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Study of Effectiveness of Double J (D-J) Stent and Transanastomotic BMI Tube Stent in Anderson Hynes (A-H) Pyeloplasty for The Management of Unilateral Pelvi-Ureteric Junction (PUJ) Obstruction in Children

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Abstract

Background: Hydronephrosis is a major urological health problem in children. Pelviretic junction (PUJ) obstruction is common among the congenital causes of hydronephrosis. A-H pyeploplasty is the most popular and common technique. There are different modalities of using trans-anastomotic stent in A-H pyeloplasty. Some surgeons use external drainage like nephrostomy tube, pyelostomy tube or trans-anastomotic stent and others use internal drainage D-J stent. In this study, D-J stent and BMI feeding tube were used for trans anastomotic drainage. We analyzed the data to find out which method of stenting in A-H pyeloplasty is more effective and safer and also to reduce the morbidity by reducing stent related complications. **Material & Methods:** A prospective interventional study was conducted in the faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute during the period from January 2016 to December 2019. A total of 60 patients under 12 years of age were included in this study were diagnosed as uni-lateral hydronephrosis for PUJ obstruction. Patients were divided into two groups by random lottery method and all patients underwent A-H pyeloplasty under general anaesthesia (G-A). In group-A, A-H pyeloplasty were done with using Double (D-J) stent and in group-B, 5Fr or 6Fr BMI tube were used as trans-anastomotic drainage. Patients were followed up after 2 weeks of operation, at 3 months and them at 6 months. The variables of the post-operative follow up study were patency of anastomosis, urinary tract infection, (UTI), urinary leakage and post-operative hospital stay and statistical analysis were done. **Results:** In group-A (30 cases), Anderson-Hynes pyeloplasty were done using D-J stent and in group-B (30 cases) with using trans-anastomotic BMI tube. In group-A most (73.33%) patients were below 5 years and in group-B 48 patients (80%) were below 5 years. In group-A mean age was 3.57+ 3.11 years and in group-B mean age was 3.31+3.21 years. There is no statistically significant difference in age distribution. In group-A left kidney were involved 66.7% cases and in group B in 80% cases left kidney were involved. In the early post-operative period, no urinary obstruction in group-A, however in 20% cases developed urinary obstruction in group-B but that was not statistically significant. In group-B continuous urinary leakage through drain tube was for 0-15 days but in group-B

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leakage was only or 0-1 day. It was statistically significant (p=0.037). In group-A, range of time of removal of drain tube was 4 days but in group-B range was 8-27 days. It was statistically significant (p=0.0001). Hospital stay in group-A was 4-8 days and in group B 9-29 days. It was also statistically significant (p=0.0001). **Conclusion:** In A-H pyeloplasty, morbidity of the patients can be reduced by using D-J stent which is more effective and safer. We found definite statistically significant difference in terms of urinary leakage, post-operative UTI, and hospital stay.

Keywords:- Hydronephrosis, Uni-lateral PUJ obstruction, A-H pyeloplasty, stenting.

INTRODUCTION

Among the entire congenital problems faced in paediatric surgery, hydronephrosis is one of the most common condition. It cases anxiety both for the parents and the attending doctor. It is well known that 50% of all abdominal masses in infants and children are of renal origin and 40% of these renal masses are due to pelviureteric junction (PUJ) obstruction with resultant hydronephrosis.[1] The incidence of PUJ obstruction is 1 in 1250 live births.[2] PUJ obstruction is the commonest from of congenital obstructive urophathy found in unfancy and childhood.[3] Anderson-hynes (A-H) pyeloplasty is the most commonly used method and has a high success rate with few complication in some cases.[4] The routine use of transanastomatic ureteric stents and percutaneous nephrostomy tube after an open pyeloplasty remains controversial especially in children whom the diameter of ureter is relatively small.[5,6] The advantage of non-stented pyeloplasty are decreasing infection rate, decreasing hospital stay, early patient mobilization and avoiding dry anastomosis.[7] Main concern of the study is to reduce morbidity after Anderson-Hynes pyeloplasty by reducing stent related complications not by using stent routinely.

MATERIAL AND METHODS

A prospective observational study was conducted in the Faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute. The study period was January 2016 to December 2019. All the hydronephrotic patients were screened out in the out patient department and out of them 60 patients those who are diagnosed as uni-lateral hydronephrosis due to PUJ obstruction were selected for admission for surgical treatment and to be included in this study. After admission patients were randomly divided into two groups by lottery method. Age of the patients were upto 12 years of age and underwent A-H pyeloplasty under general anaesthesia. Group-A (30 cases) patients underwent A-H pyeloplasty with D-J stent and Group-B (30 cases) patients underwent A-H pyeloplasty with trans-anastomotic BMI tube (5Fr or 6Fr) stent. Patients were followed up immediately after operation and specific variables were observed and recorded in the follow up data sheet. On the 7th post-operative day most of the patients were discharged. After 2 weeks of operation, at 3 months and them at 6 months all the patients were routinely followed up. The variables of the post-operative follow up study were urinary tract infection, post-

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operative hospital stay, patency of anastomosis and urinary leakage.

RESULTS

A total of 60 cases were analyzed during the study period. This study was conducted in the Faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute. In group-A (30 cases), Anderson-Hynes pyeloplasty were performed with D-J stenting and in group-B (30 cases) Anderson-Hynes pyeloplasty were performed with using a trans-anastomotic stent with multiple holes kept in situ in the pelvis. Both groups of patients were followed up in the immediate post-operative period, after 2 weeks, 3 months and then after 6 months.

Figure 1: A-H pyeloplasty with trans-anastomotic D-J stent.

Figure 2: A-H pyeloplasty with trans-anastomotic BMI tube stent

In group A, 22 patients presented below 5 years (73.33%), 6 patients between 5-10 years (20%), 2 patients above 10 years (6.7%). In group B, 24 patients presented below 5 years (80.0%), 4 patients between 5-10 years (13.3%). 2 patients above 10 years (6.7%). In group A, mean age was 3.57+ 3.11years, range 0.42-10.33 years. In group B mean age was 3.31+3.21 years, range 0.17-12.00 years. There was no statistical significant difference in age distribution between the two groups. In group A (n=30) 80% patients were male, 20% were female. In group B (n=30) all patients (100%) were male.

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Table 1: Distribution of age of the patients

Age (years)	Group A	Group B	Test		
	(n=30)	(n=30)	Result	df	p value
< 5	22(73.3%)	24(80.0%)	0.243	2	0.885
> 5-10	6 (20.0%)	4 (13.3%)			
> 10	3 (6.7%)	4 (6.7%)			

Group A: Anderson-Hynes pyeloplasty without trans-anastomtic stent
Group B: Anderson-Hynes pyeloplasty with trans-anastomtic stent
Chi-square test
ns= Not significant

In group A (n=30) left kidney were involved in 20 (66.7%) cases and right kidney were involved in 10(33.3%) patients. In group B (n=30), left kidney were involved in 24(80%) patients and in 6 (20%) patients right kidney were involved. In the immediate post-operative period, there was no urinary obstruction in group A, however in group B, 6(20%) patients developed temporary urinary obstruction. But it was not statistically significant.

Table 2: Status at post-operative urinary obstruction

Obstruction	Group A	Group B	Test		
	(n=30)	(n=30)	Result	df	p value
Present	0	6 (20%)	0.224	1	0.224^{ns}
Absent	30 (100%)	24 (80%)			

Fisher's exact test
Ns=Not significant

In group A, urinary leakage through drain tube persisted for 0-1 day and in group B, continuous leakage for 0-15 days. It was statistically significant (p=0.037). In group A, time of removal of drain tube range from 3-4 days. In group B, range was 8-27 days. It was statistically significant (p=0.0001). Hospital stays was range from 4-8 days in group A and in group B range was 9-29 days. It was statistically significant (p=0001). In group A, 8(26.67%) patients had UTI and 22 (73.33%) patients were free UTI in the preoperative period. In group B, 12(40%) patients had UTI and 18(60%) patients were free from UTI. N the immediate post-operative period 2 (6.7%) patient in group A had evidence of UTI and 28 (93.3%) patients were free from UTI. In group B 8(26.7%) patients had UTI and 22(73.3%) were from UTI. After 7 days of discharge all patients in both the groups were free from UTI. After 3 months after of discharge (2nd follow-up), 2 (6.7%) patients in group A had evidence of UTI and 28(93.3%) patients were free from UTI. In group B, 10(33.3%) patients had evidence of UTI and 20 (66.7%) patients were free from UTI. None of the results were statistically significant.

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Table 3: Assessment of pre-operative and post-operative UTI

UTI	Group A (n=30) No.(%)	Group B (n=30) No.(%)	Test result	df	P value
Pre-operative Present Absent	 8(26.7) 22(73.3)	 12(40) 18(60)	0.700	1	0.700^{ns}
Immediate Post-operative Present Absent	 2(6.7) 28(93.3)	 8(26.7) 22 (73.3)	0.330	1	0.330^{ns}
After 7 days Of discharge Absent	 30(100%)	 30(100)			
After 3 months Of discharge Present Absent	 2 (6.7) 28 (93.3)	 10(33.3) 20(66.7)	0.169	1	0.169^{ns}
After 6 months Of discharge Present Absent	 2 (5.7) 28 (94.3)	 9 (32.3) 21 (67.7)	0.159	1	0.159^{ns}

Fisher's Exact test
ns = Not significant

Comparison of grade of hydronephrosis between pre-operative and post-operative (six months) later): In group-A, in case of 24(80%) patients grade of hydronephrosis was improved and in 6 (20%) patients remained unchanged. In group-B 16(53.3%) patients hydronephrosis was improved and 14(46.6%) remained unchanged. All these results were statistically insignificant.

Table 4: Assessment of post-operative hydronephrosis after 6 months of discharge.

Hydronephrosis by Ultrasonogram	Group A (n=30)	Group B (n=30)	Test Result	df	p value
Improved	24 (80)	16 (53.3%)	0.245	1	0.245^{ns}
Uncharged	6 (20%)	14 (46.7%)			

Fisher's Exact test
ns= Not significant

In group A, urinary leakage through peri-anastomotic drain tube continuous for 0-1 day (mean0.13+0.35 days) and in group B urinary leakage continues for 0-15 days (mean 2.60+4.34 days). It was statistically significant (p=0.037).

In group A, the time of removal of peri-anastomotic drain tube ranged from 3-4 days (mean 3.27+0.46 days). In group B, drain tube removal range was 8-27 days (mean12.13+6.42 days). It was statistically

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significant (p-0.0001). Hospital stay in group A ranged from 4-8 days (mean 4.53+1.06 days) and in group B, ranged from 9-29 days (mean13.33+6.87 days). It was alos statistically significant (p=0.0001).

Table 5: Status of post-operative period

Parameters	Group A (n=30)	Group B (n=30)	Test Result	df	P value
Urinary leakage From drain tube (days) Mean+SD Range	 0.13 + 0.35 0.00 - 1.00	 2.6 + 4.34 0.00 – 15.00	-2.194	28	0.037*
Perianastomotic Drain tube removal (days) Mean+SD Range	 3.27 + 0.46 3.00 – 4.00	 12.13+6.42 8.0 – 27.00	-5.332	28	0.0001**
Hospital stay (days) Mean+SD Range	 4.53 + 1.06 4.00 – 8.00	 13.33 + 6.87 9.00 – 29.00	-4.901	28	0.0001***

DISCUSSION

Hydronephrosis due to PUJ obstruction is one of the commonest cause of congenital anomaly encountered in paediatric population. In the period from January 2016 to December 2019, a total of 60 patients were analyzed in the Faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute. Admitted patients were selected in two group-A, Anderson-Hynes (A-H) pyeloplasty were done with using D-J stent. In group-B, A-H pyeloplasty were done with using trans-anastomic stent with multiple holes in situ in pelvis. A peri-anastomotic drain was kept in situ in both the groups. The objective of the study was to decrease morbidity in A-H pyeloplasty in terms of reducing post-operative urinary obstruction, urinary tract infection, urinary leakage and reducing post operative hospital stay.

Patients were closely monitored during the immediate post operative period, 2 weeks after discharge, 3 months and at 6 months. During the post operative follow-up period patients were monitored clinically and by some investigations were done to detect post-operative complications and improvement of functional status of kidneys.

In group-A, most of the patients (73%) were below 5 years, 20% patients were between 5-10 years. In group-B 80% patients were below 5 years, 13.3% patients were between 5-10 years. In group-A, mean age was 3.57+3.11 years, range 0.42-10.33 years. In group-B mean age was 3.31+3.21 years, range 0.17-12.00 years. There is no statistical significant difference in age distribution between the two groups [Table-1]. In group-A (n=30), 80% patients were male and 20% were female. In group-B (n=30) all patients were male. In group-A (n=30) left kidney was involved in 66.7% cases and right kidney was involved in 33.3% cases. In group-B (n=30), in 80% of patients right kidneys were involved. These data were similar to a study by Vihma and Parkkulainen.[8]

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In the immediate post-operative period there was no urinary obstruction in group-A, however in group-B, 2 patients developed temporary urinary obstruction. It was not statistically significant. A study by Sarin et al showed post-operative mechanical obstruction in intubated patients of A-H pyelolasty.[9] In group-A, continuous urinary leakage through peri-anastomic drain tube for 0-1 day and in group-B, continuous urinary leakage were for 0-15 days. It was statistically significant (p=0.037). A study by Arda et al reported more urinary leakage in non-stented group of A-H pyeloplasty.[10] In group-A, time of removal of rain tube range from 3-4 days. In group-B, range was 8-27 days. It was statistically significant (p=0.0001). Ahmed and Crankson reported similar results.[11] Oguike reported the time of removal trans-anastomotic stent in his study was 6 to 12 days.[12]

In terms of post-operative hospital stay, it is more in group-B than in group-A patients (mean 13.33 days to 4.53 days). It was statistically significant (p=0.0001). Sarin et al and smith et al reported similar results in their study.[9,13] In group-A 8(26.7%) patients had UTI and 22(73.3%) patients were free from UTI in the pre-operative period. In group-B, 12(40.0%) patients had UTI and 18(60%) patients were free from UTI in the pre-operative period. 2(6.7%) patient in group-A had evidence of UTI, 28(93.3%) patients were free from UTI and in group-B, 8(26.7%) patients had UTI and 22(73.3%) patients were free from UTI in the immediate post-operative period. All patients in both the groups were free from UTI after 7 days of discharge. Hassan et al reported same result in his study group.[14]

Three months after discharge that is during the 2nd follow up 2(6.7%) patients in group-A had evidence of UTI and 28(93.3%) patients were free from UTI. In group B, 10(3.3%) patients had evidence of UTI and 20(66.7%) patients were free from UTI. None for the results were statistically significant. Gupta reported similar result in his work. In case of post-operative UTI all studies reported more UTI in BMI tube stented pyeploplasty then in D-J stenting pyeloplasty.[15,16]

In group-A, in case of 24(80%) patients hydronephrosis was improved and 6(20%) patients remained unchanged. In group B, 16(53.3%) patients improved hydronephrosis and 14(46.6%) remained unchanged. All these results were statistically non significant. Follow-up results were similar to a study by Sutherland et al, Uygur et al, and Paul et al.[17,18,19]

CONCLUSIONS

In the light of discussions we can state that morbidity of the patients in A-H pyeloplasty can be reduced by using D-J stent. We found definitive statistically significant difference in terms of urinary leakage, per-anastomatic drain removal and hospital stay. In observation of post-operative urinary tract infection and post-operative renal functional improvement showed better effects in D-J stenting group.

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REFERENCES

1. Dino MS, Hassen SM, Tufa TH. Unilateral Giant Hydronephrosis Secondary to Ureteropelvic Junction Obstruction in a Middle-Aged Woman. Case Rep Urol. 2021;2021:9900560. doi: 10.1155/2021/9900560.
2. Klein J, Gonzalez J, Miravete M, Caubet C, Chaaya R, Decramer S, et al. Congenital ureteropelvic junction obstruction: human disease and animal models. Int J Exp Pathol. 2011;92(3):168-92. doi: 10.1111/j.1365-2613.2010.00727.x.
3. Passoni NM, Peters CA. Managing Ureteropelvic Junction Obstruction in the Young Infant. Front Pediatr. 2020;8:242. doi: 10.3389/fped.2020.00242.
4. Janczak D, Szydełko U, Apoznański W, Panek W, Szydełko T. W-type suture in Anderson-Hynes laparoscopic pyeloplasty: a novel approach to an old technique. Wideochir Inne Tech Maloinwazyjne. 2018;13(4):512-517. doi: 10.5114/wiitm.2018.76087.
5. Lee CH, Lee SD. A rare cause of ureteropelvic junction obstruction. Korean J Urol. 2014;55(10):687-9. doi: 10.4111/kju.2014.55.10.687.
6. Obermayr F, Luithle T, Fuchs J. Laparoscopically Guided External Transanastomotic Stenting in Dismembered Pyeloplasty: A Safe Technique. Urology. 2015;86(1):200-4. doi: 10.1016/j.urology.2015.04.024.
7. Smith KE, Holmes N, Lieb JI, Mandell J, Baskin LS, Kogan BA, et al. Stented versus nonstented pediatric pyeloplasty: a modern series and review of the literature. J Urol. 2002;168(3):1127-30. doi: 10.1097/01.ju.0000026415.22233.d7.
8. Ahmed S, Crankson S. Non-intubated pyeloplasty for pelviureteric junction obstruction in children. Pediatr Surg Int. 1997;12(5-6):389-92. doi: 10.1007/BF01076947.
9. Hussain S, Frank JD. Complications and length of hospital stay following stented and unstented paediatric pyeloplasties. Br J Urol. 1994;73(1):87-9. doi: 10.1111/j.1464-410x.1994.tb07462.x.
10. Nguyen DH, Aliabadi H, Ercole CJ, Gonzalez R. Nonintubated Anderson-Hynes repair of ureteropelvic junction obstruction in 60 patients. J Urol. 1989;142(3):704-6. doi: 10.1016/s0022-5347(17)38859-6.
11. Woo HH, Farnsworth RH. Dismembered pyeloplasty in infants under the age of 12 months. Br J Urol. 1996;77(3):449-51. doi: 10.1046/j.1464-410x.1996.89723.x.
12. Hensle TW, Shabsigh A. Pyeloplasty (Anderson-Hynes). BJU Int. 2004;93(7):1123-34. doi: 10.1111/j.1464-410X.2004.04878.x.
13. Polok M, Borselle D, Toczewski K, Apoznański W, Jędrzejuk D, Patkowski D. Laparoscopic versus open pyeloplasty in children: experience of 226 cases at one centre. Arch Med Sci. 2019;16(4):858-862. doi: 10.5114/aoms.2019.84496.
14. Lee LC, Kanaroglou N, Gleason JM, Pippi Salle JL, Bägli DJ, Koyle MA, et al. Impact of drainage technique on pediatric pyeloplasty: Comparative analysis of externalized uretero-pyelostomy versus double-J internal stents. Can Urol Assoc J. 2015;9(7-8):E453-7. doi: 10.5489/cuaj.2697.
15. Sutherland RW, Chung SK, Roth DR, Gonzales ET. Pediatric pyeloplasty: outcome analysis based on patient age and surgical technique. Urology. 1997;50(6):963-6. doi: 10.1016/S0090-4295(97)00397-X.
16. Almodhen F, Jednak R, Capolicchio JP, Eassa W, Brzezinski A, El-Sherbiny M. Is routine renography required after pyeloplasty? J Urol. 2010;184(3):1128-33. doi: 10.1016/j.juro.2010.05.017.
17. Nirmal TJ, Singh JC. Follow-up after pyeloplasty: How long? Indian J Urol. 2008;24(3):429-30.
18. Psooy K, Pike JG, Leonard MP. Long-term followup of pediatric dismembered pyeloplasty: how long is long enough? J Urol. 2003;169(5):1809-12.
19. Panda SS, Bajpai M, Jana M, Baidya DK, Kumar R. Anderson-Hynes pyeloplasty with isthmotomy and lateropexy in horseshoe kidneys with pelviureteric junction obstruction in children. Indian J Urol. 2014;30(2):161-3. doi: 10.4103/0970-1591.126897.

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