

Comparison of Complications of Robot-Assisted Laparoscopic and Open Appendicovesicostomy in Children

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Abbreviations and Acronyms

APV = appendicovesicostomy

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Purpose: Robot-assisted laparoscopic appendicovesicostomy in children has become increasingly popular. However, the literature on this technique mainly consists of small case series with only 1 small comparison to an open cohort. We compared the number of complications and surgical revisions required with open and robotic surgery in children undergoing appendicovesicostomy at our institution.

Materials and Methods: We retrospectively reviewed the charts of all patients who underwent appendicovesicostomy by 3 surgeons between July 2002 and September 2013. Acute complications and surgical revisions were recorded and compared between groups with t-tests for continuous variables and Fisher exact test for categorical variables.

Results: A total of 28 open and 39 robotic appendicovesicostomies were included. At a mean followup of 2.7 years there was no difference in number of complications or reoperations ($p = 0.788$ and $p = 0.791$, respectively) between groups. Time to first reoperation was shorter in the robotic group. However, there was no significant difference between groups regarding number of patients who underwent reoperation within the first 12 months postoperatively ($p = 0.346$).

Conclusions: Comparison of robotic and open appendicovesicostomy revealed no significant difference in the number of acute complications or reoperations between groups. However, the nature and timing of complications differed between groups.

Key Words: appendix; cystostomy; robotics; urinary bladder, neurogenic; urologic surgical procedures

THE Mitrofanoff principle uses the appendix to create a continent alternative means of intermittently catheterizing the bladder in patients with neurogenic bladder who cannot catheterize per urethra.¹ Not only does this technique provide ease of catheterization and improved continence, but it also has been shown to improve patient self-esteem and enhance independence.² However, this procedure traditionally involves an open

surgical approach with a large Pfannenstiel or midline incision.³ Because of the potential advantages of shorter hospital stay, decreased narcotic use, shorter convalescence and improved cosmesis over an open procedure, the robot-assisted laparoscopic approach to appendicovesicostomy is gaining popularity.³

Despite the increased interest in performing complex reconstructive procedures in a minimally invasive

fashion, the literature to date describes only case reports and small case series of robotic APV.^{3–10} Currently only 1 small study compares robotic to open APV.⁵ Although these reports emphasize the feasibility of creation and revision of APVs robotically,¹¹ there is minimal emphasis on acute complications or incidence or nature of reoperations after robotic APV. Before any new surgical approach to a well established open technique is widely adopted it is prudent to ensure that the complication and reoperation profiles are similar. Thus, we compared the nature and number of complications and surgical revisions required between open and robotic pediatric APV at our institution.

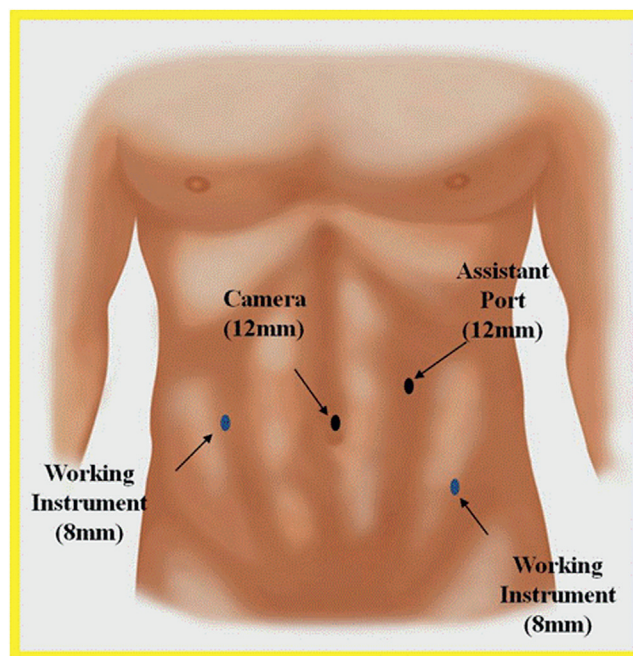
MATERIALS AND METHODS

Following institutional review board approval we retrospectively reviewed the charts of all patients who underwent formation of a catheterizable channel by 3 surgeons performing open and robotic procedures between July 2002 and September 2013. All patients had difficulty catheterizing the native urethra secondary to pain or poor manual dexterity, or were undergoing concomitant bladder neck reconstruction. Patients who underwent a Monti catheterizable channel were excluded, as these procedures were only performed via an open approach.

Data collected included surgical approach, age at surgery, acute complications (perioperative events related to any organ system that occurred less than 30 days from original surgery) and number, type and timing of future surgeries required as a result of chronic complications related to the APV channel. Acute complications were categorized according to the Clavien-Dindo classification system.¹² Number of acute complications and number and timing of surgical revisions related to the APV channel were compared between the open and robotic groups with t-tests for continuous variables and Fisher exact test for categorical variables.

Because of the potential for skewing of the data secondary to outliers, length of followup and age comparisons between the 2 groups were reported with medians and comparisons were made with the nonparametric Mann-Whitney U test. Variables such as operative time, length of stay and narcotic use were not compared between groups, since this was not an aim of the study and the comparison would be highly confounded by the variation in types of concomitant procedures performed at APV creation. A 2-tailed alpha of less than 0.05 was considered statistically significant.

Open APV was performed as described previously.¹ Robotic APV is routinely performed as follows. Patients are admitted to the hospital the night before the procedure for mechanical bowel preparation and intravenous antibiotic administration. The patient is placed in the Trendelenburg supine position, and an 8 or 12 mm camera port is placed at the umbilicus with two 8 mm working ports and one 5 or 12 mm assistant port placed in the configuration (see figure). The appendix is identified and separated from the cecum with an articulating 55 GIA™



Port placement for robot-assisted laparoscopic appendicovesicostomy.

vascular stapler and carefully mobilized on its blood supply. An approximately 4 cm posterior detrusorrhaphy is created, the appendix is laid in the channel and the bladder is closed over it in an interrupted or running fashion with 3-zero absorbable suture. The bladder is hitched to the abdominal wall and the appendix brought to the umbilical port site, where the stoma is matured. A catheter is left in the APV channel for approximately 4 weeks.

RESULTS

A total of 81 catheterizable channels were created during the study period. Four patients required conversion from robotic APV to open creation of a Monti channel due to a short appendix (2 patients), inability to canalize the appendix (1) or absence of appendix (1). After exclusion of these 4 patients, as well as 10 additional open Monti procedures, there were 39 robotic and 28 open APVs available for review. Diagnoses included myelomeningocele (27 patients), posterior urethral valves (11), idiopathic neurogenic bladder (7), prune belly syndrome (5), bladder exstrophy (5), spinal cord injury (4), female epispadias (3), imperforate anus with neurogenic bladder (2), sacral agenesis (1), transverse myelitis (1) and megacystis-microcolon-intestinal hypoperistalsis syndrome (1).

Mean age at surgery was 9.1 years (range 2.3 to 18.1) and 54% of patients were male. In comparing the 2 groups patients in the robotic cohort were significantly older than those in the open cohort but

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