



# Simplified Stenting Methods during Laparoscopic Pyeloplasty in Children

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## ABSTRACT

We are dedicated to evaluate a simplified methods for ureteric stent insertion during laparoscopic pyeloplasty in children.

After detect the cause of obstruction, UPJ resection was made. At that stage, we performed antegrade extracorporeal installation of stent by removing the proximal ureter through the lower skin defect after extraction of the trocar. That allowed for successful stenting under precise tactile and visual control. Then the ureter was reintroduced back into abdominal cavity. Dismembered LP by Hynnes-Andersen technique was made using 6/0 absorbable monofilament suture. The second method of ureteric stenting: after the anastomosis of posterior pelvis wall is complete, puncturing with Veress needle between the optics and the upper trocar. The stylet was removed, after that we can introduce a stent through the needle hole with ensure accurate tactile sensations, maximum control over the stent direction.

Since January 2017, we have used this method in 32 children with congenital hydronephrosis were operated by LP. The proposed methods of ureteric stenting allowed reducing that stage to 3-10 minutes, with successful outcome in all cases. The children were discharged 5-7 days after surgery. No conversion to open surgery had to be performed.

Our experience shows that LP in children with congenital HN reduces the surgical burden on the patient, improves post-surgery quality of life. The proposed methods of antegrade intraoperative stenting significantly reduce the duration of surgery while improving the success rate of this key manipulation.

**Keywords:** hydronephrosis, pyeloplasty, laparoscopy

## INTRODUCTION

Active advancement of pediatric endoscopic surgery in countries with developing medicine provides accumulation of considerable practical experience. The transition from open to endoscopic surgery has significantly improved the outcome of treatment and postoperative rehabilitation in children. Since 2012, some centers for pediatric surgery of the Republic of Kazakhstan have been successfully applying laparoscopic repair of hydronephrosis (HN). In the beginning, this method of HN correction was used in elder children. The experience gained and the use of modern endoscopic equipment allowed doing laparoscopic pyeloplasty (LP) in younger children. According to many studies, there was a consensus on the benefits of laparoscopy over traditional access: reduction of pain in early postoperative period, reduced length of hospital stays and quick recovery quality of life for children and parents. (1,2).

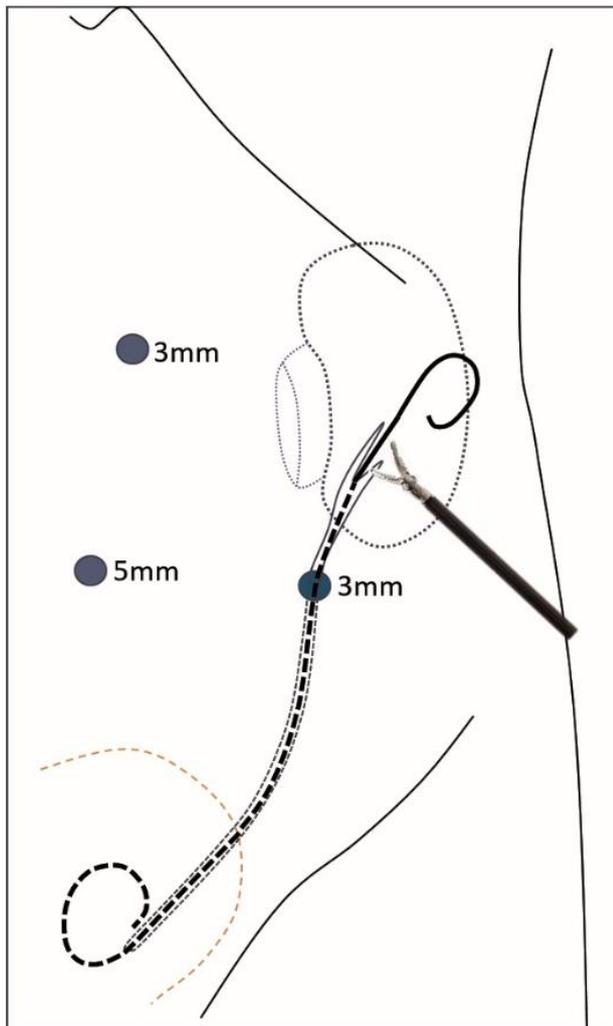
According to the international and domestic experience, a frequent problem is the complicated installation of internal drainage of upper urinary tract using stents (3). This procedure occupies more than one third of the whole duration of surgery

or failed (4). Main reasons include thin diameter of ureter and ureteropelvic junction (UPJ), thin and fragile ureter wall, the mobility and springing of the stent, the risk of stent twisting or damage, and the lack of precise tactile feedback during stenting. This is an acute problem as the method of drainage has a direct impact on the length of hospital stay, successful formation of anastomosis, and the period of postoperative rehabilitation of the patient. The existing methods of preoperative retrograde ureteric stenting are associated with a high risk of ureter perforation, the risk of the stent transection during pelvis resection or ureter spatulation. The pre-set stent complicates the ureter spatulation and creation the posterior wall of anastomosis (5). This report describes the methods of simplified ureteric stenting during LP in children.

## MATERIALS AND METHODS

### Patients

We obtained approval from our institutional internal review board (The Asfendiyarov Kazakh National Medical University, Institutional Ethics Committee No. 414/17), all

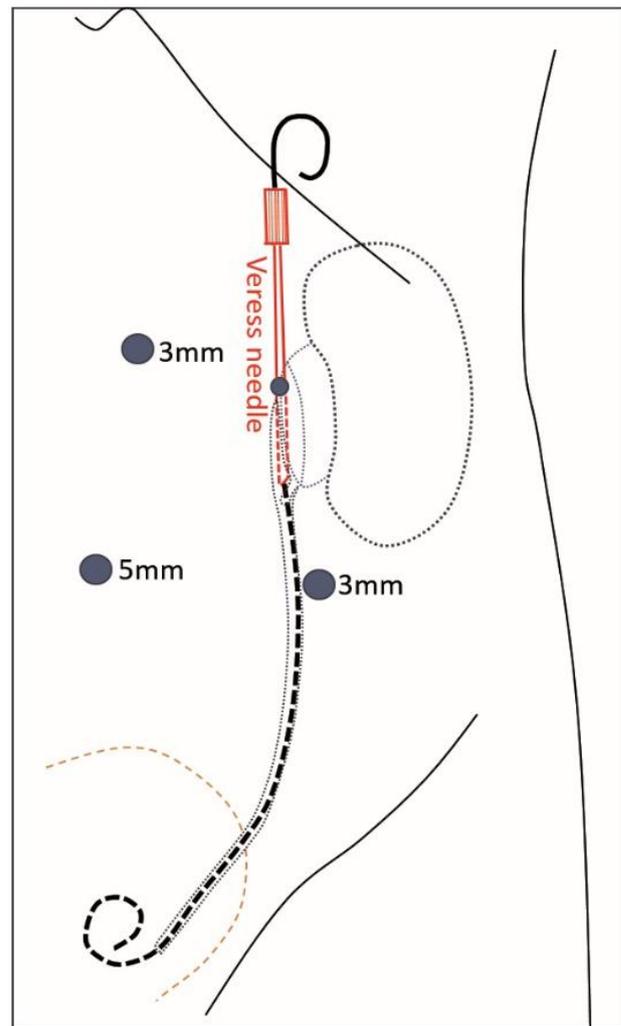


**Figure 1.** Antegrade extracorporeal installation of ureteric stent

parents provided written informed consent and all patients provided written assent when appropriate. All children underwent diagnostic testing including ultrasound examination of the urinary system, voiding cystography, and excretory urography. All patients were diagnosed with unilateral congenital HN. The indications for LP included HN of third degree with a healthy contralateral kidney, without significant renal compromise (GFR higher than G3 or CKD lower than 60 ml/min/1.73m<sup>2</sup>), fusion abnormality or kidney position anomalies.

### Operative Technique

Patient position was lateral decubitus on the healthy side, angled by 45 degrees. The first 5 mm trocar was regularly placed above the umbilical ring to introduce 30-degree optics. The following general examination of abdominal cavity was done to detect any additional pathology. Two 5 (3) mm manipulation trocars were installed from the side of the affected kidney at the edge of the rectus abdominis muscle to form a rhombus with the umbilicus as the lower vertex, and the projection of the affected kidney as the upper vertex. The fourth additional trocar was installed to elevate the liver. Abdominal pressure was maintained at 8-10-14 mm/Hg, it depends to age. The kidney was assessed by mobilization of hepatic or splenic flexures of large bowel. After the necessary kidney exposure, the pelvis and ureter were mobilized to



**Figure 2.** Introducing a stent through the Veress needle

detect the cause of obstruction. Next, the upper vertex of renal pelvis was fixed by monofilament suture to the abdominal wall. UPJ resection was made. At that stage, we performed antegrade extracorporeal installation of stent by removing the proximal ureter through the lower skin defect after extraction of the trocar by gently pulling the ureter with Kelly forceps. That allowed for successful stenting under precise tactile and visual control (**Figure 1**). Then the ureter was reintroduced back into abdominal cavity followed by anastomosis with renal pelvis. Dismembered LP by Hynnes-Andersen technique was made using interrupted stitches using 6/0 absorbable monofilament suture.

The second method of ureteric stenting: after the anastomosis of posterior pelvis wall is complete, puncturing with Veress needle between the optics and the upper trocar. The stylet was removed, after that we can introduce a stent through the needle hole with ensure accurate tactile sensations, maximum control over the stent direction and reduce the risk of gas leak (**Figure 2**). The stent size 3 Ch - 4 Ch. After that, the anterior wall was sutured, and the peritoneum defect was tightly sutured with leaving one draining lumbostoma.

## RESULTS

Since January 2017, we have used this method in 32 children (11 boys and 21 girls) aged 3 months to 3 years with congenital HN of third degree were operated by LP. All patients were diagnosed with unilateral congenital HN (25 left sided). The duration of surgery in average 100 minutes. With experience accumulation, the duration of surgical intervention was decreasing to reach the duration of open pyeloplasty, about 60 minutes. The proposed methods of ureteric stenting allowed reducing that stage to 3-10 minutes, with successful outcome in all cases. The children were discharged 5-7 days after surgery. Antibacterial, intravenous fluid and symptomatic therapy were significantly reduced. There were no wound postoperative infections. No conversion to open surgery had to be performed. Blood loss was minimized due to less traumatic access. In all cases, the stents were removed after 1.5 months by cystoscopy. X-ray urological control after 4 months showed positive postoperative dynamics.

## DISCUSSION

Early diagnosis of congenital kidney pathologies, as well as excellent results on the correction of UPJ obstruction in children of the younger group, led to the fact that the main contingent of patients is children under 3 years of age (9). LP by Hynnes-Andersen technique in children of this group is a common procedure at the present time and has determined many positive aspects in comparison with traditional access to the kidney (1,2,10). But in same time, some stages of this manipulation were technically complicated when using video endoscopic surgery, as for the plastic surgery of the ureteropelvic segment - this is the assembly (modeling) of a 3-dimensional anatomical structure through a 2-dimensional monitor. The process of intracorporeal installation of JJ stent has also become more complicated, since we reduced our tactile sensitivity when undergoing anatomical narrowing and bending of the ureter, especially at the level of the UVJ, this increases a certain risk of intraoperative complications - trauma to the fragile and thin walls of the ureter, penetration, deformation dysfunction and migration of an improperly installed JJ stent, the risk of separation of the created anastomosis due to the excess of the difficult to control stent installation effort (6,7). The intraoperative retrograde cystoscopic installation is difficult in that it is necessary to change the position of the child's body, for this manipulation, it is also often rather difficult to detect ureteral orifice. We understand that there are other methods of kidney drainage in the postoperative period, and drainage methods are also described, in our opinion, they were developed for the reason that surgeons often faced a situation where they could not install a JJ stent or, it took a lot of time (8). We also consider the use of external pyelostomas or drainless methods in children of the younger group possible, but for very limited indications, since they pose an unreasonable risk of infection, impaired UPJ or stoma, risk of UPJ injury, urinary leakage, and a decrease in the quality of life in the postoperative period. The stenting technique we used was described in adults and in children, where excellent results were obtained in an efficient and quick installation (11,12). The thin abdominal wall simplified extracorporeal excretion of the ureter, spatulation, first suture and stent placement. We also proposed and implemented the

installation of a JJ-stent using a Veress needle, so we achieved a reduction in the leakage of warm and moist gas from the abdominal cavity, easier navigation of directions, tactile sensitivity of the passage of anatomical bends and narrowing of the ureter, dosed force.

## CONCLUSION

Our experience shows that LP in children with congenital HN reduces the surgical burden on the patient, improves post-surgery quality of life. The proposed methods of antegrade intraoperative stenting significantly reduce the duration of surgery while improving the success rate of this key manipulation.

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