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ORIGINAL ARTICLE

Extravesical verses intravesical ureteral reimplantation in paediatric patients suffering from vesicoureteric reflux.

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ABSTRACT… Objective: To compare two different techniques for ureteric reimplantation for management of Vesicoureteric reflux in children. **Study Design:** Comparative study. **Setting:** Department of Pediatric surgery at D. G Khan Medical College Dera Ghazi Khan. **Period:** January 2010 to April 2021. **Material & Methods:** Seventy four patients with vesicoureteric reflux were included. Extravesical reimplantation technique was performed in 35 children labeled as Group A , while intravesical reimplantation was performed in 39 children labeled as Group B. Parameters compared between two groups were length of the surgical procedure, average duration of hospital stay, postoperative bladder spasms, significant hematuria >72 h, and long-term complications. **Results:** The mean age at operation was 6.5 years in Group A and 6.35years in Group B. The mean duration of surgery was significantly less in Group A .i.e 104 min with SD 18 min compared to Group B where mean duration was 128 min; SD 15 min. The mean postoperative stay was significantly lower (P value =0.032) at 4.5 (1.5) days in Group A compared to 6.5 (0.5) days in Group B. Postoperative bladder spasms were significantly lower (P = 0.003) at 1/35 in Group A compared to 35/39 in Group B. Postoperative hematuria was significantly lower (P =0.001) in Group A compared to Group B. **Conclusion:** Extravesical reimplantation technique has lower operative time, less postoperative discomfort and shorter hospital stay compared to intravesical reimplantation. Both techniques are equally effective in treating reflux.

Key words: Hydronephrosis, Urinary Bladder, Vesico-Ureteral Reflux.

INTRODUCTION

Vesicoureteric Reflux (VUR) is abnormal retrograde flow of urine from bladder through ureter to kidney. It is present approximately 1% of general population.[1] It occurs in 20-35% of children evaluated for bacteriuria. Although no local data is available. With advancing age submucosal tunnel elongates and ratio between submucosal tunnel and ureteral diameter increases, that adds resistance to back flow of urine from bladder to ureter and decrease the reflux.

Severity of Reflux is graded using the International Reflux Study system, which includes domains such as height of retrograde flow, dilatation and tortuosity of the ureters.[2] According to International Reflux study system, 5 categories are mentioned as shown in Figure-1. Grade V being most severe. Low grade (I, II, III) reflux generally resolves overtime whereas high grade ((IV and V) reflux is less likely to resolve spontaneously. Persistent reflux causes recurrent Urinary Tract Infection, renal scarring, Hypertension and progressive renal failure that can be life threatening to the children.[3] Main goal of management of reflux is to prevent episodes of Urinary Tract Infection and renal scaring.[4]

Low grade (I, II, III) reflux is managed conservatively but high grade (IV and V) reflux need intervention. There are many surgical procedures available[5] to manage Urinary Tract Infection (UTI) including endoscopic and open surgical treatment. Open surgical treatment remains the gold standard

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in treating high grade reflux. If postoperative recurrence and worsening of Vesicoureteric reflux (VUR) exists then it can be managed by endoscopic subureteric injection of dextronomer/ hyaluronic acid.[6]

Endoscopic surgery is reported by 80% success rate, but it needs specialized centers and equipment and in some cases, multiple sessions are required to achieve the success.[7] Open surgery for reflux has reported 98% success rate in experienced hands and several open surgical techniques are available.

Intravesical (LeadBetter-politano) approach in generally applicable to all types of mega ureters with additional benefits of ureter tailoring and tappereing as well but it needs excessive mobilization of ureter and bladder dissection with blood loss, prolonged hospital stay and bladder spasm.[8] The common steps of intra vesical technique include the following: [I] make a vertical incision in bladder to gain access to ureter, [II] incise the mucosa around ureteral orifice, [III] dissect and mobilize intra vesical ureter from its attachments to Waldeyer's sheath,[IV] create a submucosal tunnel, [V] place ureter within tunnel, [VI] anastomose ureteral orifice to bladder mucosa and [VII] close any remaining mucosal defects within bladder.[13]

Extra vesical (Modified Lich-Gregoir) is relatively simple and excellent technique with less mobilization of ureter and bladder in less time and is done after trauma and transplantation.[9] This can also be done in children's. The main steps of an extra vesical re-implant include [I] identify and dissect ureter down to its anastomosis with the bladder, [II] separate the intramural portion of ureter from detrusor muscle, [III] divide the detrusor muscle down to supepithelium to create a 3-5cm trough in which ureter will lay, [IV] mobilize lateral flaps of detrusor muscle for space for the ureter within the trough, and [V] close the bladder muscle with absorbable sutures over the ureter to create the tunnel.[13]

We wanted to compare extra vesical reimplantation technique (Modified Lich-Gregoir) with the intravesical technique (LeadBetter-politano) in children for Vesicoureteric Reflux management.

We present here our experience of extra vesical reimplantation in children using Lich-Gregoir technique and compare our results with intra vesical technique of Leadbetter-Politano.

MTERIAL & METHODS

It is a comparative study conducted at the Department of Pediatric surgery at DG Khan Medical College Dera Ghazi Khan from January 2010 to April 2021 after approval from Institutional Ethical Review Committee (28/PHY/DKMC).

A total Seventy-Four children, both male and female, of grade IV and V Vesicoureteric Reflux (VUR) having unilateral or bilateral involvement, were included in this study. All the patients with secondary reflux, previous bladder or ureteric surgery, duplex ureter and ureterocele were excluded from this study.

Patients were divided in to two groups according to the type of surgery performed. In Group-A (n=35) Extravesical technique was performed while in Group-B (n=39) intravesical technique was performed. All the relevant data were entered in a pre-designed proforma. Age, sex, surgical technique, average hospital stay, early post-operative complications (hematuria, bladder spasm) and delayed post-operative complications (persistent VUR, postoperative uretric obstruction) were noted. We followed up the patients at 6th and 12th month postoperatively with voiding cystourethrogram (VCUG) for observing the delayed post-operative complications.
Statistical Package for Social Sciences (SPSS) version 24 was used for entering and analyzing the data. Mean and Standard Deviation (mean ± SD) was measured for quantitative variables and frequency with percentage calculated for categorical variables. Chi-Square and student t-test was applied to compare the Extravesical (Modified Lich Gregoir) group with Intravesical dbetter Politano) group.

RESULTS

Over a period of 11 years, only a total of 74 cases

of Vesicoureteric reflux (VUR) fulfilled the inclusion criteria and they underwent the reimplantation surgery. In Group-A, extravesical (Modified Lich-Gregoir) technique was performed and in Group-B the patients selected were operated with intravesical (Leadbetter-Politano) technique.

Mean (mean ± SD) age at operation in Group-A was 6.5±2.55 years while in Group-B it was 6.3±3.27 years. The difference was statistically non-significant ($p>0.05$). There were 67 (70.8%) males and 7 (29.2%) were females having male predominance which is statistically significant ($p<0.324$).

Table-I shows the comparison between Extravesical and Intravesical techniques with age, duration of surgery and hospital stay. The comparison of age between the Extravesical and Intravesical groups was found to be non-significant ($p>0.909$) which means that both surgical procedures may be performed at any age. Comparison of Duration of Surgery between the Extravesical and Intravesical groups was found to be significant ($p<0.032$).

Comparison of Hospital Stay between the Extravesical and Intravesical groups was found to be highly significant ($p<0.000$). This means that Duration of Surgery was significantly shorter in Extravesical technique as compared with the intravesical technique. Length of Hospital Stay was found to be significantly shorter in Extravesical technique as compared with the intravesical technique.

Table-II shows the comparison of the occurrence of early complications in the Extravesical group and the Intravesical group. Occurrence of Bladder Spasm was significantly higher ($p<0.003$) in Intravesical group as compared with the Extravesical group. Occurrence of Hematuria was highly significantly ($p<0.000$) higher in Intravesical group as compared with the Extravesical group. This demonstrated that Spasm and hematuria occurred significantly in patients operated with intravesical technique. The spasm was differentiated from wound pain by observing the leakage of urine alongside the per-urethra catheter.

Considering bladder spasm, in group A only one patient and in group B 35/39 patients reported spasm. All patients responded well to anticholinergic drugs. Hematuria was noted in one patient in Group A while all patients in Group B suffered hematuria of which 6 patients needed blood transfusion. Average blood loss in group A was 20-30ML and in group B 70-100ML (Table-IV).

Stent was placed in all patients of group B while in group A no Patient required stenting. In group B one patient had persistent hydroureter after removal of stent and re-stenting failed so open redo surgery was done. One patient in group A had persistent leaking of urine in extra vesical drain and redo surgery was done.

Long term complications like obstruction in ureter or postoperative vesicoureteric reflux were noted after a follow up at 6th and 12th month of operation with voiding cystourethrogram. These complications were insignificant in both groups implying that both procedures are effective in correcting Vesicoureteric reflux (VUR).

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DISCUSSION

The main goal of any anti reflux surgery is to restore normal anti reflux function of Vesicoureteric junction[10] and Success of surgery can be verified by doing Voiding cystourethrograph.[11] There exist many techniques for correction of VUR that means no single technique is full proof in the treatment of these patient.

Although Intra vesical technique is more popular in United States, extra vesical technique has the advantage of lesser operative time, overall shorter h ospital stay, having less morbidity associated with less hematuria and fewer bladder spasm.[12]

Name of Factors	Group	Mean±SD	P-Value (Student t-test)
Age	Extravesical	6.500±2.549	0.909
	Intravesical	6.357±3.272	
Duration of Surgery (Hours)	Extravesical	8.6256±5.433	0.032
	Intravesical	17.1143±12.099	
Hospital Stay (Hours)	Extravesical	26±5.164	0.000
	Intravesical	46.29±8.516	

Table-I. Comparison between extravesical and intravesical with age, duration of surgery and hospital stay.

Early Complications			Group-A Extravesical	Group-B Intravesical	P-Value (Chi- Square)
Bladder Spasm	Yes	Number	1 (4.2%)	35 (41.7%)	0.003
Hematuria	Yes	Number	1 (4.2%)	39 (58.3%)	0.000

Table-II. Comparison of early complications between extravesical and intravesical groups.

Variables	Group-A	Group-B
Duration of Surgery	0.75-1houre	2.5-3hour
Hospital Stay	2-3 Days	3-6 Days
Blood Loss	20-30 ml	70-100ml

Table-III. Summary of comparison between two techniques;

Late Complication	Group A	Group B
Postoperative VUR	0.00	0.00
Postoperative Obstruction	0.00	0.00

Table-IV. Complications

Our comparative study shows same late outcome in both techniques but less early complication i.e. hematuria and bladder spasm in extra vesical as compared to intra vesical technique and also duration of surgery, hospital stay, and blood loss is less in extra vesical technique as compared to intra vesical technique.

Ellsworthet al[14] compared the extra vesical reimplantation with intra vesical reimplantation and claimed that success rate is same in both groups however patients undergoing extra vesical reimplantation needed fewer pain medicines lesser anti cholinergic to control bladder spasm comparable to our study.

Outcome of our study is in agreement (or comparable) with study done by Wacksman et al[15] in 1992 who performed extra vesical reimplantation in 132 patients and observed that this technique is associated with less hospital stay, reduced post-operative morbidity and long term out comes were also comparable.[16] Similar results were observed by Sriram & Babu[17] in their study.

CONCLUSION

It is concluded that combination of excellent results, reduced morbidity, less hospital stay, also avoids necessity of ureteral stenting and relative ease in getting the expertise, make the extra vesical approach an excellent alternative to the traditional intra vesical reimplantation.

LIMITATIONS OF STUDY

This study is done by two different surgeons in two different institutions and very few studies are available nationally so results may be considered primary. Moreover most of the studies are on laproscopic technique in advance setup while these advance techniques are yet not upto mark in our centres thus limiting the cases and references.

CONFLICT OF INTEREST

There is no conflict of interest.

REFFERENCES

1. Mak RH, Kuo HJ. **Primary ureteral reflux: Emerging insights from molecular and genetic studies.** Current opinion in pediatrics. 2003; 15(2):181-5.

2. Ozaydin S, Celebi S, Caymaz I, Besik C, Karaaslan B, Kuzdan O, et al. **Increasing the reliability of the grading system for voiding cystourethrograms using ultrasonography: An inter- rater comparison.** Nephro-urology monthly. 2016 S; 8(5). doi:10.5812/numonthly.38685

3. Williams G, Craig JC. **Long‐term antibiotics for preventing recurrent urinary tract infection in children. Cochrane database of systematic reviews.** 2019(4).doi: 10.1002/14651858.CD001534.pub4. PMID: 30932167; PMCID: PMC6442022

4. RIVUR Trial Investigators. **Antimicrobial prophylaxis for children with vesicoureteral reflux.** New England Journal of Medicine. 2014 Jun 19; 370(25):2367-76.

5. Esposito C, Escolino M, Lopez M, Farina A, Cerulo M, Savanelli A, et al. **Surgical management of pediatric vesicoureteral reflux: a comparative study between endoscopic, laparoscopic, and open surgery.** Journal of Laparoendoscopic & Advanced Surgical Techniques. 2016; 26(7):574-80.. doi:10.1089/lap.2016.0055

6. Lau G, Anderson R, Cartwright P, Wallis MC, Schaeffer A, Oottamasathien S, et al. **Unilateral open extravesical ureteral reimplanation with contralateral dextronomer/hyaluronic acid injection performed as an outpatient therapy.** Journal of Pediatric Urology. 2018; 14(6):566-e1. doi:10.1016/j.jpurol.2018.07.014

7. Garcia-Aparicio L, Rovira J, Blazquez-Gomez E, García-García L, Giménez-Llort A, Rodo J, et al. **Randomized clinical trial comparing endoscopic treatment with dextranomer hyaluronic acid copolymer and Cohen's ureteral reimplantation for vesicoureteral reflux: long- term results.** Journal of Pediatric Urology. 2013;9(4):483-7.doi: 10.1016/j.jpurol.2013.03.003

8. Aboutaleb H, El-Mahdy A, Bolduc B, Upadhyay J, Shoukr R, Khoury A. **Extravesical ureteral re-implantation versus intravesical techniques for vesicoureteral reflux in children.** African Journal of Urology. 2004; 10(4):257-63.

9. Bustangi N, Kallas Chemaly A, Scalabre A, Khelif K, Luyckx S, Steyaert H, et al. **Extravesical ureteral reimplantation following Lich-Gregoir technique for the correction of vesico-ureteral reflux retrospective comparative study open vs. laparoscopy.** Frontiers in pediatrics. 2018; 6:388. doi:10.3389/fped.2018.00388

10. RIVUR Trial Investigators. Hoberman A, Greenfield SP, Mattoo TK, Keren R, Mathews R. **Antimicrobial prophylaxis for children with vesicoureteral reflux.** New England Journal of Medicine. 2014; 370:2367–76.

11. Arlen AM, Scherz HC, Filimon E, Leong T, Kirsch AJ. **Is routine voiding cystourethrogram necessary following double hit for primary vesicoureteral reflux?.** Journal of pediatric urology. 2015; 11(1):40-e1. doi:10.1016/j.jpurol.2014.11.011

12. Aboutaleb H, El-Mahdy A, Bolduc B, Upadhyay J, Shoukr R, Khoury A. **Extravesical ureteral re-implantation versus intravesical techniques for vesicoureteral reflux in children.** African Journal of Urology. 2004; 10(4):257-63.

13. McAninch JW, Lue TF, editors. **Smith & Tanagho's general urology.** New York: McGraw- Hill Medical; 2020(19); 196-197.

14. Ellsworth PI, Merguerian PA. **Detrusorrhaphy for the repair of vesicoureteral reflux: Comparison with the Leadbetter-Politanoureteroneocystostomy.** Journal of pediatric surgery. 1995; 30(4):600-3. , https://doi.org/10.1016/0022-3468(95)90141-8

15. Wacksman J, Gilbert A, Sheldon CA. **Results of the renewed extra vesical reimplant for surgical correction of vesicoureteral reflux.** The Journal of urology. 1992 Aug; 148(2 Part 1):359-61.

16. Yap M, Nseyo U, Din H, Alagiri M. **Unilateral extravesical ureteral reimplantation via inguinal incision for the correction of vesicoureteral reflux: A 10-year experience.** International braz j urol. 2017 Oct; 43(5):917-24. https://doi.org/10.1590/s1677-5538.ibju.2016.0179

17. Sriram K, Babu R. **Extravesical (modified Gregoir Lich) versus intravesical (Cohen's) ureteric reimplantation for vesicoureteral reflux in children: A single center experience.** Indian journal of urology: IJU: journal of the Urological Society of India. 2016; 32(4):306.. doi:10.4103/0970-1591.18972.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Zulfiqar Anjum	Writing manuscript.	
2	Muhammad Khalid	Writing manuscript.	
3	Muhammad Hammad Hassan	Writing references and framing of manuscript.	
4	Asif Abbas Khwaja	Responsible about, data collection.	
5	Muhammad Asif	Statistical analysis.	
6	Samah Fatima Qaisrani	Tabulation and ethical committee approval.	