

Pyeloplasty in Children: Advantages of External Trans-Anastomotic Drainage

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Abstract

Introduction: There are several forms of successful treatment and prevention for obstruction of the pyelourethral segment in pediatric patients. However, each method has its advantages and disadvantages. Namely, some those widespread surgical techniques frequently associate with different complications and subsequent financial deprivations. Therefore, the optimal method of external trans-anastomotic drainage is still disputable. In this study, we studied the results of pyeloplasty in children using a transanastomotic catheter.

Method: In this observational study, which was conducted from 2013 to 2018, we evaluated the outcomes of pyeloplasty in 132 children under 3 years old. For all patients a trans-anastomotic catheter for urinary evacuation was used during the postoperative period. The observation period ranged from 6 months to 3 years (an average of 22±6,8 months). Antegrade pyelography was performed in 119 patients on the 6th day of postoperative period. The average hospital stay was 8.4 days (ranging from 6 to 16 days), most of the patients were discharged from hospital 7 days after surgery.

Results: 137 pyeloplasty was performed on 132 patients using a transanastomotic catheter. The observation lasted from 6 months to 3 years. Antegrade pyelography was performed in 119 patients on the 6th day after surgery. Of those 119 pyelograms taken, 108 (91 percent) showed adequate drainage after pyeloplasty. In 11 patients, partial obstruction was revealed, while in 8 (73 percent) children the possibility of the anastomosis returned to normal on its own about within 12 days. The transanastomotic catheter was removed on average 7-8 days after surgery. The average hospital stay was 8.4 days.

Conclusion: Urine evacuation with transanastomotic catheter after pyeloplasty in pediatric patients is highly effective and safe. Other comprehensive studies may be required to prove the further upsides of this technique.

Keywords: *Pyeloplasty, hydronephrosis, ureteral obstruction, children, drainage.*

Introduction

Dividing pyeloplasty is a common method of surgical treatment for obstruction of the pyelourethral segment in children with a success rate of 94% to 99% (Shahzad et al, 2014)¹. As with all surgical interventions

on the urinary tract, there are various method of urine diversion after pyeloplasty. Currently, many surgeons use an internal double pig tail stent (Elmalik et al, 2008 and Hsu et al, 2016)², or Salle's transanastomotic external stent, and some authors prefer non-drainage pyeloplasty (Kagantsov et al, 2012)⁵. According to some authors'

results on postoperative drainage of the upper urinary tract using a nephrostomy tube showed an increase in the incidence of urinary tract infections, the hospitalization period of patients, and the risk of secondary obstruction of the pyelourethral segment (Sibley et al, 1987)⁸. At the same time, there are ongoing discussions in the scientific literature regarding the optimal method for urine diversion after dissecting pyeloplasty in pediatric patients.

In this study, we studied the results of pyeloplasty in children under 3 years old using a transanastomotic catheter.

Materials and Method

This retrospective study was conducted from 2013 to 2018, included data from children under the age of 3 years with obstruction of the pyelourethral segment. After surgery, a transanastomotic catheter for postoperative urine evacuation was installed in all patients. In all patients, dividing pyeloplasty was performed through lateral access. After the first suture of the anastomosis placed between the pelvis and ureter, the distal end of the transanastomotic catheter (PVC catheter with a diameter of 8-10Fr) was inserted into the ureter, the other end of the catheter was taken out as a pyelostomy through the anterior wall of the pelvis. With further stitches the posterior semicircle of the anastomosis was formed, then the anterior one. When forming the anastomosis, a synthetic polyfilament suture material (6/0) was used. At the end of pyeloplasty, the intubating catheter was not fixed to the pelvis, since excessive fixation can significantly complicate its removal in the postoperative period. At the same time, a transanastomotic catheter adequately provided urine evacuation in two directions. Urine with a hemorrhagic shade, extending through the urinary catheter and the absence of urine discharge through the safety drainage, were indirect signs of the adequate function of the transanastomotic catheter. With adequate catheter function, ultrasound monitoring and antegrade pyelography were performed on the 6th day after operation in order to check the location of the catheter and the passability of the anastomosis. Then the catheter was clamped for 1 day. In the absence of parental complaints about the child's anxiety and negative dynamics during the control ultrasonography, the catheter was removed on the 7th day after the surgery.

Results

In 132 patients, 137 pyeloplasty was performed

using a transanastomotic catheter (Table 1). The observation period ranged from 6 months to 3 years (average 22–6.8 months). Antegrade pyelography was performed in 119 patients on the 6th day after surgery. Of those 119 pyelograms taken, 108 (91 percent) showed adequate drainage after pyeloplasty. One patient experienced a slight extravasation of urine, which resolved independently after 1 week. In 11 patients, partial obstruction was revealed, while in 8 (73 percent) children the possibility of the anastomosis returned to normal on its own about within 12 days. The anastomosis impassibility lasted longer only in 3 patients, however, in two of them, normal urodynamics recovered after 16 days. Persistent obstruction of the pelvic ureteric segment was detected in one patient, which required installation of an internal stent. Ultimately, with intravenous urography 6 months after surgery, this patient had a good urine evacuation through the anastomotic zone. The transanastomotic catheter was removed on average 7-8 days after surgery. The average hospital stay was 8.4 days (ranging from 6 to 16), and discharge from the hospital occurred mainly on the 7th day after surgery.

Table 1: Clinical distribution of patients

Clinic course	Number of patients	
	n	%
Asymptomatic course	115	87
Palpable formation	4	3
Anxiety in the child (abdominal/lumbar pain)	1	0,8
Urinary tract infection	12	9,2
Total amount	132	100

Postoperative complications are provided in Table 2. None of the patients had progressive postoperative obstruction and re-pyeloplasty was required. Renal function did not deteriorate during postoperative examination, and no patient was noted soreness or anxiety associated with postoperative drainage with a transanastomotic catheter.

Table 2: Postoperative complications

Complications	n	%
Urinary tract infection	2	1,5
Temporary obstruction of the ICP (internal stent)	1	0.7
Insignificant extravasation	1	0.7
Total	4	2.9

Discussion

Despite the presence of numerous method of urine derivation in the postoperative period, the optimal choice of the method of postoperative urinary evacuation after pyeloplasty remains under debates. While some authors argue that when using a nephrostomy, the risks of developing urinary tract infections increase and the length of hospitalization of patients elongates. Other researchers, on the other hand, argue that using internal stents requires repeated anesthesia to remove the latter (Sibley et al, 1987)⁸. However, in many publications devoted to postoperative urinary diversion after pyeloplasty, the influence of the derivation method on the total number of long-term results of pyeloplasty is not well studied. They just compared the results with each other. So, Hsu et al (2016)³, comparing the radiological results of pyeloplasty with nephrostomy and drainage pyeloplasty, did not note the significance of the differences between them. It should be emphasized that the improvement of surgical method, as well as the accessibility of modern suture materials, led to a significant improvement in postoperative results (Mendrek et al, 2019)⁶. The use of prophylactic antibiotic therapy also reduces the incidence of urinary tract infections, as evidenced by the results of our study. Thus, the incidence of urinary tract infections in our study was merely 1.5 percent. Therefore, in our opinion, preventive antibiotic therapy should be continued throughout the entire period of urine diversion. In this case, catheterization of the bladder in the early postoperative period is extremely important for adequate evacuation of urine from the bladder.

Wollin et al (1989)⁹ believed that an empty bladder (low intravesical pressure) prevents the newly formed anastomosis from increased pressure, thereby reducing the risk of extravasation through the anastomosis. In addition, low intravesical pressure improves urodynamics in the anastomotic zone in the early postoperative period.

The literature describes the shortcomings of external method of urine evacuation, such as a longer period of hospitalization of patients after pyeloplasty (Hussain et al, 1994)⁴. The average hospital stay, in these earlier studies ranged from 9.8 to 24.8 days. However, in our study, the average hospital stay was 8.4 days. Meanwhile, removal of the transanastomotic catheter was usually performed without any difficulties, which allowed to avoid repeated anesthesia. In addition, external method of urine derivation have recently been criticized due

to the increased frequency of various postoperative complications. However, the results of this study prove that using a transanastomotic catheter has several advantages. At the same time, the transanastomotic catheter provides urine derivation in two directions, allowing surgeons to adequately assess the state of the anastomosis. It also prevents the postoperative bending of the anastomosis zone, acting as an internal stent. In addition, it completely eliminates the need for repeated anesthesia during its removal, which is mandatory when removing the internal stent.

Conclusion

In our patients, the number of postoperative complications did not differ from those presented in the literature. The transanastomotic catheter serves as a reliable protective mechanism against postoperative edema and kink in the anastomotic zone, and prevents the extravasation of urine. And also makes it easy to perform x-ray examinations to assess the possibility of the pyelourethral segment. Furthermore, using a transanastomotic catheter completely eliminates the need for re-anesthesia for the removal of it.

Study Limitations: Further researches are required to clarify the other advantages of transanastomotic cathetering in children. This was an observational study. Further comparative studies and secondary researches are needed to identify the most optimal therapy for children after pyeloplasty.

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