ORIGINAL ARTICLE

Laparoscopy in Children

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ABSTRACT

Objective — *To analyze data related to different laparoscopic procedures performed on children so as to document pattern over the years at a public sector hospital.*

Study design — *Retrospective chart review.*

Place & Duration of study — *Department of Paediatric Surgery National Institute of Child Health Karachi, from January 2011 to December 2013.*

Methodology — *The data of all the laparoscopic procedures was reviewed for the indications, type of surgical procedure performed, operative details including time taken for completion of the procedure, difficulties / conversion rate and complications. Data was entered into SPSS version 16 and descriptive statistics were used for analysis.*

Results — *Total number of patients who underwent laparoscopic procedure was 201. There were 164 (81.6%) males and 37 (18.4%) females. Most of the patients (n=122 – 60.7%) were above five year of age. Clinically impalpable testis (n=124 - 61.7%)) was the most common surgical condition for which laparoscopy was performed. This included first, second stage Stephen Fowler procedure, single stage orchiopexy and orchiectomy. Other procedures included appendectomy (n=27-13.4%) and cholecystectomy (n=12 - 6%).* Diagnostic laparoscopy was performed in 11 (5.5%) babies with persistent jaundice to find out surgical cause of hyperbilirubinemia. There were 7 (3.4%) cases with disorders of sex development (DSD). *Complications occurred in 19 patients which included port site infection (n=8), port site bleeding (n=5), bowel injury (n=2) and others. In only seven (3.5%) cases procedure was converted to open surgery.*

Conclusions — *Laparoscopy was a safe surgical procedure in children performed for different indications. Learning curve over period improved procedure related outcome.*

Key words — *Laparoscopy, Child, Stephen Fowler procedure.*

INTRODUCTION:

Surgeons all over the world are moving towards minimally invasive surgery. General surgeons remain on top of the list. It has progressed fast and now in technologically advanced countries significant number of procedures in various surgical disciplines, are performed through this approach. Pediatric surgeons were slow to adopt this technique.[1] There were many fears in relation to anatomy, physiology, anesthesia, and most important, the availability of appropriate sized equipment. As understanding of various physiological changes during the procedure in children improved and with availability of appropriate sized equipment, number of procedures performed with this technique progressed at fast pace.[2] Currently in various centers majority of the procedures are done through this minimally invasive approach.[3]

Laparoscopy, one of the minimally invasive procedures, is freely available at various urban centers in Pakistan in adults surgical practice. However only few procedures like cholecystectomy, appendectomy, herniotomy etc are usually performed.

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National Institute of Child Health (NICH) is one of the major tertiary care public sector hospitals in Pakistan. Laparoscopic approach at this institute is has gradually adopted over period of time. This study was conducted to find out the pattern of laparoscopic surgeries and complications related to the procedures performed over the years.

METHODOLOGY:

This study was conducted at the Department of Paediatric Surgery, National Institute of Child Health Karachi. It was a retrospective review of records of all the patients operated through laparoscopic approach from January 2011 to December 2013. The data was retrieved and analyzed for demographic profile of the patient population, indications for surgery, procedure performed, technique adopted, intraoperative difficulties / complications, conversion to open approach, postoperative complications and hospital stay. Closed and open techniques were used for creating pneumoperitoneum. Equipment of size 5mm and 3mm size were used, depending upon age of the patients.

Data was entered into SPSS version 16. Descriptive statistics were applied to the variables. Data was expressed in number, percentages and proportions.

RESULTS:

In three years duration 201 procedures were performed through laparoscopy at NICH. This included 164 males (81.6 %) and 37 females (18.4%). The age of the patients ranged from the neonatal period to more than 12 year. Most (n=122 – 60.7%) of the patients were above five year of age. Age group distribution is given in table I.

Clinically impalpable testis was the most common indication(n=124 – 61.7%) for which laparoscopy was performed. In 47 patients each first and second stage Stephen Fowler orchiopexy was performed. In 15 cases vas and vessels were found entering into inguinal canal at deep ring. In 12 (6.0%) of these cases on inguinal canal exploration nubbin of tissue was found (vanishing testis) while in 3 (1.5%) cases normal looking testis was found and orchiopexy done. In 5 cases blind ending vas deferens (absent testis) was noted in pelvis. Single stage orchiopexy was possible in 09 (4.4%) patients as testicular vascular pedicle was long and testis could reach the scrotum. In one patient with small size testis orchiectomy was performed. In this series appendectomy was performed in 27 (13.7%) and cholecystectomy in 12 (6.0%) patients.

Laparoscopic cholangiogram was performed in 11 (5.5%) babies with persistent jaundice to find out surgical cause of hyperbilirubinemia. There were 7 (3.4%) cases with disorders of Sex development (DSD). Of these there were two cases with 46 XX DSD (congenital adrenal hyperplasia). In these normal female internal genitalia were found. There were three cases of 46 XY DSD androgen insensitivity syndrome. In this group laparoscopy was done to demonstrate the size of Mullerian duct remnants. In two cases on 46 XY DSD with small sized penis laparoscopy was done to find out the location of the testis. There was rudimentary type of tissue palpable in the inguinal region under general anesthesia. Laparoscopy revealed vas deferens and vessels entering into deep ring.

In 4 (1.9%) patients with recurrent abdominal pain where other investigations did not reveal any pathology, laparoscopy was performed. Mesenteric lymph nodes were found enlarged. In a female patient with abdominal pain, pelvic collection was noted on ultrasound and appendix was not appreciated. At laparoscopy appendix was found normal and purulent pelvic collection was drained out. She was labeled as a case of primary peritonitis. Break up of the cases is given in table II.

Complications occurred in few patents. This included bowel injury in two patients. It occurred in patients operated for postoperative intestinal obstruction due to adhesions. In both the cases conversion to open was done and stoma made that was subsequently reversed. Eight patients had minor port site infection. This was managed conservatively. Five patients had bleeding from the port site. Two of these patients required blood transfusion. A girl with sickle cell disease in whom cholecystectomy was performed,

Table I: Age Groups

Age Groups	Frequency (n)	Percentage (%)
Up to 1 Year	15	7.5
1 Year to 5 year	64	31.8
5 year and above	122	60.7
Total	201	100.0

Table II: Break up of Laparoscopic Procedures		
Procedures	Number (n)	Percentage (%)
Clinically Impalpable Testis	**124**	**61.7**
Stage I Stephen Fowler procedure	47	23.4
Stage II Stephen Fowler procedure	47	23.4
Vanishing testis	12	6.0
Absent testis	05	2.5
Single stage orchiopexy of intrabdominal testis	09	4.5
Orchiopexy of inguinal testis	03	1.5
Orchiectomy	01	0.4
Appendectomy	27	13.4
Cholecystectomy	12	6.0
Cholangiogram	11	5.4
Cysts / Masses	**13**	**6.4**
Ovarian cyst	06	2.9
Omental cyst	03	1.5
Mesenteric cyst	02	0.9
Intussusuception	01	0.4
Splenic cyst	01	0.4
DSD cases	07	3.4
Recurrent Abdominal pain	04	1.9
Post operative adhesions	02	0.9
Primary peritonitis	01	01
Total	**201**	**100**

developed acute chest syndrome postoperatively. She also improved with adequate hydration and oxygen support. Three patients had surgical emphysema during the procedure that was managed conservatively.

In seven (3.5%) cases conversion to open was done. This included two cases of complicated appendicitis, and two cases of mesenteric cyst as resection of adjacent gut loop was required. As expertise for this procedure was not at hand thus conversion to open surgery was done. There was no mortality in this series.

DISCUSSION:

Laparoscopy in paediatric population has progressed rapidly in last decade though it was slow to start and initially remained limited to diagnostic procedures only.[4] First reported peritoneoscopy, later named as laparoscopy was performed in a child in 1971.[5] It did not get much acceptance by paediatric surgeons but adult general surgeons took it forward and now this minimally invasive approach has become standard of care across the world for most of the surgical procedures. Gradual surge in paediatric laparoscopy witnessed in late 90s and early part of this century and over the years this approach is adopted for newborns as well.[6]

At NICH same trend is apparent. The equipment was made available in last decade of past century and initially only diagnostic procedures were performed. Later with the help of general surgical colleagues many advanced procedures were also attempted. Following further training in laparoscopic skills and provision of equipment through NGOs this technique was employed in infants and neonates as well. This learning curve is apparent while looking at the type of procedures performed at NICH. Undescended testis remained on top of the list. Second stage Stephens Fowler which initially was contemplated through open approach is now performed laparoscopically as well.

Acute appendicitis is a common surgical emergency and many of the operations are performed either in

the evening or night calls. As laparoscopic equipment is not available during these hours, open appendectomy was performed. However 27 (13.4%) patients underwent laparoscopic appendectomy in this series during morning OR sessions. There was a learning curve for this procedure as reported with other conditions from various disciplines.[7] Innovative ways of dealing with appendix base with suture ligation, application of diathermy for vascular control rather than clips or harmonic scalpel, and use of glove finger for retrieval of appendix are few to mention here.

Acute cholecystitis and cholelithiasis are uncommon conditions in children.[8] In this series 12 (6%) patients underwent cholecystectomy. This is a standard surgical procedures for which most of the beginners in general surgery residency are trained. However it is not the case with pediatric residency program where clinically impalpable testis is usually the first procedure to be learned by the novice.[9] Many surgical procedures in paediatric practice require handling of gut, including resection and different types of anastomosis. These require higher level of training and equipment (staples) which at present is not available but our faculty is getting experience on this as well. In future it is hoped that such procedures will be performed at NICH.

Complications related to surgical procedures are part and parcel of the management. However an acceptable percentage must be defined. If open surgery is taken as baseline then laparoscopic approach must prove safe at parity or may be superior in its outcome so as to recommend it across the board for various surgical ailments.[10] Complication rate in this series was quite low and managed easily. Some of the complications are related to the technique and few to the anatomy and physiology of the paediatric population.[11] Port site infection and bleeding were the most complications as reported by others.[12] In this series first port is placed usually with a semilunar incision within the lower lip of umbilicus. We use closed technique of pneumoperitoneum is all cases. Preparation of navel is thus important.

Subcutaneous emphysema was another important complication worth mentioning.[13] This usually occurs when peritoneum is not entered and gas is insufflated into subcutaneous tissues. This is recognized immediately as crepitus is felt easily. At times due frequent displacement and re insertion of ports this may happen. Another important reason that must be kept in mind is sudden creation of pneumoperitoneum with high intrabdominal pressure.[14] This is a serious condition and must not occur. It is therefore recommended that pneumoperitoneum must be created only when it is absolutely confirmed that Verees needle is inside peritoneal cavity and slow pressure insufflation is ensured with frequent monitoring of intrabdominal pressure so as to keep it within required limits.[15]

Technological advances in medical field lead to the development of miniaturized equipment. This has influenced the current minimal surgical technique. Single port laparoscopic approach is now available not only for adults but paediatric population as well.[16] There shall be new experimentation in future and debate whether laparoscopy has advantages or not over the conventional surgery continue, but a patient centered approach must be kept up front. A high level of evidence in the form of randomized controlled trial and meta analysis shall go a long way in establishing usefulness of minimal surgical approach in clinical practice.

CONCLUSIONS:

Laparoscopy is a practical approach to different surgical conditions from neonatal period to adolescense. Complications in this series were less in number and easily managed. A learning curve was apparent as more therapeutic procedures were performed as experience with the technique was gained.

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