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Modified Shanfield Ureteric Reimplantation with or Without Ureteric Tailoring in Primary Obstructive Megaureter

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ABSTRACT

Background: Obstructive megaureter is one of the leading cause of renal failure. If not resolve on time, surgical correction is necessary**.** Excision of stricture part and ureteric reimplantation is procedure of choice. Modified shanfield technique is one of the surgical procedures for ureteric reimplantation with good outcome. Those with huge megaureter, excisional tapering of distal ureter to facilitate ureteric reimplantation is mandatory. The objective of this study was to evaluate and assess the outcome of modified shanfield procedure in children with obstructive megaureter.

Methods: A retrospective review of all patients with obstructive megaureter who underwent modified shanfield ureteric reimplantation with or without ureteric tailoring between April 2022 to March 2024 was done. The following were recorded for each patient: age, sex, laterality, ureteral diameter, operative time, hospital stay, outcome and complications.

Results: This study consisted of 16 paediatric patients (6 boys and 10 girls) who underwent modified shanfield ureteric reimplantation with or without ureteric tailoring with a mean age of 47 months(12 months to 132 months). Left side repair was performed in 10 patients (62.5%). Mean operative time was 118 minutes. The mean length of hospital was 6.65 days (5- 9 days). None of the patients developed major complications including vesicoureteric reflux or stricture but three cases had febrile urinary tract infection. Follow up ultrasound and Di-ethylene triamine-penta-acetic acid (DTPA) scan was obtained after 6 months postoperatively, which showed improved renal function in DTPA in 14 patients (93.4%).

Conclusions: Modified shanfield ureteric reimplantation is also an alternative procedure for ureteric reimplantation because of its easiness, quick and good outcome. Its implication in paediatric age group is also safe. For better outcome, patient selection and refinement technique should be pursued.

Keywords: Modified shanfield; obstructed megaureter; ureteral tailoring; ureteric reimplantation.

INTRODUCTION

Megaureter is a nonspecific term implying a spectrum of anomalies associated with grossly dilated diameter of ureter, usually 8 mm or more.[1,2] Primary obstructive megaureter (POM) is defined as an intrinsic congenital abnormality at the lower segment of the ureter in the ureterovesical junction which causes obstruction to urine flow.[2] POM is the third most common cause of upper urinary tract dilatation after pelviureteric junction obstruction and vesicoureteric reflux in paediatric age group.[3] Majority of patients were asymptomatic and were incidentally detected and were managed initially with conservative approach with spontaneous remission rate of 85% in primary megaureter. However, few patients with recurrent urinary tract infections, deteriorating renal function and significant obstruction require surgical intervention. Ureters of more than 10 mm in diameter are more likely to require ureteric reimplantation surgery along with ureteric tailoring procedures.[4,5]

In this era of modern technology, laparoscopic ureteric re-implantation (ureteric tailoring if necessary) are commonly used for quick recovery, aesthetic advantage and short hospital stay.[6] However, in developing countries like Nepal where aforementioned facility is not available, POM are managed with open ureteric reimplantation

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and ureteric tailoring if necessary. Modified Shanfield procedure is performed considering its safety, simplicity and robust anti-reflux implantation technique without the need to formally open the bladder. Along with it, this technique offers several advantages as it allows overcoming the problem of inadequate tunneling when the bladder template is deficient.[7]

The aim of the current study is to evaluate the outcomes of Modified Shanfield procedure ureteric reimplantation in our part of world.

METHODS

Patients with diagnosis of primary obstructive megaureter at Kanti children's hospital between April 2022 to March 2024 (2 years duration) were retrospectively reviewed. Approval for this study was received from Kanti Children's hospital's Institutional review committee (IRC) with reference no 580 (Approved on 04 October 2024). Diagnosis of obstructive megaureter was made after evaluating Computed Tomography Intravenous Urography (CT-IVU) for hydroureteronephrosis, Micturating Cystourethrography (MCUG) for evaluating reflux or vesicoureteric reflux (VUR) and Di-ethylene triamine-penta-acetic acid (DTPA) Scan to see renal split function. All of the patients were presented to us with incidental findings on ultrasonography of abdomen either antenatally or postnatally. None of them have any features of recurrent urinary tract infection; symptoms or signs of acute or chronic kidney disease, failure to thrive etc.

The following were recorded for each patient: age, sex, laterality (side), ureteral diameter, operation time, hospital stay and Clavien-Dindo postoperative complications.[8] DTPA scan evaluation before and after operation (6 months after operation) was documented and analyzed.

All procedure was performed by single surgeon. Intraoperatively, maximum ureter diameter was measured at lower ureter just proximal to obstruction using measuring scale in millimeter. If diameter was less than 10 mm, Modified Shanfield ureteric reimplantation only was performed. However, if diameter of ureter was >10 mm, excisional ureteric tailoring followed by Modified Shanfield ureteric reimplantation was performed.

Data were assessed using hospital information systems and fed into an Excel (Microsoft Corporation, Redmond, WA, USA) datasheet. Descriptive statistics were performed with the same software. Patients with primary obstructive megaureter. Patients who underwent Modified shanfield ureteric reimplantation either unilateral or bilateral. Patients who need additional ureteric tailoring procedures. Patient with refluxive megaureter, Patient who required redo ureteric reimplantation. Patient who was lost in follow up.

All patients underwent Open Modified Shanfield technique with or without excisional uretericTailoring via retroperitoneal flank access. About 5 cm skin incision is made above pubis along skin crease (Pfannenstiel incision). Rectus abdominis muscle was divided. Lateral umbilical ligament was identified and tied and cut to expose ureter. Ureter is followed to expose uretero-vesical junction by extra-vesical approach. Distal ureter was dissected and mobilized preserving vessels and nerves and vas in male child. Measurement of lower ureter is done using measuring scale. Extramucosal detrussotomy (Vesical muscular layer in incised) of about 2-4 cm from junction to the proximal side on postero-lateral bladder wall above the trigone as per Paquin law (5:1 ureteral tunnel length –to diameter ratio). The prolapsed mucosa is open through a small stab incision into the interior of bladder. The ureter is advanced through the window to the interior of bladder, and invaginated. Anchoring stitch were given its lower end against the trigone 1-2 cm distal to the detrussotomy wound with 5-0 polyglactin sutures in a U-stitch fashion. Second U-stitch anchored suture is given on contralateral ureteric end. With this manoeuvre, ureter is towed to the interior of bladder and anchored. Additional burying suture are given. Detrussotomy is closed over loosely, forming a short sub-mucosal tunnel. In case of megaureter, the ureter was tailored or tapered over 12fr feeding tube, ureteric stent was kept. Foley catheter was kept. Abdominal wall was closed in layers using absorbable suture.

Chemoprophylaxis was continued for the first month after discharge and ultrasound of Kidney-ureter-bladder (USG-KUB) along with urine culture and sensitivity was performed at one month during follow up. Chemoprophylaxis was stopped if USG-KUB did not show any significant dilatation of ureter and urine culture showed no growth. Second USG-KUB was performed at three months of follow up. However, option of performing MCUG (to check iatrogenic VUR) or not was given to parents as it is an invasive test (MCUG), and there is chance of introduction of bacteria to urothelium.

Outcome was assessed by degree of radiographic resolution of hydroureteronephrosis, non-obstructive flow pattern in DTPA Scan.

RESULTS

This study consisted of 16 consecutive paediatric patients with obstructive megaureter who underwent Modified Shanfield technique with or without excisonal ureteric tailoring from April 2022 to March 2024. There were 10 girls and 6 boys. Mean ureteral diameter was 12.78 mm (7 to 25 mm). Mean age was 47 months (12 months to 132 months). Mean operative time for ureteric reimplantation with excisional ureteric tailoring period was 118(108-138) minutes. Mean hospital stay was 6.65 (5 to 9) days (**Table 1**).

Table 1. Patient characteristics.

Age at surgery (months)	Mean 47(Range: 12 – 132)
Sex Male: Female	10 (62.5%): 6 (37.5%)
Site of surgery (left: right)	10: 6
Mean Ureteral diameter (millimetres)	12.78 (7- 25)
Mean operative time one side without ureteral tailoring(minutes)	72 (62-82)
Mean operative time one side with ureteral tailoring(minutes)	118 (108-138)
Hospital stay (days)	Mean 6.65 (5-9)
Follow up (months)	Mean 22.18 (20-28)

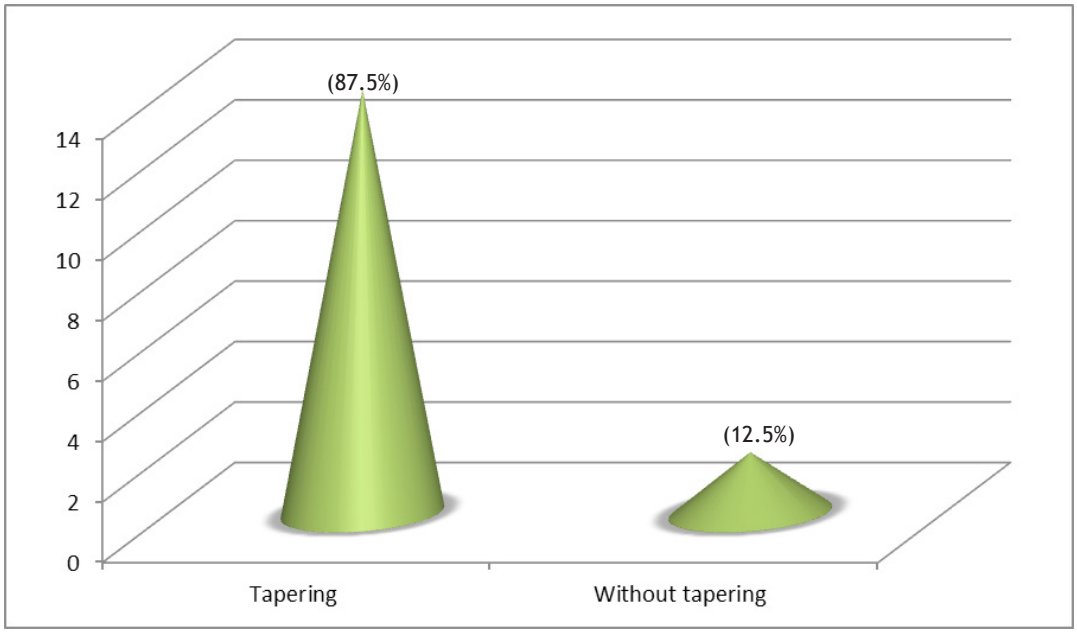

Figure 1. Modified Shanfield technique with or without ureteric tapering. (N=16)

Fourteen patients (87.5%) had ureteral tailoring using excisional technique while two patients (12.5%) did not require it (**Figure 1**).

Twelvepatients had Grade I complications as described by Clavien-Dindo complication group.[8] Four patients had Grade II complications (**Table 2**) which was managed with some medicines. Amongst which, one developed hospital acquired pneumonia in postoperative period.

During follow up (mean 22 months), three patients (18 %) suffered febrile urinary tract infection (UTI). These patients were kept under chemoprophylaxis for 6 months. Later, they didn't have any recurrent febrile issues. One

female patient had spontaneous expulsion of DJ Stent at 3rd postoperative week. One patient developed hypertrophic scar. No surgical site infection occurred in any patients. (**Table 3**)

Mean DTPA Scan in postoperative period was found to be 34.27 ± 7.67 in compare with preoperative 32.67 ± 8.24. It was found statistically significant. (**Table 4**)

Table 2. Early complication.

Complication	N (%)
Clavien-dindograde I	12 (75%)
Clavien-dindograde II	4 (25%)
Clavien-dindograde III	0 (0 %)
Clavien-dindograde IV	0 (0 %)

Table 3. Late Complications.

Complication	N (%)
Febrile UTI	3 (18.75 %)
Non febrile UTI	3 (18.75 %)
Spontaneous expulsion of DJ Stent	1 (6.25 %)
Stricture	0 (0 %)
Hypertrophic scar	1 (6.25 %)

UTI : urinary tract infection

Table 4. Comparison of DTPA Scan.

	DTPA value (%) of ipsilateral kidney with standard deviation	p-value
Preoperative mean DTPA value	32.67 ± 8.24	0.029*
Postoperative mean DTPA value	34.27 ± 7.67	

*Chi square test is used to see level of significance

DISCUSSION

An ideal ureteric reimplantation should be leak-proof, provide an adequate anti-reflux mechanism, and allow unobstructed passage of urine from the ureter to the urinary bladder.[7,9] There are many factors related with anti-refluxing mechanism like submucosal tunnel length[10-12] and conduit diameter should be 5:1 for continent channel (Paquin Law)[13,14], opening of ureteric orifice at the corner of trigone area and the configuration of ureteric opening.[15] Recently, it has been stated that ureteric orifice configuration has a greater impact than tunnel length in establishing anti-refluxing conduit.[16] Classical tunneling techniques like cross-trigonal (Cohen's) and supra-trigonal (Politano-Leadbetter) area dissection are used to provide a submucosal trough of adequate size to receive the implant.[17,18] In an attempt to reach same goals via a minimal dissection through extravesical approach, shanfield[18] proposed a 'ureter tip bladder drop-in technique' through a vesical stab wound with fixation of the spatulated ureter to the interior of the bladder by a U-stich. This modified technique is used in paediatric ureteric reimplantation with modification of giving double U-stich to reinforce ureter in to bladder and also reimplantation just near to native ureteric orifice.

We observed less operative time along with short hospital stay with this procedure when compare with Cohens ureteric reimplantation.[19] Majority of cases had excisional tapering of distal ureter to facilitate ureteric reimplantation Paquin law principle.[12] In addition to it, idea of relocating ureteric orifices to extra anatomical position render obstruction or reflux. In our

experience, the result of this technique is promising with no intraoperative issues with channel formation. Postoperatively, no patients developed anastomotic leakage. None of the patients showed neo-ureteral stricture or de Novo reflux during study period.

At the outset of our experience, complications are regrouped according to Clavien-Dindo classification[20], grade II complications are more likely to occur after this technique. In our series, febrile (18.7%) and non-febrile UTI (18.7%) could be due to relative obstruction, possibly created by detrussoraphy. One female patient had spontaneous expulsion of DJ stent on 2nd postoperative week. However, she didn't develop any complications.

The current study was limited by retrospective nature of study. Additionally, there are fewer number of cases as incidence of obstructive megaureter in itself is rare. Finally, median follow up time reported was suboptimal for clinical outcome.

As this is simple procedure with less complication, it can also be used in lower urinary tract reconstruction of exstrophy, complex cloacal exstrophy or small neuropathic or valve bladders where bladder template is usually small to perform a formal tunnelling procedure.

CONCLUSIONS

Modified Shanfield procedure is one of the surgical options for primary obstructive megaureter in paediatric age group. Ureteric tailoring is frequently required while reimplanting ureter in obstructive megaureter.

CONFLICT OF INTEREST

Authors declare there are no any conflicts of Interest.

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