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Safety and feasibility of laparoscopic appendicovesicostomy in children

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Abstract *Introduction:* Mitrofanoff appendicovesicostomy is needed for securing a conduit for clean intermittent catheterization in children with myelomeningocele, posterior urethral valves and non-neuropathic neuropathic bladder. An open technique is widely used; herein we report our initial experience with minimally invasive laparoscopic appendicovesicostomy in children.
Patients and methods: During 2007—2011 we operated on 4 male children with a mean age of 6 years (3—9) suffering from posterior urethral valves (1), myelomeningocele (2), and non-neuropathic neuropathic bladder (1). A posterior Mitrofanoff trough was used in one child while in the remaining children we used the anterior Mitrofanoff trough.
Results: The mean operative time was 3.5 h (3—5). The mean hospital stay was 3.7 days (2—5). The mean follow up was 12.5 months (5—30). All are continent; one child was converted to open because of failure to pass the catheter at the end of the procedure. Cosmetic aspect is perfect. No difficulty in catheterization was encountered.
Conclusion: Laparoscopic Mitrofanoff is a feasible, safe and effective technique associated with low morbidity.

Introduction

CIC (clean intermittent catheterization), since its description by Lapides in 1972, has been established as the standard of care in patients with failure of bladder emptying [1]. CIC has the following advantages: the child is independent, the upper urinary tract is protected, the bladder is better drained, and there is a lower incidence of symptomatic UTI [2,3].

Many types of conduit have been introduced, such as the use of ureter, fallopian tube, Monti procedure, detrusor tube, but the appendix is the most popular. The Mitrofanoff procedure is done through a lower abdominal incision; recently, laparoscopic and robotic assisted laparoscopic Mitrofanoff techniques have been developed [4—10].

Herein, we report our preliminary experience with laparoscopic Mitrofanoff appendicovesicostomy in children

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presenting with variable lower urinary tract pathologies via two different approaches: anterior and posterior trough. Feasibility, efficiency and safety as well as cosmetic outcome are the main points to be addressed.

Patients and methods

During the period of 2007—2011 we operated on 4 male children with a mean age of 6 years (3—9) suffering from posterior urethral valves (PUV) (1), myelomeningocele (2), and non-neuropathic neuropathic bladder (1). None of them had previous surgery on the bladder level or bladder neck. A posterior bladder trough was used in one child suffering from posterior urethral valves while in the remaining children we used the anterior bladder wall trough.

In all children urethral catheterization was difficult: in the child with PUV this was due to a sensate urethra and hypertrophic bladder neck, in the child with non-neuropathic neuropathic bladder the CIC was painful too, and in the children with myelodysplasia caregivers were not able to introduce the catheter per urethra. The indications for CIC in the child with PUV were increased residual urine following micturition and concomitant nocturnal polyurea with the need to drain the bladder diurnally and nocturnally. In the other three children, the use of anticholinergic treatment in the form of oxybutinin hydrochloride was associated with increased residual urine and hence CIC was indicated to empty the bladder.

Full laboratory investigations were performed to ensure that urine culture was free of infection. Full imaging studies of the bladder and upper urinary tract in the form of ultrasound and voiding cystourethrogram were performed to determine the bladder morphology and capacity together with the condition of the upper urinary tract. Full urodynamic investigation was performed in all children to rule out the need for concomitant augmentation cystoplasty or any bladder outlet incompetence.

Results of combined imaging and urodynamic studies revealed adequate bladder capacity in all children, associated with good bladder compliance and bladder stability under control of the anticholinergic treatment. Mild hydronephrosis with no reflux was encountered in two children and unilateral vesicoureteral reflux was encountered in a third child.

Two main techniques were used: laparoscopic Mitrofanoff appendicovesicostomy in the posterior bladder wall which was performed in the first case in our series suffering from PUV, and laparoscopic Mitrofanoff appendicovesicostomy in the anterior bladder wall which was performed in the remaining children.

The technique of the anterior Mitrofanoff appendicovesicostomy was as follows. The child under general anaesthesia was installed in the supine position. Four trocars were used. The 1st 10 mm trocar was introduced by open technique into the umbilicus. During this step we paid utmost attention to making a triangular skin flap from the umbilicus which would be matured at the end of the procedure with the spatulated appendix. The 2nd and 3rd 5 mm trocars were inserted at the right and left lateral borders of the rectus muscle at the level of the umbilicus, and the 4th trocar was inserted 3 cm below the left lateral trocar on the lateral border of the rectus muscle (Fig. 1).

The abdomen was insufflated with CO_2 at 15 mmHg. The appendix was identified and dissected while preserving its blood supply. The base of the appendix was identified carefully and a mesenteric window was created. A 4/0 Vicryl ligature was placed at the base of the appendix and then it was divided from the caecum (Fig. 2). Dissection of the bladder anterior wall from the Retzius space was performed using a monopolar hook starting from the urachus. The anterior seromuscular trough was created after distension of the bladder by saline (Fig. 3). Cystostomy was performed and then anastomosis of the appendix to the cystostomy. Interrupted 4/0 Vicryl sutures were used to close the trough over the appendix (Fig. 4).

The technique of the posterior Mitrofanoff appendicovesicostomy was as follows. After the same process of installation, access and appendix isolation, a 2/0 vicryl suture was introduced from the anterior abdominal wall just above the symphysis pubis and the dome of the bladder was sutured to the abdominal wall to make the posterior wall straight and more accessible. The bladder was filled with sterile saline and dissected. A seromuscular trough almost 3 cm long was made in the posterior bladder wall. A cystostomy was opened at the distal end of the trough. The tip of the catheter was passed through the cystostomy and the distal end of the appendix anastomosed to the bladder using 4/0 Vicryl sutures. Interrupted sutures were used to close the trough over the appendix.

The last step involved placing a 5 mm lens in one of the working trocars, and then a non-crushing instrument was

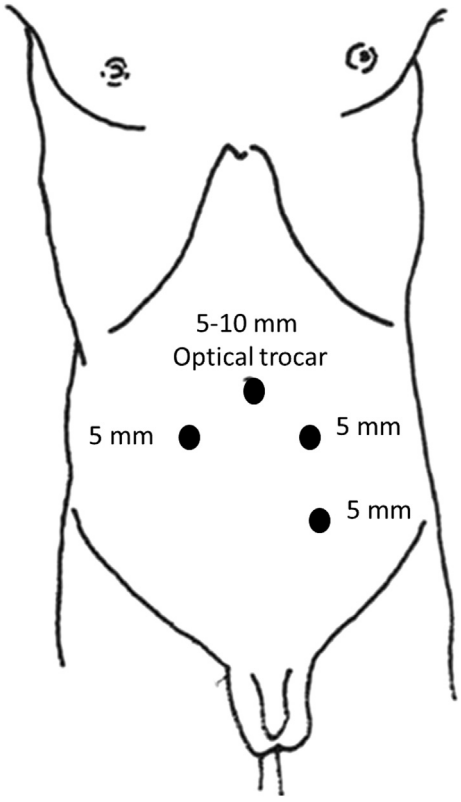

Figure 1 Sites of the trocars.