim-sulfamethoxazole per oral was continued until the double J catheter was removed. Patients were followed at 1, 3, 6 and 12 months postoperatively. Diuresis renography and serum creatinine levels were obtained at 3, 6 and 12 months after surgery. Retrograde ureteropyelography and ureteroscopy were performed when the renographic findings were equivocal or obstructive to investigate the patency of the ureteropelvic anastomosis. Success was defined by the presence of each of three criteria: A falling renographic excretion curve or proven anastomotic patency according to the methods described, improved or stable renal function and symptomatic relief.

Results:

Mean age of the patients was 27.04 years. Median age group was 23.5 years with a range of 2 to 70 years. **Mean pre op split function** is 33.69% and mean SRF% of group 1(16), group 2(26) and group 3(29) patients were 20.76% , 34.99% and 45.33 % respectively. P value among these groups was 0.01 which was significant. p value among these groups were 0.02 , which was significant. **Mean postoperative SRF** was 38.62% (SD \pm 12.7). The mean postoperative SRF% are 24.83% in group 1, 41.05% in group 2 and 50% in group 3. *t* test showed a *p* value of 0.014, which is a significant increase in postoperative function. The mean **increase in SRF% (net change in SRF%)** was 5.56 (SD \pm 0.69). Where as among groups, it was 5.88 in group 1, was 6.05 in group 2, and it was 4.77 in group 3. its *p* value of 0.005, which is considered as a significant increase among groups. **significant increase in SRF by >5%**, when stratified according to groups, in 6 out of 16 (17.64%) patients in group 1, 17 out of 26 in group 2 (50%) and 11 patients out of 29 in group 3 (32.35%). and so in total of 34 (47.88%) cases out of 71 cases, had a >5% increase in SRF which is considered significant, while the rest 37(52.12%) were unimproved. None of the patients in the unimproved group showed significant deterioration (>5% decrease) in SRF postoperatively. Only group 2 has more % of cases with >5% increase in split function when compared to other groups. {17 (65.38%) cases in group 2, where as only 6(37.5%) cases in group 1, and only 11(37.93%) cases in group 3}. **Mean preoperative T1/2** - 30.45(SD \pm 5.07). Mean T1/2 of group 1, group 2 and group 3 patients were 34.16, 32.52 and 24.67 respectively. **Mean post op T1/2** was 17.56 (SD \pm 4.9). The mean postoperative T 1/2 according to groups were 22.32 in group 1, 17.87 in group 2 and 12.5 in group 3. *t* test showed a *p* value of 0.117. **Mean of Net change in post operative T1/2** was 12.96(SD \pm 13.84). according to groups were 11.84 in group 1, 14.8 in group 2, 12.26 in group 3. calculated *p* value was 0.005 which was significant.

Discussion:

Since the first description of pyeloplasty in late 19th century there is a considerable debate in the literature about the functional outcomes of pyeloplasty, the factors influencing the outcomes and optimal split renal function to consider surgical management. Calculation of absolute renal function values such as GFR is more accurate but requires multiple blood samples. Methods using plasma sampling yield only global function estimates, while gamma camera methods measure both global and differential renal functions. In patient management, the question of the relative contribution of each kidney to the total renal function is often more important than the global function itself. For this reason the results are expressed in relative units (% of total function) rather than absolute units (ml/min). We used SRF as measured by DTPA renogram in our study as a practical and easy method that could be performed in our department. To attain the best functional outcome, which is essential for patient selection for surgery and preoperative counselling, many factors have been tested that could have a significant effect on the renal

function outcome. The factors included the patient age, preoperative SRF, serum creatinine, and GFR etc.

In our study the success rate achieved with the Anderson-Hynes technique is comparable to those reported worldwide.⁽⁷⁻¹⁰⁾ When considering symptoms, 65 (91.54%) patients were asymptomatic clinically post operatively. The success rate in our study is similar to that of a retrospective review involving 111 patients with UPJ obstruction undergoing open surgical repair over a 15-year-period, by Clark and Malek (1987), who found a 95% success in resolution of clinical symptoms and 91% success in decompression of pelvicalyceal system on urography following one surgical repair.⁽¹¹⁾ The split renal function in group 1 i.e., patients with severely impaired function (SRF<30%) had a 5.88% increase in baseline function, which is less when compare with group B and group C when they are combined. This increase is not considered significant given the variation in DTPA renogram. Similar findings are reported by Niemczyk et al. They reported that patients with renal function greater than 35% demonstrated functional improvement after surgery and that none of the patients with renal function less than 30% showed postoperative functional improvement. In the present study, 6 of 16(37.5%) patients who had initial SRF < 30% showed significant improvement (>5%) of a function, while 28 of 55 (50.90%) patients with initial SRF \geq 30% showed an improvement of >5% of split renal function from base line. In the present study there was an average increase of 6.05% above baseline in the patients with moderately impaired split renal function (group 2). Of the 26 patients in group 2, 17 patients (65.38%) had significant improvement during our study. Similar results have also been observed by Castagnetti et al.⁽¹²⁾ where improvement in renal function was greater in patients with moderately rather than severely impaired preoperative function. The same result was also reported by Almodhen et al.⁽¹³⁾ In their series none of 49 patients with baseline SRF greater than 45% achieved more than 5% improvement postoperatively compared to 43% with baseline SRF less than 45%, who achieved greater than 5% improvement. This could be explained by the fact that in patients with lower baseline SRF there is more space for the kidney to recover than in those with better baseline SRF. However, Chandrasekharan et al.⁽¹⁴⁾ reported that kidneys with initial SRF below 30% showed significant improvement than the kidneys with initial SRF over 30%. An initial SRF over 40% was associated with little or no improvement. Niemczyk et al.⁽¹⁵⁾ reported that patients with renal function greater than 35% demonstrated functional improvement after surgery and that none of the patients with renal function less than 30% showed postoperative functional improvement. In contrast, we found a high improvement in patients who had initial SRF greater 30% compared with those with less than 30%. In our study there was an average increase of 4.77% above baseline in the patients with split renal function over 40%(group 3). 11 of 29 patients (37.93%) in group 3, who had an SRF over 40%, showed further improvement. It is found that 18 patients who had not had >5% increase of SRF from the baseline had maintained their renal function. None of the patients showed any deterioration in split function. This finding can also be seen in some studies which have suggested that affected kidneys with good SRF at the time of diagnosis are less likely to manifest deterioration of renal function after surgery. In contrast, Mc Aleer et al. showed that renal function did not improve after pyeloplasty regardless of the initial level of renal function. But in this study, mean SRF was 41% and it may explain their conclusion. Salem et al. also observed that only kidneys with impaired preoperative function were associated with greater degrees of improvement after surgery. But they did not define a cutoff value for SRF improvement. Gupta et al.⁽¹⁶⁾ reported a drop in the success rate from 93% to 54% when the preoperative split function was more than 40% versus less than 25%. O'Reilly and associates⁽¹⁷⁾ demonstrated that the greatest potential recovery often will be found in patients with the greatest pre-existing functional deficit. At decompression, the parenchyma regains a more normal disposition and recovers useful function. Also, follow up in our preliminary study is short. However, there is no universally agreed protocol and minimum duration of follow-up in patients with UPJO

after surgical intervention. Madi et al identified 3 late failures in a recent retrospective study.⁽¹⁸⁾ However, all patients had normal imaging at 1 year postoperatively and all presented with symptoms at the time of failure. The authors concluded that short follow up should be interpreted. Most studies, however, suggest that recurrences after pyeloplasty usually occur within 12 months.^(19,20) The histopathological results in our patients showed submucosal fibrosis and thickening, and muscle hypertrophy, these histological findings are similar to those found in congenital ureteropelvic obstruction as described by Starr et al.⁽²¹⁾ Allen.⁽²²⁾

Conclusion:

We believe that surgery should be considered when the diuretic renogram suggests obstruction regardless of the renal function. Because surgery can relieve the symptoms even when the split renal function is >40%. Split renal function improved by more than 5% in 47.88% of patients. Renogram measured drainage half times improved by more than 10 min in 83.09%. After pyeloplasty, significant improvement can be expected in most kidneys with impaired SRF, especially if the initial SRF is between 30 and 40%.

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