

# Pediatric laparoscopic surgery: three years experience in a tertiary level hospital in Dhaka, Bangladesh

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## Abstract

**Purpose:** Laparoscopy is gaining popularity over laparotomy in various surgical conditions. Nowadays, an increasing number of diagnostic and therapeutic surgical procedures are being done laparoscopically. The aim of this study is to assess the safety and feasibility of laparoscopy in children. **Materials and Methods:** This retrospective study was carried out in the Department of Pediatric Surgery of Dhaka Medical College Hospital over a period of 3 years from June 2009 to May 2012. A total of 92 patients were operated laparoscopically up to 12 years of age for different surgical conditions. Data was collected from the hospital records and analyzed retrospectively. **Results:** Out of 92 laparoscopically performed cases, inguinal hernia repair was done in 30 patients, followed by appendectomy (26), orchiopexy (13), cholecystectomy (11), adnexal mass (05), ambiguous genitalia (04) diagnostic laparoscopy for biliary atresia (02) and for pancreatic pseudocyst (01). Sixty-two were male and age ranged from 2 months to 12 years (mean  $7.15 \pm 3.35$  years). Overall 7.60% patients had some complications. Mean postoperative hospital stay was  $2.55 \pm 1.37$  days. **Conclusion:** With the recent development of surgical techniques and equipments, laparoscopic surgical procedures are becoming popular day by day and can be performed safely for both diagnostic and therapeutic purposes in children.

## INTRODUCTION

Laparoscopic surgery has replaced conventional laparotomy in various surgical conditions. With the gradual advancement of minimally invasive surgery, it is now practiced in many centers as both diagnostic and therapeutic tool in increasing number.

Additional benefits of laparoscopic procedure are excellent visual exposure, smaller incision, minimal tissue dissection, fewer trauma, less postoperative pain, early recovery, shorter hospital stay and better cosmetic result.

## MATERIALS AND METHODS

It was a retrospective observational study, carried out to see the feasibility and outcome of laparoscopic procedure in different surgical conditions in pediatric

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age group in the Department of Pediatric Surgery of Dhaka Medical College Hospital, Dhaka, Bangladesh from 1 June 2009 to 31 May 2012 (36 months). Ninety-two patients underwent laparoscopic procedures for various surgical problems, for both therapeutic and diagnostic purposes. Detailed history, findings of complete physical examinations and relative investigations were recorded before the procedures.

The various conditions for which laparoscopic procedures were carried out are: inguinal hernia, recurrent appendicitis, impalpable testis, cholelithiasis, adnexal mass, ambiguous genitalia, biliary atresia and pancreatic pseudocyst.

All the cases were done under general endotracheal anesthesia. For inguinal hernia, we used 3 ports: umbilical port for camera and one port in each flank for procedure. During surgery, surgeon and assistant stood on the opposite side of defect with foot end of the operating table and affected side elevated. Closure of internal inguinal ring was done by intra-corporeal knotting using 3/0 polyglactin. Impalpable testes cases had similar ergonomics and port placements and procedures done were single stage or two stage Fowler-Stephens (F-S) orchiopexy. Ambiguous genitalia patients had similar ergonomics. Adnexal masses in girls also had the same ergonomics and port placements and cyst excision or salpingo-oophorectomy was done. For appendectomy, camera port was at umbilicus, one port was medial to left anterior superior iliac spine and another just above the pubic crest on the right side. Right side and foot end of the patient were elevated and surgeon and assistant stood on the left side. Appendicular base was either ligated or clipped. Four ports were used for laparoscopic cholecystectomy: camera port at umbilicus and others were epigastric, left hypochondriac and right iliac fossa ports. Surgeon and camera assistant stood on the left side and another assistant on the right side of the patient. Head end and right side of the patient were elevated. Diagnostic laparoscopy followed by liver biopsy was performed in patients with biliary atresia using 3 ports: umbilical, left hypochondriac and right iliac fossa. Diagnosis and drainage procedure was done by laparoscopy in the patient with pancreatic pseudo-cyst using 3 ports: umbilical, right iliac fossa and right hypochondriac ports.

The patients with inguinal hernia and impalpable testes were discharged on the day of operation after satisfactory recovery from anesthesia. The others were discharged between the 1st and 5th postoperative days. Requirement of postoperative analgesics and cosmetic appearance of wounds

were assessed in all the patients, and were followed up post-operatively for 6 months—on the 1st week, 1st month, 2nd month, 3rd month and finally on the 6th month.

## RESULTS

In the study period of 36 months, out of 92 patients, 60% comprised of inguinal hernia and appendicitis (Table 1).

## DISCUSSION

In 1910, Hans Christian Jacobaeus of Sweden reported the first laparoscopic surgery in humans.<sup>2</sup> In the ensuing several decades many individuals refined and popularized laparoscopic procedures further. Due to improved patient outcomes, in the last two decades, laparoscopic surgery has been adopted by various surgical sub-specialties including gastrointestinal surgery, gynecologic surgery, urology and pediatric surgery.

Inguinal hernia is one of the commonest conditions encountered in pediatric surgical practice. Owing to advances in pediatric laparoscopic instrumentation and increased experience with the technique of laparoscopy, a number of centers routinely perform laparoscopic inguinal hernia repair in children. Laparoscopic repair of inguinal hernia is technically easier as high ligation of sac is the only procedure necessary in most children.<sup>3,4</sup> Nowadays, this procedure is becoming more popular, more feasible, less invasive, and less painful and with a better cosmetic result. Moreover an advantage of this procedure is that it allows detection and repair of the contra-lateral hernia in the same setting.<sup>4-6</sup> Laparoscopic suturing and knot tying are becoming an integral part of the skill that any laparoscopic surgeon must

**Table 1:** Clinical presentations of patients (n = 92)

Presentation	No.	(%)
Inguinal hernia	30	(32.60)
Recurrent appendicitis	26	(28.26)
Impalpable testes	13	(14.13)
Cholelithiasis	11	(12.95)
Adnexal mass	05	(05.43)
Ambiguous genitalia	04	(04.30)
Biliary atresia	02	(02.17)
Pancreatic pseudocyst	01	(01.08)

Males were predominant (62) and age ranged from 2 months to 12 years (mean  $7.15 \pm 3.35$  years). Table 2 depicts different procedures done in 92 cases.

**Table 2:** Laparoscopic procedures done in different cases ( $n = 92$ )

Clinical conditions	Procedure done	Number
Inguinal hernia	Closure of internal ring	Unilateral: 26 Bilateral: 04
Recurrent appendicitis	Laparoscopic appendectomy	26
Impalpable testes	Laparoscopic orchiopexy/orchiectomy	Single-stage orchiopexy: 08 1st stage F-S technique: 03 2ndstage F-S technique: 01 Orchiectomy: 01
Cholelithiasis	Laparoscopic cholecystectomy	11
Adnexal mass	Laparoscopic aspiration and excision	Excision: 03 Salphingo-oophorectomy: 01 Conversion to open: 01
Ambiguous genitalia	Laparoscopic evaluation	04
Biliary atresia	Laparoscopic examination and liver biopsy	02
Pancreatic pseudocyst	Laparoscopic detection and drainage	01

Postoperative analgesics were used according to CHEOPS  $\geq 4^1$  (Table 3) in the form of diclofenac sodium or paracetamol 1.5 mg/kg/dose or 15 mg/kg/dose respectively, per rectally. All the patients required 1–4 doses of analgesic to control the post-operative pain.

**Table 3:** Children's Hospital-of-Eastern Ontario Pain Score (CHEOPS)

	0	1	2
Crying	None	Moaning/crying	Screaming
Facial expression	Smiling	Composed	Grimace
Verbal expression	Positive	None/other complaints	Complaints of pain
Torso	Neutral	Shifting/tense/upright	Restrained
Legs	Neutral	Squirming/kicking/drawn-up	Restrained

The patients with inguinal hernia and impalpable tests were operated as day case surgery. The mean hospital stay for the remaining patients was  $2.55 \pm 1.37$  days.

The postoperative period was uneventful in most of the cases except a few. Overall 7 (7.60%) had some complications and the nature and number with percentages are given in Table 4.

**Table 4:** Morbidity and mortality after laparoscopic intervention ( $n = 92$ )

Clinical conditions	Morbidity and mortality	Number with percentage
Closure of internal inguinal ring (30)	Port-site hematoma Stitch abscess	02 (6.66%) 01 (3.33%)
Laparoscopic appendectomy (26)	Hernia at umbilical port	01 (3.85%)
Orchiopexy (13)	Recurrence	01 (7.69%)
Cholecystectomy (11)	Secondary hemorrhage	01 (9.09%)
Adnexal mass (05)	Conversion to open procedure	01 (20%)
Others	None	
Mortality	None	

acquire and intra-corporeal suturing and knot tying for closure of the internal inguinal ring may need a long learning curve.<sup>7</sup>

Cryptorchidism is the most common genitourinary anomaly in male children. About 20% of cryptorchid testicles are non-palpable. In these cases, the laparoscopic technique is a useful alternative method of diagnosis and treatment.<sup>8,9</sup> Laparoscopy was first used in 1976 for diagnosis of impalpable testes.<sup>10</sup> Only after 1990, laparoscopy was used for the treatment of impalpable testes as the urologists gained experience with the method and since then laparoscopic orchiopexy and orchiectomy have been increasingly used.<sup>11,12</sup> In our country, laparoscopy for the impalpable undescended testis is gaining popularity and the surgeons are becoming more familiar with the procedure. In the case of orchiectomy in an 11-year-old boy, the testis was atrophied, dysgenetic with separated testicular and epididymal components.

Appendectomy is a common surgical procedure in the pediatric population. Though open appendectomy is the 'gold standard' for the treatment of acute appendicitis, laparoscopic appendectomy is widely practiced nowadays.<sup>13</sup> In 1981, Semm from Universitäts Frauenklinik, Keil, Germany performed the first laparoscopic appendectomy<sup>14</sup> which is now considered as a safe alternative to open appendectomy in pediatric patients and results in shorter hospital stay, less postoperative pain, less postoperative complications, less postoperative ileus and of course, a better cosmesis.<sup>13-17</sup> The only patient who developed hernia at umbilical port was a result of inadequate closure probably due to fatty patient.

Laparoscopic cholecystectomy is the most common laparoscopic procedures performed in adults.<sup>14</sup> It has now replaced open cholecystectomy as the first choice of treatment for gallstones and inflammation of gall bladder unless there is a contraindication to the laparoscopic approach. This is because open procedure leaves the patients more prone to infection.<sup>18</sup> This procedure can be safely practiced in pediatric age group of patients with additional advantages of less postoperative pain and ileus, quicker recovery, better cosmesis.<sup>19,20</sup> Our study includes 11 cases out of which one case suffered from secondary haemorrhage and laparotomy was needed to manage the case.

Laparoscopy is a technically feasible and safe method in the diagnosis and treatment of benign ovarian masses in children and young females, associated with shorter hospitalization, minimal analgesic requirement and a good cosmetic appearance.<sup>21,22</sup> Most surgeons agree on the use of laparoscopy when a young female patient complains of vague

lower abdominal pain and there are many reports showing that laparoscopy improves diagnosis and provides proper therapeutic option.<sup>23</sup>

Out of the five cases, salpingo-oophorectomy had to be done in one case due to necrosed ovary following torsion and the conversion was due to poor visualization as a result of bleeding.

Laparoscopy is widely used both as a diagnostic as well as a therapeutic tool in children with ambiguous genitalia. Laparoscopic detection of gonads, excision of dysgenetic gonads or removal of residual Müllerian duct structures or vice versa as well as management of other anomalies can be done in these patients by means of laparoscopy.<sup>24,25</sup> All the four cases of ambiguous genitalia showed karyotype 46XY. Laparoscopic examination was done to detect the gonads and to exclude Müllerian duct remnants. 1 patient had associated cystoscopic and vaginoscopic examination.

Minimal invasive surgery has overcome many technical limitations and has evolved into a safe alternative treatment of many complex pediatric surgical procedures. The use of this approach for the correction of biliary tract anomalies had to wait until instruments and surgeons' skills improved enough. Nowadays, laparoscopic portoenterostomy is practiced in many centers for the treatment of biliary atresia and different studies have shown to have good early outcome.<sup>26,27</sup> In our study, 2 patients with biliary atresia underwent only laparoscopic evaluation by intra-operative cholangiography and liver biopsy. The available treatment options of symptomatic pancreatic pseudocyst are endoscopic drainage, percutaneous catheter drainage and surgical drainage either via open surgery or laparoscopic surgery.<sup>28,29</sup> The only patient with pancreatic pseudocyst in our study had diagnostic laparoscopy followed by drainage.

The scoring system for wound appearance used in this study was Visual Analog Scale (VAS). Parents of the patients were explained and demonstrated about the worst possible scar and almost normal skin and were asked to score 0 and 100, respectively for these two extreme and other possible scores for wound appearance in between these. Most of the patients' parents gave excellent scores to their children's wound cosmesis according to VAS following laparoscopy. All the patients required significantly lesser amount of analgesic, recovered faster, had significantly better wound cosmesis, had shorter hospital stay and had minimal complication.

While laparoscopic surgery is advantageous in terms of patient's outcomes, the procedure is more difficult from the surgeon's perspective when compared to traditional open

surgery.<sup>14</sup> Moreover, operative cost is more expensive due to costly instrument set up and also takes longer operating time. As we are practicing laparoscopic surgery, in our department, only for the last three years, we need much more practice to develop our skills in this area.

## CONCLUSION

Laparoscopic surgery is taking its upper hand over many open surgical procedures not only in adults but also in children. It can be performed safely, and has both diagnostic and therapeutic values. It has additional benefits of shorter hospital stay, less postoperative pain and superior cosmetic result and less morbidity and mortality. But it needs to be evaluated in wider group of patients with a longer period of follow-up and needs more practice.

## DISCLOSURE STATEMENT

No competing financial interests exist.

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