

faster postoperative recovery, less severe pain syndrome, a good aesthetic result, significant savings in dressings and medicines.

CONCLUSION

Analyzing the work done, it should be said that the laparoscopic method of treatment is feasible and can be an operation of choice. The advantages of laparoscopy include a good visualization of the operating field, surgical accuracy, less severe pain syndrome in the postoperative period, rapid recovery of peristalsis, a good aesthetic result, a rapid recovery of patient activity, a reduction of hospital bed-days, a reduction of risk of adhesion in the abdominal cavity. It should be noted that this method requires the surgeon a lot of experience in performing endoscopic operations.

REFERENCES

1. Dronov A.F., Poddubnyj I.V., Kotlobovskij V.I. Jendoskopicheskaja hirurgija u detej [Endoscopic surgery in children]. Moscow: GJeOTAR–Media, 2002.
2. Razumovskij A.Ju., Degtjareva A.V.,

Kulikova N.V. et al. Laparoskopicheskie operacii pri porokah razvitija zhelchevyvodjashhih putej u detej [Laparoscopic surgery for malformations of bile ducts in children]. Rossijskij vestnik detskoj hirurgii [Russian Journal of Pediatric Surgery], 2012, No.1, p.19-24.

3. Detskaja hirurgija: nacional'noe rukovodstvo [Pediatric surgery: the national manual] / Pod red. Ju.F. Isakova, A.F. Dronova [Edited by Ju.F. Isakov, A.F. Dronov]. Moscow: GJeOTAR–Media, 2009, p. 79.

4. Uskova N.G. Laparoskopicheskie operacii pri porokah razvitija zhelchevyvodjashhih putej u detej [Laparoscopic surgery for malformations of biliary tract in children]. Dissertacija na soiskanie uchenoj stepeni kandidata medicinskih nauk [Thesis for the degree of candidate of medical sciences]. Moscow, 2014.

The authors

1. Bozhedonov Konstantin Konstantinovich, the pediatric surgeon of the Surgical Department of Pediatric Centre, Republican Hospital №1, National Centre of Medicine.

2. Savvina Valentina Alekseevna, Doctor of Medical Sciences, Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov, the chief freelance pediatric surgeon of MH RS (Y).

3. Varfolomejev A.R., Doctor of Medical Sciences, Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov.

4. Petrova Natalya Ermakovna, the doctor, the pediatric surgeon of the Surgical Department of Pediatric Centre, Republican Hospital №1, National Centre of Medicine.

5. Tarasov Anton Yurievich, the Head of the Surgical Department of Pediatric Centre, Republican Hospital №1, National Centre of Medicine, 677027, Yakutsk, Oktyabrskaya str. 27/1, flat 29, mob. 8-914-294-13-91, silvestry@rambler.ru.

6. Nikolaev Valentin Nikolaevich, Associate Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov.

S. O. Kupryakov, N. F. Stepanyuk, V. A. Savvina, V. A. Grigoriev, A. R. Varfolomeev, V. N. Nikolaev, Y. G. Pavlov

THE EXPERIENCE OF LAPAROSCOPIC PYELOPLASTIES IN CHILDREN AND THE CHOICE OF THE METHOD OF DRAINAGE

ABSTRACT

The method of an open pyeloplasty until the end of the 20th century was considered as the «gold standard» of treatment of patients with hydronephrosis. However, rapid development of minimally invasive technologies hasn't avoided pediatric urology. Now the laparoscopy pyeloplasty is a widespread method of treatment. We have presented the experience of 22 laparoscopic pyeloplasties in children. The evaluation of the duration of operations, postoperative bed-days and complications were carried out. The analysis of methods of drainage was also carried out.

Keywords: laparoscopy, pyeloplasty, stent, pediatrics.

INTRODUCTION

Among obstructive uropathies, hydronephrosis is the most common pathology. In pediatric urological practice, the frequency of occurrence is 1:800 or 2.8 cases per 1000 newborns [1]. Stenosis of the pyeloureteral segment in hydronephrosis is one of the frequent indications for instrumental or surgical correction [3,4]. Nowadays the «gold standard» for correcting the patency of the ureteropelvic segment in children remains the dismembered plasty of the ureteropelvic segment (UPS), proposed by J. Anderson and W. Hynes in 1949 [2], which proved its reliability and a high percentage of good results (more than 90%) [5-10]. For a long time this operation was performed from

open access. Currently liuobotomous pyeloplasty fades into the background, both in adult and in pediatric urological practice. Since 1993, clinical cases of laparoscopic operations in adult patients have been described. In 1995, S. Peters and coauthors reported the first performed laparoscopic pyeloplasty (LP) in a child [11]. But pyeloplasty in children with laparoscopy remains a controversial issue because of the longer duration of the operation than with open pyeloplasty, the difficulty of imposing an intraocorporal suture, and the inexperience of the surgeons in the access performed [12]. Recent research has shown that this method can be an excellent alternative to open surgery, with a total success rate of more than 95%. Also, laparoscopic

pyeloplasty has a number of advantages, such as: short hospital stay, minimal blood loss, less severe pain syndrome in the postoperative period, early recovery after surgery, better cosmetic effect. Improved visualization, the accumulation of experience and the improvement of surgical skills have made it possible to use widely laparoscopic access [13,14,15,16]. The method of postoperative drainage of the collective system of the kidney is also not fully defined: to apply antegrade or retrograde stenting, to use pyelostoma or nephrostomy, or to use their combination. There are works devoted to the study and comparison of these methods [17,18,19]. Thus, nowadays the optimal variant of removing urine from the kidney after such operations has not been finally

determined. In this paper, we present our experience of performing laparoscopic pyeloplasty and compare the use of various options for urinary tract drainage after these operations.

MATERIALS AND METHODS OF RESEARCH

In total, 64 (100%) pyeloplasties were performed in children with congenital hydronephrosis at the age of 3 months to 18 years in the Urological department of the Pediatric Center, Republican Hospital №1, National Centre of Medicine, from November 2011 to March 2016. The cause of obstruction in 51 patients (79.6%) was segmental dysplasia of the ureter wall and aberrant (crossing) vessel was detected in 13 children (10.4%). Laparoscopic access surgery was performed by 22 children (34%) in the age group 5-17 years. The reason for the X-ray-urological examination was the detection of the expansion of the CPS in a screening ultrasound study. The standard examination included ultrasound of the kidneys, excretory urography, mictorial cystography. As additional diagnostic methods we used diuretic sonography, X-ray-computer tomography with intravenous contrast study and static nephroscintigraphy. The indication for surgical treatment was an increase in the dynamics of the size of the CPS with hydronephrosis of 2nd degree, hydronephrosis of 3d and 4th degrees. Three children with hydronephrosis of 4th degree 2 months before the operation were drained the calyxo-pulmonary system of the kidney by performing a hanging nephrostomy followed by an evaluation of the function.

The technique of laparoscopic pyeloplasty: we used 5 mm laparoscopic instruments. In most cases, access to the pyeloureteral segment was achieved by mobilizing the descending or ascending colon (depending on the side of the operation) medially, followed by exposure of the paranal space and access to the pyeloureteral segment. Classically the pelvis crossed in an oblique direction, the ureter in the longitudinal along the anti-brazier margin. Drainage was used in various ways. In the formation of anastomosis monofilament suture material PDS 5/0 or vicryl 5/0 was used. High-definition image and 5 mm instruments allowed to create a leak-proof anastomosis neatly, carefully comparing the edges of the pelvis and ureter.

Results of the study and discussion:

The results of operative treatment were evaluated according to the following parameters: duration of operation, time of hospitalization, complications.

The average operation time was 180 minutes (120-240 minutes). All children underwent pyeloplasty by Hines-Andersen. In 21 cases, ureteral stents were established, in 1 pyelostoma. There were no conversions. There were no intraoperative complications. Postoperative complications were revealed in 1 (4.5%) case - the development of urinary peritonitis due to the prolapse of the pyelostomy tube into the abdominal cavity. Laparoscopic suturing of the defect on the pelvis was performed, followed by recovery of the patient. The reason for the complication is the insufficiently reliable fixation of the pyelostomy tube to the pelvis and the use of the urethral catheter (size 10 Ch) with additional holes for these purposes. At present, we have adopted a tactic for the use of special pyelostomic tubes with a fixing curl in the pelvis for these purposes. The postoperative bed-days after laparoscopic pyeloplasty were 8-21 days, the average number of bed-days was 13.4 days. A prolonged postoperative bed-day in some cases is associated with the inability to re-hospital the child to remove the stent after 1-1.5 months because of the remote residence and high cost of air travel. In such cases, the child was in the department without an extract until the stent was removed 10-16 days after the operation. The examination was carried out 1 and 2 years after the operation. There are no recurrences to date. Patients achieved positive echographic signs of resolving obstruction in the form of a reduction in the renal collecting system, increasing the thickness of the parenchyma, and improving the parameters of the parenchymal blood flow. There were no signs of recurrence of urinary tract infection. The ratio of methods of drainage of the renal collecting system in our patients is presented in Table 1. As can be seen from the presented data, most patients underwent antegrade intraoperative drainage of the «double J» stent. The system of internal drainage was established after the formation of one of the semicircles of the anastomosis through a separate puncture of the abdominal wall or through a manipulative trocar. The stent was removed in 1-1.5 months after the operation during

cystoscopy. The duration of drainage was determined by the timing of completion of reparative processes in the area of anastomosis. The impossibility of antegrade stent placement was noted by us in 1 child. In this case, the obstruction was localized at the level of the uretero-vesical segment. Retrograde preoperative stenting in children is not always successful due to the peculiarities of the pathological process in the region of the pyeloureteral segment.

Laparoscopic pyeloplasty is now becoming the most common method for treating the obstruction of the pyeloureteral segment in children, with efficacy comparable to the results of open surgery, and the incidence of complications is reduced from 36% to 2% [5,9,10]. With laparoscopic pyeloplasty there are certain advantages in comparison with open surgery: good visualization of anatomical structures due to optical magnification, local isolation of the pyeloureteral segment, sufficient working space for performing pyeloureteroanastomosis, good cosmetic effect, short postoperative period and rapid recovery of physical activity.

At present, there is no consensus on the optimal way of draining the pelvis. We have experience of retrograde stenting before surgery, antegrade stenting during surgery, pyelostomy and pre-puncture nephrostomy. We do not apply non-drainage techniques for laparoscopic pyeloplasty, relying on the experience of performing non-drainage lumbar operations, when in some cases a prolonged (up to 2-5 days) urine leakage through safety paraneal drainage is maintained. In our opinion, with non-drainage pyeloplasty, the risk of complications (blood clot in the pelvis, leakage of the anastomosis, swelling of the anastomosis) is great, which can have very serious consequences. These conditions with adequate drainage of the kidney will not lead to complications, or their number will be much smaller. The use of internal drainage ensures correct positioning and «splinting» of the anastomosis zone, prevention of postoperative obstruction and stable drainage of urine. The most common variant of drainage is the installation of an internal «double-J» stent. To the

Methods of drainage of the pelvis

	Antegrade stenting	Retrograde stenting	Pyelostomy	Puncture nephrostomy
Lumbar plastic of the pyeloureteral segment	30	9	2	1
Laparoscopic plastic of the pyeloureteral segment	19	2	1	0

disadvantages of the internal stent, some authors consider the necessity of its removal under anesthesia [20]. The most common complications of internal stent drainage are urinary tract infections [20-22] and stent migration [23]. Advantages of internal drainage are the possibility of prolonged passage of urine without contact of drainage with the external environment, which, with proper stent placement, does not lead to severe social disadaptation of the patient and reduces the risk of inflammatory complications [24]. However, along with the advantages of internal drainage, there are disadvantages. So, often a measure with the use of an internal stent requires the installation of a urethral catheter in the bladder to prevent urine reflux through the stent and the need for subsequent cystoscopy to remove the stent, which can lead to complications such as orhoepididymitis, prostatitis, urethral stricture [25,26]. The advantage of pyelostomy drainage is in providing more adequate urine diversion and the ability to visually control the amount of urine released, and their removal does not require endoscopic intervention. The disadvantage of pyelostomic drainage can be considered the elongation of the patient's stay in the hospital and the absence of frame drainage of the anastomosis zone, the risk of infection increases, the patient feels discomfort at the outlet of the drainage, the leakage of urine through the fistula after drainage removal [27]. Another disadvantage of this method is the impossibility of checking the patency of the anastomosis before removal of the pyelostoma. As follows from the presented data, the question of optimal intraoperative drainage of the pelvis remains controversial. In our opinion, the ideal method does not yet exist. And further study of this issue is seen in the application of different options for the derivation of urine, depending on the age of the patient or the degree of hydronephrosis transformation.

CONCLUSION

Thus, in our opinion, endosurgical pyeloplasty in children seems to be an effective and safe method of correction of the defect, consistent with the principles of minimally invasive surgery. But the necessary condition for high effectiveness of the method is sufficient experience, professional skills of the surgeon, use of

quality endosurgical instruments and the correct choice of draining of the pelvis.

REFERENCES

1. Martov A.G. Rentgen-endoskopicheskiye metody diagnostiki i lecheniya zabolevaniy pochek i verkhnikh mochevykh putey (supravezikal'naya endourologiya) [X-ray endoscopic methods of diagnosis and treatment of kidney and upper urinary tract diseases (suprazysical endourology)]: dis. ... d-ra med. nauk. [dis. ... MD] M., 1993. 76 p.
2. Rudin Yu.E., Osipova A.I., Kuznetsova Ye.V. Optimal'nyye metody drenirovaniya mochevyvodyashchikh putey posle plastiki pri lokhanochnoy otdele mochetchnika u detey s gidronefrozom [Optimal methods of drainage of the urinary tract after pyeloplasty in children with hydronephrosis] Detskaya khirurgiya [Pediatric surgery]. 2000;(5):16 - 19.
3. Cheskis A.L., Ostapko M.S., Leonovich A.Ye. Evolyutsiya pochek posle operativnoy korrektsii gidronefroza [Evolution of the kidneys after the operative correction of hydronephrosis.] V kn.: Materialy Vserossiyskogo simpoziuma detskikh khirurgov-urologov «Obstruktivnyye uropatii u detey» [Materials of the All-Russian symposium of pediatric urologists-urologists «Obstructive uropathy in children»]. Kazan'; 1998. 21 p.
4. Vrublevskiy S.G. Shmyrov O.S. Vrublevskaya Ye.N. Kulayev A.V. Lazishvili M.N. Korochkin M.V. Endovideokhirurgiya gidronefroza u detey. Tekhnika. Drenirovaniye. Oslozhneniya. [Endovideosurgery of hydronephrosis in children. Equipment. Drainage. Complications] Sbornik tezisov V Yubileynoy Vserossiyskoy shkoly po detskoj urologii-andrologii [Collection of theses of the V Anniversary of the All-Russian School on Pediatric Urology-andrology]. 2016. p. 41-42.
5. Anderson JC, Hynes W. Retrocaval ureter: A case diagnosed preoperatively and treated successfully by a plastic operation. BJU 1949;21(9):209-214. DOI:10.1111/j.1464-410X.1949.tb10773.x.
6. Eden C, Gianduzzo T, Chang C, Thiruchelvam N, Jones A. Extraperitoneal laparoscopic pyeloplasty for primary and secondary ureteropelvic junction obstruction. J Urol. 2004;172(6 Pt 1):2308-11.
7. Peters CA1, Schluskel RN, Retik AB. Pediatric laparoscopic dismembered pyeloplasty. J Urol 1995;153(6):1962-5.
8. Reed MJ, Williams MPL. Open pyeloplasty in children: experience with an improved stenting technique. Urol Int 2003; 71(2):201-3. DOI: 71847.
9. Richter S, Ringel A, Shalev M, Nissenkorn I. The indwelling ureteric stent: a 'friendly' procedure with unfriendly high morbidity. BJU 2000; 85(4):408-11. PMID: 10691815
10. Schuessler WW, Grune MT, Tecuanhuey LV, Preminger GM. Laparoscopic dismembered pyeloplasty. J Urol 1993; 150(6):1795-9. PMID: 8230507
11. Sibley GNA, Graham MD, Smith ML. Improving springtag techniques in pyeloplasty. Br J Urol 1987;60(6):489-91.
12. Zaidi Z, Mouriquand PDE. The use of a multipurpose stent in children. Br J Urol 1997;80(5):802-5.
13. Zoeller C, Lacher M, Ure B, Petersen C, Kuebler JF. Double J or transrenal transanastomotic stent in laparoscopic pyeloplasty in infants and children: a comparative study and our technique. J Laparoendosc Adv Surg Tech A 2014;24(3):205-9. DOI: 10.1089/lap.2013.0338.

The authors:

1. Kupryakov Sergey Olegovich, head of the Urological Department of the Pediatric Center, Republican Hospital №1, National Centre of Medicine, e-mail: skupryakov@yandex.ru
2. Stepanjuk Nina Fedorovna, the doctor, pediatric urologist-andrologist of the Urological department of Pediatric center, Republican Hospital №1, National Centre of Medicine
3. Savvina Valentina Alekseevna, Doctor of Medical Sciences, Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov, the chief freelance pediatric surgeon, e-mail: SavvinaVA@mail.ru
4. Grigoryev Vasily Afanasevich, the doctor, pediatric urologist-andrologist of the Urological Department of the Pediatric Center, Republican Hospital №1, National Centre of Medicine
5. Varfolomeyev Ahmed Romanovich, Doctor of Medical Sciences, Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov
6. Nikolaev Valentin Nikolaevich, Associate Professor of the Department of Pediatrics and Pediatric Surgery, Medical Institute, North-Eastern Federal University named after M.K. Ammosov
7. Pavlov Jan Gryanovich, the doctor, pediatric urologist-andrologist of the Urological Department of the Pediatric Center, Republican Hospital №1, National Centre of Medicine