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A Comparative Study of Laparoscopic Versus Open Herniotomy in Paediatric Age Group of 5 To 12 Years with Special Reference to Outcome

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Abstract: *In the present study, I have done a randomized, prospective comparative study of ―LAPAROSCOPIC VERSUS OPEN HERNIOTOMY IN PAEDIATRIC AGE GROUP OF 5 TO 12 YEARS‖. In the Department of Surgery, R.G. Kar Medical College and Hospital, Kolkata, from January 2014 to June 2015. The aim of this study was to evaluate and compare the advantages and disadvantages between laparoscopic herniotomy and open herniotomy in patients with inguinal hernia.*

After randomisation, 60 patients that were included in the study group. Among them, 30 patients underwent laparoscopic herniotomy and 30 patients underwent open herniotomy. All the patients allocated to the two groups underwent the assigned procedure.

Wound infections in Laparoscopic herniotomy group (6.67%) and Open herniotomy group (23.3%) p< 0.05. RTI in LH group (16.6%) and in OH group (13.3%) p = 0.7175 (statistically insignificant).UTI in LH group (6.66%) and in OH group (3.33%) p = 0.5536 (statistically insignificant).Post operative scrotal oedema in LH group (10.71%) and in OH group (32%) p = 0.0095 (statistically significant). Average operative time in LH group: 63.66 minutes and in OH group: 40.83 minutes, p < 0.05. CPPV detected in 20% cases of laparoscopic herniotomy and in nil cases in open group, p = 0.0098, the difference differ significantly. Average VAS score for cosmesis assed by the mother/guardian of patient in LH group: 1.28 and in OH group: 2.34, p < 0.05. Post operative pain was much less in LH group. p<0.0001, (60% and 40% of OH group had moderate and severe pain respectively, where as 60% and 40% patient among LH group had mild and moderate pain respectively) - pain assessed by the mother of the patient as per VAS scale. Average duration of Hospital stay in LH group: mostly 1 day and in OH group: mostly 2 days, p< 0.05. Average time to return to Normalcy in LH group: approx 3 days and in OH group: approximately 7 days, p< 0.05.

The data from this study confirmed that the results of the laparoscopic technique has the advantage of reduced post operative pain, diagnosis of CPPV with its management in the same sitting, rapid return to everyday activities, lesser wound infection and better cosmetic results.

Key words: *LAPAROSCOPIC, OPEN, HERNIOTOMY , PAEDIATRIC AGE*

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I. Introduction

Congenital inguinal hernia repair is one of the most commonly performed elective operations in children. Earlier it was done by traditional open groin exploration, having a high success rate and a low complication rate. In paediatric hernia simple dissection and high ligation of processus at internal ring was found to be sufficient to provide a long lasting cure to repair indirect inguinal hernia. The Ferguson principle states the excision of hernia sac, still is the basis of all paediatric hernia repairs even in the 21st Century. Ferguson proposed hernia repair by just exposure, dissection, simple high ligation and removal of the hernial sac. This was applied successfully to the paediatric population by Potts et al. [1].

Some issues, like the debate about managing the contralateral groin hernia in children presenting with unilateral hernia and in the case of recurrence, repeated surgery risking damage to the structures of the spermatic cord remain unresolved in open surgery.

Laparoscopy is an option for surgical repair of inguinal hernias in addition to the traditional open approach as inguinal hernia remains one of the most common surgical disorders in children. Some say that Paediatric laparoscopy was adopted too quickly and unduly advertised and frequently misused by individual surgeons for their personal reason. Enthusiasts of paediatric laparoscopy claim that it is minimally invasive, less painful, cost effective, cosmetically more appealing and is associated with shorter hospital stay and fewer complications.[2]

Laparoscopic hernia repair is a posterior approach in comparison to open repair which is an anterior approach. Although laparoscopes are known for more than 100 years, only during the last two decades an unprecedented hype has precipitated among the public as well as among professionals. Newer technologies are always welcome as they are likely to benefit humanity. Nevertheless, as Sir Robert Hutchison remarked, It is always well, before handing the cup of knowledge to the young, to wait until the froth has settled'. Any new technology should be critically examined, practically explored and adequately experienced before incorporating it into routine practice. Laparoscopic surgery for inguinal hernia of adult patient is increasingly becoming a part of surgical practice. Minimally invasive surgery has been shown to be feasible and safe in paediatric patients since 1975 when laparoscopic surgery was first used to treat a small bowel obstruction. However, controversy is rife on its laparoscopic feasibility and wider adoption. [2-5]

The objective of this study is to compare laparoscopic hernia repair with open herniotomy as regards operative time, hospital stay, time required to return normalcy, postoperative complications, and cosmetic results. Here is an ongoing debate about whether laparoscopic or open hernia repair (LH or OH) is the best choice for inguinal hernia in children. Laparoscopy provides the surgeon with a –

i. superior diagnostic tool.
ii. facilitating the diagnosis of any kind of inguinal hernia or contralateral patent processus vaginalis and its repair in the same session.
iii. simultaneous diagnosis of other intra abdominal pathology if present.
iv. surgery- and anesthesia-related stress is minimized.
v. provides an excellent view on the cord structures and leaving them, as well as the testis.
vi. Less wound infection and post operative complication.

II. Materials And Method

STUDY AREA: 60 Patients (30 in each group) were selected at R.G. Kar Medical College and Hospital, Department of General Surgery and Paediatric Surgery from January 2014 to June 2015.

POST-OPERATIVE COMPLICATIONS: This includes complications occurring uring stay in hospital. It is broadly divided into following categories- (mechanical wound complications, urinary tract infections, pulmonary complications, gut related complications, cardiovascular complications and systemic complications).

STUDY DESIGN: All patients with congenital hernia (unilateral or bilateral) without any history of herniotomy or any other abdominal surgery will be randomized into two groups by closed envelope method; one group will be taken for laparoscopic surgery and other for open surgery. The study was carried out as an open randomized single centre study. For randomization, a stratified random sampling method was used. Every parent of the patient planned for operation was numbered 1, 2, 3, 4, and 5 and so on. Age between 5-12yrs was a criterion of selection.

Every 3rd patient was planned for open herniotomy and every 4th patient was planned for laparoscopic herniotomy. The parents of the patient were explained in details about the operative modalities (laparoscopic and open herniotomy).

Thus the patients were not given the opportunity to voluntarily opt for the operative procedure they would like to undergo and this was probably the main cause in the exclusion criteria. Out of 60 patients 30 patients had undergone laparoscopic and rest 30 open herniotomy.

The two treatment groups were well matched with regard to age. Each patient underwent thorough clinical history taking and physical examination. Clinical history details were taken. General survey was performed. Cough impulse, get above the swelling, reducibility and deep ring occlusion test are performed.

Parents are explained in details about the operative modalities and an informed consent was taken for laparoscopic and open herniotomy. All the patients underwent thorough pre-anaesthetic check up for general anaesthesia. All the parents of the patient were thoroughly explained preoperatively regarding post-operative pain and methods of analgesia available.

III. Result

We found that in open herniotomy group out of 30 patients 5 patients were female whereas in laparascopic group 2 patients were female among 30 study group.

We found that in this study 3 patients had bilateral hernia among the patients undergoing open herniotomy and 4 patients had bilateral hernia in laparoscopic group. This difference is statistically insignificant.

It was found that pn this study CPPV detected in 6 children among 30 children in laparoscopic group whereas in open heniotomy this facility is not feasible.

We found that cosmesis measured on VAS scale for laparoscopic and open group. Judged on a visual analogue scale by the mother of the patient, both groups scored well, but patients randomised to laparoscopy were more satisfied with the cosmetic result.

We found that cosmesis was assessed by the mother and maximum numbers of mother were satisfied with lap herniotomy.

It was found that post operatively pain was measured (as per mother) in VAS Scale after 12 hours of operation. Result showed among 30 patients in open herniotomy group 12 patients had severe pain while in lap herniotomy group no patient had experienced severe pain.

It was found that in this study post operative wound infection is noted more in open herniotomy group.

We found that post operative scrotal oedema found more in open herniotomy group.

IV. Discussion

This study comparing laparoscopic versus open herniotomy in paediatric patients aged between 5 to 12 yrs has brought out a number of facts, some of which are in accordance with the literature while others differ. Open herniotomy is routinely performed in the Department of Surgery and Paediatric Surgery of R.G. Kar Medical College and Hospital.

In our Hospital Laparoscopic herniotomy is also performed. I took the opportunity to take up the prospective comparative study of laparoscopic herniotomy versus open herniotomy in paediatric patients aged between 5 to 12 years.

The mean operative time in the laparoscopic group was significantly longer than in patients undergoing an open procedure (63.66 minutes vs. 40.83 minutes). Operation time remains a topic of much debate among experts. Preliminary studies have shown significantly longer operative times for laparoscopic herniotomy. The inexperience of the surgeons with the new technique may contribute to the longer duration of the operation in the early studies.

A retrospective cohort study conducted by Mohamed E. Hassan, A.R. Mustafawi on 33 patients who underwent congenital inguinal hernia repair by either the new laparoscopic flip-flap technique or conventional open repair. Group A included those who underwent the new laparoscopic technique, and Group B included those who underwent conventional open repair. Mean operative time was 57.5 minutes for Group A versus 37.5 minutes for Group B [6]. This timings match with the present study.

In open surgery, time is consumed in gaining access, obtaining adequate exposure, in localizing and in isolating the sac from the cord structures. In LS, approaching from within makes the area of interest bloodless, and the magnification renders anatomy splendidly clear, making surgery precise. But the time limiting step remains intracorporeal suturing that places considerable demands on the requirement of hand eye coordination, especially while negotiating the posterior and medial hemi circumference of the internal ring, over the iliac and inferior epigastric vessels. With growing experience and use of refinements, such as hydrodissection and needle sign, operative time does come down.

In this study, a significant number of children (6 patients out of 30 patients i.e. 20%) presenting with Unilateral hernias have CPPV. The options for detection of CPPV are many, namely routine bilateral explorations[7], use of ultrasonography[8], laparoscopy[9], and the wait and watch policy[10].

Rafik Shalaby et al. (2012) conducted a study which showed that routine exploration and repair of CPPV could be a new concept of inguinal hernia treatment. They commented that the main advantage of laparoscopic hernia repair is the clear and direct view of the vital cord structures that makes dissection of these structures safe and easy. In addition, the incidence of testicular atrophy is so rare in laparoscopic hernia repair because of the multiple collateral circulations of the testis, which makes dissection at internal inguinal ring level extremely safe even in patients with previous inguinal surgery[11].

Laparoscopy proved advantageous over open surgery by precise detection and simultaneous repair of CPPV, although its management remains a continuous issue. Apart from that it has got the advantage of detecting other intra abdominal pathology (if present).

Post operative pain was assessed in a variety of ways. Then difference in postoperative pain following OS and LS is subject to controversy. One reason for this could be that neither the size of the incision nor the amount of muscle cutting/retraction vastly differs in either group.

In the immediate post-operative period non-opiate (mainly paracetamol suppository) analgesics were used in both. A visual analogue scale was used to assess the post-operative pain. It was found to be less in the laparoscopy group with the same dose of parenteral analgesics per kg body weight as compared to open herniotomy. The difference in postoperative pain following open surgery and laparoscopic surgery is subject to controversy.

Koivusalo et al. conducted a single blinded RCT on inguinal herniotomy showed significantly lesser pain and lesser analgesic requirement in laparoscopic surgery than open herniotomy [12].

Parietal pain predominates in OS, in general, which can well be controlled by caudal analgesia. On the other hand, pain perception is multimodal and multifactorial [13] in LS. In addition to parietal pain caused by port placement, Capnoperitoneum causes visceral pain due to stretching (peritoneal and diaphragmatic) and acidosis. Neither the use of smaller ports nor the use of caudal analgesia would completely obliterate pain following laparoscopy. Smaller scars are obviously more pleasing. Irrefutability of this contention, perhaps, precluded designing of proper scientific studies to address the cosmetic superiority of LS.

According to A.G. Pedersen and Coll (2001)[14] laparoscopy was associated with improved cosmesis ($p<0.001$). Cosmesis was recorded on a visual analogue scale by the patient from (5) excellent to poor (1). According to Mustafa Kamal (Pakistan J. Med., 2003)[15] Laparoscopy procedure gives us a small scar which is more cosmetic and acceptable. Five millimetre incisions in LS were, indeed, cosmetically more appealing compared with 2 cm incisions in OS.

In the present study Laparoscopic herniotomy was associated with improved cosmesis when compared with open herniotomy ($p<0.01$) However, this significance decreases because the scar in OS, by virtue of its position, gets concealed by clothing. In accordance with other studies there were significantly fewer wound infections, scrotal oedema in the laparoscopy group ($p<0.05$) .In the present study wound infection rate and incidence of scrotal oedema is low. This has also been confirmed in a study on a large number of patients.

Study conducted by Arbinder K. Singal & Aseem R. Shukla at Navi Mumbai, Maharashtra, India showed that the known complications with open surgery such as iatrogenic ascent, tethering of the testis, inguinodynia and wound infections are rare with the laparoscopic approach [16]. Yep et al. published a new laparoscopic technique in which the hernial opening was repaired with a peritoneal flap anchored with a single tension free intracorporeal suture. The valve mechanism of flap helped to avoid scrotal collection and prevent hernia recurrence [17].

In LS, trivial ooze from peritoneal vessels usually ceases spontaneously. It is the magnification in LS that renders them conspicuous, which would otherwise go unnoticed in open surgery. Wound erythema was minimal in OS, and none at all occurred in LS. Although the initial recovery from the effects of anaesthesia was delayed in a greater proportion of patients undergoing LS the effect of anaesthesia usually weans of within 12 hours and in my study most of them were discharged after 24 hrs in laparoscopic procedure. This initial delay in recovery may be due to deeper anesthesia and muscle relaxation needed for intubations in LS, in addition to the effects of capnoperitoneum.

Saranga Bharathi, Arora et al., noticed that immediate postoperative recovery (3 hr) was delayed in a greater proportion of children undergoing LS, but all patients except 3 were discharged within 10 hours of surgery. Patients were detained on account of geographic distance (3 of LS group). The results are similar to the present study[18]. OS can well be performed with the patient under a face mask, especially when caudal analgesia is administered simultaneously. Even when a patient is intubated, the degree of anaesthesia and relaxation needed is less.

V. Conclusion

In this study, a significant number of children (20%) presented with unilateral hernia had CPPV. Laparoscopy proved advantageous over Open surgery by precise detection of CPPV with its repair in the same session and thereby minimising the surgery and anaesthesia related stress. The results of this study on the above parameters matches and comparable with the previous various studies performed world widely.

The data from this study confirmed that the results of the laparoscopic technique has the advantage of reduced post operative pain, diagnosis of CPPV with its management in the same sitting, rapid return to everyday activities, lesser wound infection and better cosmetic results. The result of this study seems promising, however longer follow-up and larger study group is required for drawing definitive conclusion.

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Table: Distribution of mean OT time in two groups

		Number	Mean	SD	Minimum	Maximum	Median	p-value
OT time	**Open Herniotomy**	30	40.8333	4.1695	35.0000	50.0000	40.0000	<0.0001
	Laparoscopic Herniotomy	30	63.666	12.5212	45.0000	85.0000	60.0000	

Table: Distribution of sex, laterality, Presence of CPPV, Cosmesis, Post Op. Pain, Hospital stay (days), Time to normalcy (days), Post Op. complication(UTI), Post Op. complication (RTI), Post Op. complication(wound infection) and Post Op. complication (scrotal edema) in two groups

		Open Herniotomy	Laparoscopic Herniotomy	TOTAL	p-value
Sex	Female	5	2	7	0.2276
	Male	25	28	53	
Unilateral/bilateral	Unilateral hernia	27	26	53	0.6875
	Bilateral hernia	3	4	7	
Presence of CPPV	CPPV absent	30	24	54	0.0098
	CPPV present	0	6	6	
Cosmesis	1	3	0	3	<0.0001
	2	20	0	20	
	3	7	5	12	
	4	0	11	11	
	5	0	14	14	
Post Op. Pain	Mild	0	18	18	<0.0001
	Moderate	18	12	30	
	Severe	12	0	12	
Hospital stay (days)	1	8	26	34	<0.0001
	2	22	4	26	
Time to normalcy (days)	3	0	21	21	<0.0001
	4	0	9	9	
	5	1	0	1	
	6	7	0	7	
	7	20	0	20	
	8	2	0	2	
Post Op. complication(UTI)	Absent	28	29	57	0.5536
	Present	30	30	60	
Post Op. complication (RTI)	Absent	26	25	51	0.7176
	Present	4	5	9	
Post Op. complication(wound infection)	Absent	23	28	47	<0.0001
	Present	7	2	13	
Post Op. complication (scrotal edema)	Absent	17	25	42	0.0075
	Present	8	3	11	

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