ORIGINAL ARTICLE

OUTCOME OF PYELOPLASTY IN CHILDREN

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Background: Hydronephrosis in children is a common congenital urologic problem with pelviureteric junction obstruction being its most common cause. This study was conducted to evaluate the outcome of pyeloplasty for congenital pelviureteric junction obstruction in children. **Methods:** This study was conducted in department of Paediatric Surgery, Quaid-e-Azam Medical College/Bahawal Victoria Hospital, Bahawalpur from July 2008 to December 2010. A total of 50 patients diagnosed on ultrasonography and intravenous urogram as having PUJ obstruction were included. Patients with history of previous repair were excluded. Both Dismembered (Anderson Hynes) and Non-dismembered (Flap procedures) pyeloplasties were performed depending upon the size of pelvis and degree of dilatation. Initial follow-up was after 1 week, then after 15 days and then monthly for 3 months. Minimum follow-up period was 6 months and maximum 15 months. At three month, excretory urography was obtained to assess the function of that particular renal unit. **Results:** Lumbar pain and flank mass were the commonest presenting complaints. Thirty-six (72%) patients were male. Left sided obstruction was in 32 (64%) cases, right-sided in 15 (30%), and 3 (6%) cases were bilateral. Common post-operative complications were urinoma formation and re-stenosis in two cases each. There was also no gross difference of outcome in pyeloplasty whether done with or without double-J (DJ) stents. Moreover, dismembered pyeloplasty resulted in better outcome. **Conclusions:** Open pyeloplasty is the "Gold Standard" treatment option for congenital pelviureteric junction obstruction. The use of DJ Stents is not necessary in every repair.

Keywords: Pelviureteric junction Obstruction, Ultrasonography, intravenous urogram, dismembered pyeloplasty, non-dismembered, pyeloplasty, DJ Stent

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INTRODUCTION

Hydronephrosis in children is a common congenital urologic problem, and pelviureteric junction (PUJ) obstruction is the commonest cause.[1,2] PUJ obstruction, although the result of congenital problem, can present at any time i.e., prenatal to geriatric life.[3] Widespread use of maternal ultrasound has significantly changed the practice of paediatric urology. Recent improvements in prenatal ultrasonography now allow most of the cases to be diagnosed in utero.[3–5]

Once a diagnosis of PUJ obstruction is made, prompt intervention is necessary to relieve it to provide appropriate drainage and reduce the intra-pelvic pressure and stasis that contribute to progressive renal damage. This is particularly important as soon as possible in order to maximize functional renal development and increase the ultimate number of perfuse and filtering nephrons.[6] When intervention is indicated, the procedure of choice is generally an open repair of PUJ, that is pyeloplasty.[7] Due to anatomic variations no single procedure is sufficient for all situations in which surgery is indicated.[8] There are different techniques available to repair a PUJ obstruction.

Kuster first described "uretero-pyeloneostomy" as a direct anastomosis of the ureter to the renal pelvis in 1891. In 1892 Fenger adapted for urology the Heineke–Mikulicz, a general surgical technique for pyloric stenosis. The Fenger technique splits a stenosed Uretero-pelvic junction (UPJ) longitudinally to close transversely. In an attempt to achieve a smooth pelvic-ureteral transition with minimal excess tissue, the Foley Y-plasty evolved. This procedure advances a Y-shaped incision to close as a V.[9] A variety of flaps then ensued such as the spiral flap by Culp–DeWeerd,[7,10] the vertical flap by Prince–Scardino[11], the advancing V-flap by Devine[12], and the dismembered V-flap by Diamond–Nguyen.[13]

The now common and popular Anderson–Hynes dismembered pyeloplasty was first described in 1949 by British plastic and urologic surgeons J.C. Anderson and Wilfred Hynes.[14] It consists of complete excision of an anatomically or functionally abnormal PUJ, correction of the high insertion of the ureters, reduction of renal pelvis, straightening of lengthy and tortuous proximal ureters, and transposition of the PUJ if obstruction is secondary to aberrant vessel.[5] While pelvic flap procedures described above, are ideally suited for cases in which

the PUJ has remained dependant in spite of significant pelvic dilatation.[8]

This study was conducted to evaluate the outcome of pyeloplasty, at the Department of Pediatric Surgery, Bahawal Victoria Hospital, Bahawalpur.

MATERIAL AND METHODS

This descriptive case series was conducted at the Department of Paediatric Surgery, Bahawal Victoria Hospital/Quaid-e-Azam Medical College, Bahawalpur, from July 2008 to December 2010. A total of 50 patients in which ultrasonography suggested PUJ obstruction, admitted to the Department of Paediatric Surgery, were included in the study. Besides history and examination, the investigations done before the procedure included: Complete blood examination, urine routine examination, and serum Creatinine level. Intravenous urography was also done to further elucidate preoperatively renal pelvic anatomy. To know about the lower ureteric patency and length of the obstructed PUJ segment, retrograde ureteric catheterization and retrograde urography was also done. In those patients, where excretory urography did not show sufficient dye excretion, Diethylene Triamine Pentacaetic Acid (DTPA) renal scan was also done. Patients with DTPA renal scan results of less than 10% of total uptake or 10 ml per minute glomerular filtration rate (GFR) were also excluded from this study. In these patients, percutaneous nephrostomy (PCN) was performed and after three weeks of PCN, if that particular renal unit did not show improvement in function on renal scan, nephrectomy was advised.

After inducing general anaesthesia, surgery was performed by a flank approach, with patients in the lateral decubitus position, via an anterior sub-costal incision, usually approaching the kidney anteriorly. Both Dismembered (Anderson Hynes) and Non-dismembered (Flap procedures) pyeloplasties were performed depending upon the size of pelvis and degree of dilatation.

Anderson Hynes pyeloplasty was performed in patients whose pre-operative findings and urography showed PUJ obstruction of small segment and dilated extra-renal pelvis. While patients with PUJ obstruction of longer segment and intra-renal pelvis were subjected to Non-dismembered (Flap procedures, i.e., vertical and spiral flap) pyeloplasty. DJ stent or nephrostomy tube was not kept routinely and considered only for complicated cases.

All patients were given antibiotics prophylactically. Complications were noted in immediate post-operative period and on follow-up. Patients were discharged from hospital at 72 hours post-operatively.

Initial follow-up was after 1 week when skin stitches were also removed. The next follow-up was after 15 days and then monthly for 3 months. Minimum follow-up period was 6 months and maximum 15 months for these particular patients. At three month, excretory urography was done to assess the function of that particular renal unit. DTPA renal scan was advised to those patients only in which urography showed insufficient function of particular renal unit.

RESULTS

The number of patients included in the study were 50. Age range was from 1–11 years with a mean age of 3 years. The presenting complaints were dull, continuous lumbar pain, flank mass, incidental, i.e., who were diagnosed to have PUJ obstruction on ultrasonography for other abdominal complaints, recurrent urinary tract infections, haematuria, and secondary stones. Out of these, the lumbar pain and flank mass were the commonest. Male to female ratio was 2.6:1. Majority of patients presented with left sided PUJ obstruction (Table-1). In patients with bilateral obstruction, there were two patients which on presentation had deranged renal parameters. So, percutaneous nephrostomy (PCN) was done to decompress the renal units. Surgery was performed after the settlement of uraemia and at first the side which showed better function on DTPA renal scan was addressed.

Data about type of repair is given in Table-2. Per-operative findings were stenosed PUJ obstruction in 24 (48%) patients, aberrant vessels in 14 (28%) and 12 (24%) patients were found to have adhesions and bands. Out of these 50 patients, 2 (4%) patients had urinary leakage which led to urinoma formation and 2 (04%) developed Re-stenosis which required re-operation. Post-operative complications in our study are shown in Table-3.

Table-1: Patients characteristics and presentation.

	No. of Patients	%age
Gender		
Male	36	72
Female	14	28
Side Affected		
Left	32	64
Right	15	30
Bilateral	3	6
Presenting Complaints		
Lumbar Pain	24	48
Flank Mass	10	20
Incidental i.e., on ultrasonography	8	16
Recurrent UTI	5	10
Others (Haematuria, Secondary stones)	3	6

Table-2: Patients by type of repair

Type of Repair	No. of Patients	%age
Dismembered pyeloplasty (Anderson Hynes)	40	80
Non-dismembered (Culp Spiral, Scardino Vertical)	10	20
Total	50	100

Table-3: Post-operative Complications

Complications	No. of Patients	%age
Urinoma formation	2	4
Wound infection	1	2
Fever	0	0
Re-Stenosis	2	4

DISCUSSION

Obstruction of PUJ is probably the most common congenital abnormality of the ureter.[4,5] Although the problem is congenital but may not become apparent until much later in life. In older children or adults, intermittent abdominal or flank pain, at times associated with nausea or vomiting, is a frequent presenting symptom. The age presentation in our study varied from 1–11 years with mean age of 3 years. The common presenting complaints noted in our study were almost similar to many national and international studies.[3–5,14] The delayed presentation is due to non-availability of prenatal ultrasonography and ignorance of mild symptoms.[15] In our study, the males were affected more and left side more frequently involved than right, which is in consonance with other studies.[3,5,14,16-20] Bilateral PUJ obstruction was found in 6% with comparable results reported by other studies.[14,17,19]

Radiographic approaches to the diagnosis and assessment of renal obstructive disorders have evolved significantly over the past several decades. Ultrasonography constitutes a cornerstone in the radiologic evaluation of renal obstructive disorders. It is non-invasive, inexpensive, portable, does not require ionizing radiation or contrast media, and is not limited by renal failure.[3,18] As a result, Ultrasonography is ideally suited as a screening study and for following patients with known abnormalities.[4,5] The hallmark finding of hydronephrosis on Ultrasonography is separation of the hyper-echoic central renal sinus by anechoic branching structures that represent the dilated calices. With more chronic and severe forms of hydronephrosis, cortical thinning may be seen.[18]

Excretory urography is indicated to further elucidate preoperative renal pelvic anatomy and remains the cornerstone of radiographic diagnosis of PUJ obstruction. Renal ultrasound, excretory urography and renal scan can surely detect PUJ obstruction preoperatively.[21] Nuclear scan is helpful in quantification of diagnosis and demonstration of exact site and nature of obstruction prior to surgical intervention.[4,21] In our study, the diagnosis was made on the basis of Ultrasonography, Intravenous Urography, Retrograde Pyelography and with Diuretic renal scan where required.

The surgical management of a kidney with obstruction at the uretero-pelvic junction (UPJ) has many nuances with respect to approach, degree of invasiveness, and timing of surgery.[5] The objectives remain the same: to relieve the obstruction and thus preserve or improve the overall renal function and to maintain normal development while lessening the morbidity to the patient and yet not compromise the surgical outcome.[6,15] Pyelo-plasties remain among the most rewarding surgeries that we, as surgeons, perform. Once PUJ obstruction diagnosis has been made, pyeloplasty should be performed as soon as possible in order to preserve the renal functions in normal or moderately reduced functioning renal units.[2,6]

Treatment options for ureteropelvic junction obstruction encompass the urologic spectrum. Watchful waiting, balloon dilation, endopyelotomy, laparoscopic pyeloplasty, robotic pyeloplasty, and open pyeloplasty are all current approaches. The long term success rates of endo-urologic therapies are less than the rates reported for open pyeloplasty.[11,23-26]

The successful pyeloplasty depends on a carefully designed anastomosis with care taken to ensure that the ureter and pelvis will lie in a normal anatomic position at the completion of the pyeloplasty.[3] In the past, surgeons have described various techniques to repair the PUJ, with open approaches being divided into three main groups: the flap type, the incisional intubated type, and the dismembered type. Currently the Anderson Hynes dismembered pyeloplasty is the most popular, frequently used and successful technique. When aberrant artery is encountered, dismembered pyeloplasty with relocation and re-anastomosis of PUJ on other side of aberrant vessels is successful.[14-16,20] Flap techniques are reserved for dependent PUJ obstruction.[7,10,11]

In our study, stenosed PUJ was found in 24 (48%) patients, aberrant vessels in 14 (28%) and 12 (24%) patients were found to have adhesions and bands as cause of obstruction which are comparable to many national and international studies in which these rates are found as 25–56%, 21–45%, 20–35% respectively.[7,16]

Nowadays, Anderson Hynes Dismembered Pyeloplasty is the commonly used technique by most urologists in PUJ obstruction. In our study, Anderson Hynes pyeloplasty was performed in 40 (80%) patients and Non-dismembered pyeloplasty was used in 10 (20%) patients.

The indications for placement of stents or nephrostomy tube intra operatively remain controversial and may be different in paediatric and adult practices. Most paediatric urologists avoid routine use of stents and nephrostomy tubes.[27] Stents and nephrostomy tubes once considered integral part of PUJ surgery are now rarely placed. Smith KE *et al*[28] reported no difference between stented and non-stented pyeloplasty. In our study, we placed DJ Stent in 6 patients and nephrostomy tube as stent in 4 patients and we concluded that there was no significant difference in complications rate as compared to pyeloplasties without stents. In fact, Smith KE *et al*[28] and Elamlik K *et al*[29] reported that patients with DJ stents had also faced stent related complications of suprapubic discomfort, haematuria and blockade. Moreover, DJ stent should require another procedure under anaesthesia for its removal. Recently we are facing patients with forgotten DJ stents for many years which require open pyelolithotomy or endoscopic removal of DJ stent. Austin PF *et al*[19] suggested use of nephrostomy tube as stent in place of DJ stent in pyeloplasty as it was easily removed on outpatient basis without further anaesthesia. Moreover, nephrostomy tube also provides easy access for radiographic studies before its removal. So, our study suggested that these stents should be preferred in PUJ reconstruction of solitary kidney and in more complicated cases.

The post-operative complications noted in our study were urinoma formation (4%), wound infection (2%) and re-stenosis (4%). In comparison to this, in many previous studies reported similar results as: 0.7–10%, 2–12%, and 3–15% respectively.[3,16,19,20,25,28] In follow-up, for the assessment of hydronephrosis and renal functions, ultrasonography was done at 4–6 weeks, excretory urography and renal scan at 3 months pos-operatively. An overall decrease in the degree of pelvicaliectasis over time is a good indication that the obstruction has been relieved.

Our study showed pain relief in 96%, decreased hydronephrosis in 90% and improved or preserved renal functions in 94% patients. While only 4% patients showed deterioration in renal functions. So, overall success rate of pyeloplasty in our study is 94% which is comparable to many previous studies reporting it as 90–99%.[16,23–26]

Therefore, our study suggests that pyeloplasty is the most effective and permanent treatment of PUJ obstruction. Newer endoscopic techniques currently used must be carefully assessed against the gold standard of pyeloplasty because success rates for endopyelotomy and pyeloplasty are 88% and 93% respectively while hospital stay is essentially equal and endopyelotomy is a more costly procedure than pyeloplasty.[5–7,30]

CONCLUSION

Despite newer endoscopic techniques, open pyeloplasty with dismembered or non-dismembered type is treatment of choice and remains the gold standard in the treatment of primary pelviureteric junction obstruction with an over 90% success rate. Our study also proves that the use of stents in pyeloplasty is not justified as a routine and should be only reserved for more complicated cases.

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