



## Original Article

# LAPAROSCOPY IN NEONATES IN BANGLADESH: TECHNICAL CHALLENGES AND EXPERIENCE IN CHITTAGONG

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### Abstract:

**Introduction:** Pediatric Minimally Invasive Surgery is a relatively newer concept in Bangladesh and started about 8 years ago. It took some time to gather sufficient expertise to start in the neonates. However, due to resource constraints we are to practice with conventional equipments and still performing soLaparoscopy in Neonates in Bangladeshme advanced procedures. We are one of the pioneers in neonatal laparoscopy in Bangladesh and this article will review the common procedures that we perform.

**Materials and methods:** From 7, October 2005 to 30, June 2011, 1953 cases underwent laparoscopic/thoracoscopic procedures in our department of which 117 were neonates. We have used conventional 5 mm 30 cm instruments including 5 mm 30° telescope. First trocar was introduced by open method and CO<sub>2</sub> was pressure was kept below 8 mmHg. Age, sex, indications, operative procedures, complications and outcomes are evaluated retrospectively.

**Results:** Ages ranged from 3 days to 30days with males predominant (1: 0.56). Laparoscopy-assisted pull-through for Hirschsprung's disease was the commonest procedure (71) followed by Pyloromyotomy (21), Inguinal hernia repair (15), Ovarian cystectomy (06) and Diaphragmatic hernia repair (03). Six cases needed conversion, port-site infection occurred in 5 cases and incisional hernia in one. Six cases of Georgeson's operation developed sepsis needing colostomy and

three (2.56% of total neonates) of them died. Follow up was from 3 months to 5 years. Twenty three out of 60 successful Georgeson's operations had peri-anal excoriation persisting for initial 2-3 weeks. Forty six cases are now having normal bowel habits, seven having constipation, five occasional soiling and two fecal incontinence. One (6.66%) inguinal hernia recurred. Overall 70% had uneventful outcomes and 9.4% had serious complications including death.

**Conclusions:** Laparoscopy can be done in neonates using basic instruments with reasonable outcomes in a developing country setting.

### Introduction

Reports of minimally invasive surgery (MIS) in infants and children are found from the early 1970s and were largely confined to simple diagnostic procedures.<sup>1-6</sup> The evolution of the field in pediatrics has been much slower compared to its advancement in adults. The modern era of pediatric laparoscopy began in the early 1990s with the adaptation of adult instruments to the younger patients for therapeutic procedures such as cholecystectomy, herniorrhaphy, appendectomy, pyloromyotomy, fundoplication, urology etc.<sup>7-16</sup> Enthusiasm has grown worldwide in the pediatric surgical community over the past 30 years with the advent of many technological improvements, rendering laparoscopy and thoracoscopy safer and more available to the younger and smaller patients.

Although gynecologists in our country have been practicing diagnostic laparoscopy since mid 1980s, first laparoscopic cholecystectomy was performed by the general surgeons in 1991. Thereafter this new technology gained popularity among the surgeons, however, for many years laparoscopy in Bangladesh

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confined principally to cholecystectomy. Gradually gynecologists, urologists and otolaryngologists incorporated this technique into their practice. We the pediatric surgeons were somewhat late and we could only start in 2005. Our senior pediatric surgeons were less interested with the perception that laparoscopy was not feasible in many cases and outcomes were not satisfactory. In 2004, few young pediatric surgeons including the principal author participated in the Indian Association of Pediatric Surgeons conference which was an eye opener. We then took initiative, took training in India and back home started practicing laparoscopy in children. Ours is a tertiary care pediatric hospital, so we get a lot of neonatal surgical problems notably Hirschsprung's disease. Inguinal hernia and pyloric stenosis are also common. We could only manage one set of hand instruments of 5 mm 30 cm size and had to start laparoscopy in neonates with these instruments. Our experience with neonatal laparoscopy is described here.

#### Methods:

From 7, October 2005 to 30, June 2011, 1953 cases underwent laparoscopic/thoracoscopic procedures in our department of which 117 were neonates. Age, sex, indications, operative procedures, complications and outcomes are evaluated retrospectively. The ethical review committee for thesis and research, Chattagram Maa-O-Shishu Hospital Medical College, has given permission to conduct this study.

All the cases were performed under general endotracheal anesthesia and heart rate and oxygen saturation were monitored via pulse oximeter. We have

used single chip camera and telescope used was of 30°, 5 mm. All our hand instruments were of 5mm, 30 cm size except pyloromyotomy knife and spreader. As a general rule, first trocar was introduced by open technique in all the cases and CO<sub>2</sub> pressure was kept below 8 mmHg. We have used monopolar hook cautery in most instances and bipolar cautery in selected circumstances. Feeding was allowed 4 to 6 hours postoperatively in most of the procedures except in Hirschsprung's disease and patients were discharged from hospital during the 1<sup>st</sup> or 2<sup>nd</sup> postoperative day (POD) in majority instances. Patients were followed up for up to 5 years. Ergonomics, port placements and other technical aspects of different procedures are described:

Hirschsprung's disease (HD): Patients were supine, monitor on the left side and surgeon on the right side of mid-section of patient's body. Assistant stood on the left side of surgeon towards head-end of patient. Three ports were placed: 1<sup>st</sup> port was at right upper quadrant over right rectus abdominis for telescope. After insertion of 1<sup>st</sup> port and insufflations was done, 5 mm 30° telescope was introduced and length of involved segment was assessed. In classical HD, 2<sup>nd</sup> port was in right iliac fossa and 3<sup>rd</sup> port was in left upper quadrant (Fig. 1a). In long segment HD, all three ports were on right side: 1<sup>st</sup> port in right upper quadrant, 2<sup>nd</sup> port at the level of umbilicus (used for telescope later on) and 3<sup>rd</sup> port in right iliac fossa (Fig. 1b). The 2<sup>nd</sup> and 3<sup>rd</sup> trocars were placed after applying traction on abdominal wall using four-point silk bites to prevent injuring the intestines (Fig. 2a & 2b). After port placement and insufflations, the left side and foot end of the patient was elevated for



**Fig.-1a:** Ports placement in classical Hirschsprung's disease



**Fig.-1b:** Ports placement in long segment Hirschsprung's disease



**Fig.-2a:** Traction on skin during 2<sup>nd</sup> and subsequent port placement



**Fig.-2b:** Silk bites seen on the inner aspect of abdominal wall

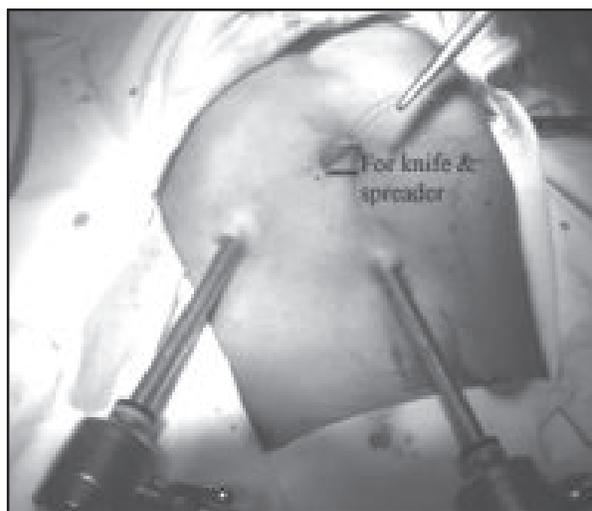
classical HD. For long segment HD, foot-end and head-end of the patient were elevated alternatively and the assistant changed position accordingly from head-end to foot-end side. Bipolar cautery was used to burn the meso-colon to create a window before skeletonization of distal colon using monopolar hook cautery. Occasionally 5 mm clips were used to divide the blood vessels between clips. Adequate length of distal colon was mobilized in this manner and CO<sub>2</sub> insufflations shut down before proceeding to trans-anal dissection. After trans-anal dissection was complete, the already mobilized colon was pulled-through the anus. Abdomen was distended again with CO<sub>2</sub>, telescope was introduced to see the orientation of pulled-through colon, any herniation of small-gut beneath it and for any bleeding or collection. Then the laparoscope and insufflations were shut down and colo-anal anastomosis was done. The ports were closed subcuticularly after fascial closure at right upper quadrant port.

**Inguinal Hernia Repair:** The patients were kept supine and monitor was at the foot-end of patient towards the affected side. Surgeon stood on the opposite side of the lesion and assistant towards head-end of patient. Three ports were used: 5 mm supraumbilical port for telescope and two more ports, one at each flank for operating. After port placement and insufflations, foot end and affected side of patient were elevated and in older children, legs were suspended at 60° from abdominal surface to minimize distance between surgeon and monitor. Intra-corporeal purse string suture technique was utilized using 3/0 vicryl to close the sac at deep inguinal ring.

**Ovarian Cystectomy:** Patient positioning, monitor and ports placement, surgeon and assistant positions were

the same as in inguinal hernia repair. The supraumbilical port was of 10 mm size to facilitate specimen retrieval later on. Cyst aspiration and Stripping ovarian cystectomy were the procedures used.

**Pyloromyotomy:** The patients were kept supine and monitor was on the right side towards head-end of patient. Surgeon stood on the left side and assistant on the foot-end of patient. Three ports were used: Supraumbilical 5 mm port for telescope, one right hypochondriac port holding the pylorus and an epigastric stab to insert endoknife and pyloromyotomy



**Fig.-3:** Ports in pyloromyotomy

spreader alternatively (Fig. 3).

**Diaphragmatic hernia:** The patients were in lateral position with left side up. Three ports were used, in the 5<sup>th</sup> intercostals space at mid-clavicular line, one above and anterior and another below and posterior.

**Table-I**  
*Detailed values of different neonatal procedures*

Procedures	Number	Mean age (days)	Mean operating time (minutes)	Conversion	Mean postoperative stay (days)	Complications (number)
Laparoscopy-assisted pull-through (Georgeson's)	71	15.08 ± 7.66	89.78 ± 17.83	05	5.40 ± 3.29	23
Pyloromyotomy	21	23.66 ± 3.71	34.75 ± 7.14	01	2.45 ± 2.13	02
Inguinal hernia repair	15	20.60 ± 4.51	38.31 ± 5.50	00	Discharged on 1 <sup>st</sup> POD	02
Ovarian cystectomy	06	15.00 ± 7.40	30.83 ± 5.84	00	Discharged on 1 <sup>st</sup> POD	00
Diaphragmatic hernia	03	9.33 ± 7.76	79.00 ± 13.52	00	3.33 ± 0.57	00
Others	01	29.0	45.0	00	03	00
Total	117	17.29 ± 6.75	69.58 ± 29.88	06	3.84 ± 2.14	27

Surgeon stood behind the patient and assistant was towards head end. Head end of the patient was elevated to help reduce the abdominal contents and that was also aided by low pressure insufflations at 6 mm Hg.

#### Results:

Ages ranged from 3 days to 30 days with males predominant (1: 0.56). Laparoscopy-assisted pull-through for Hirschsprung's disease was the commonest procedure (Table 1). Six cases needed conversion, port-site infection occurred in 5 cases and incisional hernia in one. Six cases of Georgeson's operation developed sepsis needing colostomy and three (2.56% of total neonates) of them died. Follow up was from 3 months to 5 years. Twenty three out of 60 successful Georgeson's operations had peri-anal excoriation persisting for initial 2-3 weeks. Forty six cases are now having normal bowel habits, seven having constipation, five occasional soiling and two fecal incontinence. One (6.66%) inguinal hernia recurred. Overall 77% had uneventful outcomes and 9.4% had serious complications including death (Table I).

#### Discussion

Neonatal laparoscopy took some time to get

momentum when pediatric laparoscopy got itself established. The reasons were many, including lack of proper instruments and physiological consequences of CO<sub>2</sub> insufflations.<sup>1, 7, 17-19</sup> We have enjoyed the knowledge of already established methods practiced by the pioneers, however our efforts were restrained by lack of resource and skeptical attitude of the seniors.<sup>20</sup> We had to invest a lot of time and energy to convince the hospital authority to purchase us the instruments to start with. And somehow we have managed to perform our cases using the same instruments for years together. Performing large number of appendectomies helped us to enhance our laparoscopic skills including intracorporeal knotting. With the help of two French surgeons Dr. Atger Jerome and de Lagausie Pascal we could start with advanced procedures during early stages of this study.

The operating time initially was longer in every procedure, which gradually came down to a reasonable standard. Our first Georgeson's operation for Hirschsprung's disease took 3.5 hours and latter on in some cases we could complete the procedure in less than an hour. Five of the conversions in our series were in Georgeson's procedure due to reduced working space rendered by distended bowel loops. That one in pyloric stenosis was due to perforation. A large

number of Georgeson's procedure suffered from perianal excoriation during early postoperative period, however improved in course of few weeks on zinc oxide paste application. More than 70% normal bowel habits in the long run is an acceptable outcome in Hirschsprung's disease.<sup>1, 7, 14, 21</sup>

Although we sometimes do the laparoscopy for inguinal hernia, appendicitis and impalpable testis in older children as day case, we have kept all the neonates at least overnight in inguinal hernia and ovarian cysts. In Georgeson's operation where complications occurred, postoperative stay was longer. One inguinal hernia that recurred in our series seems to be due to technical fault on our side. One incisional hernia at supraumbilical port of pyloromyotomy was the result of port-site infection. Sepsis in 6 cases of postoperative Georgeson's was during early days of the study period. Over enthusiasm during case selection played some part. Gradually we have learnt to exclude those cases with preoperative parameters indicating sepsis. Same applies to those Georgeson's cases converted i.e. taken to the theatre with inadequate preparation. Death in 3 instances was the consequence of sepsis. Although there is greater risk of complications in neonates, neonatal laparoscopy is now a well accepted modality of treatment in a variety of conditions.<sup>22-24</sup>

### Disclosure Statement

No competing financial interests exist.

### Conclusions

Laparoscopy can be done in neonates using basic instruments with reasonable outcomes in a developing country setting.

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