Original Article

Paediatric Laparoscopic Inguinal Hernia Repair: Level of Disconnection of Peritoneal Cuff – An Observational Study

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Abstract

Introduction: Inguinal hernia is a common surgical condition in children. Conventionally, the open approach for inguinal hernia repair has been considered the gold standard. However, in the past two decades, laparoscopic inguinal hernia repair has gained popularity among paediatric surgeons as an alternative to the open approach. Apart from good cosmesis and shorter stay at hospital, laparoscopy offers clear-cut advantages of visualising contralateral site and simultaneous repair if it is patent. Many techniques for laparoscopic inguinal hernia repair have been proposed. In this retrospective observational study, we are comparing outcomes between proximal and distal disconnection of hernia sac. **Materials and Methods:** Ninety-five patients with inguinal hernia were studied in two groups. Group A included 50 patients in which hernia sac was disconnected from the peritoneal cuff proximal to deep inguinal ring (DIR). Group B included 45 patients in which hernia sac was disconnected distal to DIR. Various sociodemographic parameters and intraoperative findings were compared. Outcomes were analysed in terms of post-operative pain, duration of stay at the hospital and recurrences. **Results:** In group A, there were 46 males and four females with mean age of 4.01 years with standard deviation (SD) of 2.96. Group B included 37 males and eight females with mean age of 5.09 years with SD of 3.56. Excess post-operative pain was observed in 33 patients in Group A with proximal disconnection of hernia sac whereas it was seen in only three patients in Group B with distal disconnection of sac. The *P* was 0.001 which was highly significant. The duration of stay in the hospital was more in Group A (2.36 ± 1.22 days) as compared to Group B (1.8 ± 0.66 days) with a *P* of 0.0076 which was significant. Hernia recurrence was seen in four out of 50 patients in Group A (8%) as compared to no recurrence in Group B. However, the difference was not significant. **Conclusion:** The disconnection of hernia sac distal to DIR is associated with less post-operative pain and shorter duration of hospital stay. There is less recurrence seen in distal disconnection of hernia sac as compared to proximal disconnection; however, to achieve the level of significance, a large cohort study is required.

Keywords: Ingunial hernia, laparoscopy, paediatrics, peritoneal cuff

Introduction

Inguinal hernia is defined as abnormal protrusion of abdominal viscera through the inguinal canal. It is a common surgical condition in the paediatric age group caused by patent processus vaginalis sac. Conventionally, open inguinal hernia repair is considered to be the gold standard for the treatment of inguinal hernia in children.[1] However, laparoscopic inguinal hernia repair is slowly gaining popularity.[2] As surgeons' experience is increasing, the laparoscopic approach is becoming the first choice for inguinal hernia repair. It offers many advantages such as visualisation of the contralateral side and simultaneous repair if hernia is visible on that side, less duration of surgery; cosmetically better scar and lesser post-operative stay.[3,4] Various techniques of laparoscopic hernia repair have been suggested each having its own salient feature.[5-9] The disconnection of peritoneal cuff or leaving it intact with simple closure of the internal inguinal ring is widely debated. In this original article, we are describing our experience with 95 patients over 4 years in which we performed disconnection of hernia sac from peritoneal cuff and suture closure of peritoneal cuff.

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Materials and Methods

This is a retrospective observational comparative study in a tertiary care centre with paediatric surgery facility. A total of 95 patients with laparoscopic inguinal hernia repair over 4 years from January 2015 to December 2018 were included in this study. They were divided into two groups. Group A included 50 patients with laparoscopic inguinal hernia repair in which hernia sac was disconnected from peritoneal cuff proximal to deep inguinal ring (DIR) [Figure 1a] and the cuff was suture ligated. Group B included 45 patients in which hernia sac was disconnected from peritoneal cuff distal to DIR [Figure 1b] and suture ligated. Intra-corporeal absorbale suture was used for ligation of peritoneal cuff in both groups [Figure 2].

Inclusion criteria

1. Unilateral and bilateral congenital inguinal hernia in both sexes
2. Unilateral inguinal hernia with the questionable contralateral side
3. Unilateral hernia with associated anomalies exclusion criteria:
    1. Recurrent inguinal hernia with undescended testes
    2. Complicated congenital inguinal hernia.

The outcomes that were compared in the two groups were excessive operative pain (using the Visual Analogue Scale for pain), duration of hospital stay (in days) and recurrences.

Ethical approval was taken from the institutional review board. A well-informed consent was taken from all the participants.

The statistical analysis was done using SPSS software. Comparison between outcomes of two groups was done using the Chi-squared test and Fisher test. A $P < 0.05$ was considered statistically significant.

Results

A total of 95 patients with inguinal hernia fulfilling above-mentioned inclusion criteria were included in this study, divided into two groups: Group A comprising 50 patients and Group B comprising 45 patients. In Group A, there were 46 males and four females with mean age of 4.01 years with SD of 2.96. Group B included 37 males and eight females with mean age of 5.09 years with SD of 3.56. The left inguinal hernia was present in 16 patients in Group A and 18 patients in Group B. The right inguinal hernia was present in 31 patients in Group A and 24 patients in Group B. Bilateral inguinal

Table 1: Comparison of sociodemographic characteristics, intraoperative findings and post-operative outcomes between Group A and Group B

Variables ($n=95$)	Group A ($n=50$)	Group B ($n=45$)	*t*-test/ χ^2-test	*P*
Age (years)	4.01±2.96	5.09±3.56	1.82	0.1088
Sex				
Male	46	37	2.051	0.152
Female	4	8		
Laterality				
LIH	16	18	0.74	0.689
RIH	31	24		
Bilateral	3	3		
Contralateral inguinal hernia (5/95; 5.26%)	2	3		
Status of hernia sac				
Thick	43	35	1.089	0.297
Thin	7	10		
Width of the deep inguinal ring (neck of sac)				
Wide	25	29	2.01	0.156
Narrow	25	16		
Content of sac				
Fluid	26	25	2.43	0.289
Bowel	14	7		
Nil	10	13		
Post-operative pain (VAS)				
Excess	33	3	10.64	0.001
Normal	17	42		
Duration of stay in hospital (days)	2.33±1.22	1.8±0.66	2.72	0.0076
Recurrence				
Yes	4 (8%)	0		0.215
No	46	45		

LIH: Left inguinal hernia, RIH: Right inguinal hernia, VAS: Visual Analogue Scale

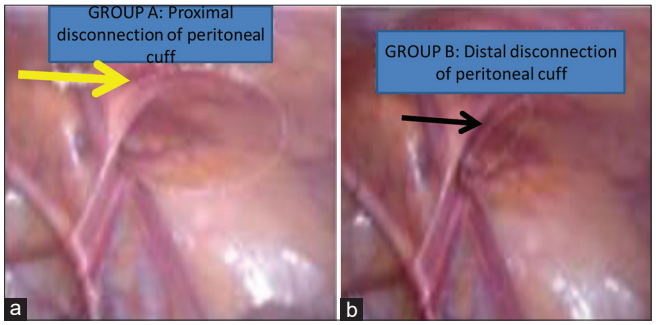


Figure 1: Intraoperative picture showing (a) disconnection of hernia sac from peritoneal cuff proximal to deep inguinal ring (yellow arrow) (b) disconnection of hernia sac from peritoneal cuff distal to deep inguinal ring (black arrow)

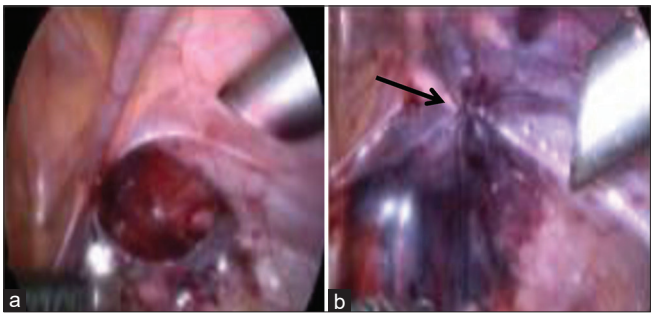


Figure 2: Intraoperative picture showing (a) raw area after disconnection of hernia sac from peritoneal cuff (b) suture closure of deep inguinal ring with absorbable suture (black arrow)

hernia was present in three patients in each group. During laparoscopy, contralateral inguinal hernia was noted in a total of five patients (5.26%) in both groups (two in group A and three in group B).

In Group A, sac was thick walled in 43 patients and thin in seven patients; the neck was wide in 25 and narrow in 25 patients; contents of hernia sac were fluid in 26 patients, bowel in 14 and no content in 10 patients. In Group B, sac was thick walled in 35 and thin walled in 10 patients; the neck was wide in 29 and narrow in 16 patients; the content of hernia sac was fluid in 25, bowel in seven and no content in 13 cases.

Post-operative pain was analysed using the Visual Analogue Scale (1 – mild pain, 2 –moderate pain, 3 – severe pain). Excess post-operative pain was observed in 33 patients in Group A with proximal disconnection of hernia sac whereas it was seen in only three patients in Group B with distal disconnection of sac. The *P* was 0.001 which was highly significant.

Duration of stay in hospital was more in Group A (2.36 ± 1.22 days) as compared to Group B (1.8 ± 0.66 days) with a *P* of 0.0076 which was significant. Hernia recurrence was seen in four out of 50 patients in Group A (8%) as compared to no recurrence in Group B. However, the difference was not significant.

Overall, there were good results with distal disconnection of peritoneal cuff in terms of post-operative pain, duration of hospital stay and hernia recurrence [Table 1].

Discussion

Historically, the approach to repair inguinal hernia has been an open technique. With the advent of minimal access surgery and small calibre laparoscopic instruments, laparoscopic inguinal hernia repair is slowly gaining popularity among paediatric surgeons. It was Felix Schier who first described a true laparoscopic approach to repair paediatric inguinal hernia in girl child.[3] However, the credit of introducing laparoscopic inguinal hernia repair as an alternative to conventional open approach goes to Montupet and Esposito.[10]

Initially, laparoscope was used to visualise opposite DIR to rule out contralateral inguinal hernia.[10-13] With the incidence of contralateral inguinal hernia ranging from 30% to 50% in some series, the evaluation of the contralateral side is considered important.[14] The conventional method to visualise the contralateral side used the technique of introducing angled scope through the ipsilateral patent DIR.[15] However, if the opposite ring was patent, it could be repaired only by open technique. With the increasing experience and expertise in laparoscopic surgeries, the use of laparoscopic approach in inguinal hernia repair serves many purposes. It helps in visualisation of contralateral DIR.[16] If found patent, it can be repaired simultaneously along with the ipsilateral side. There is cosmetically better scar, less operative time and early discharge with reduced hospital stay. The recurrence rate with laparoscopic inguinal hernia repair has been found to be similar as compared to the open approach.[17] The laparoscopic approach offers one more advantage of the virgin inguinal region to repair recurrent inguinal hernia in case recurrence occurs and vice versa, i.e., easy to operate recurrent hernia after an open approach.[18]

Various techniques of laparoscopic inguinal hernia repair have been described. These are broadly categorised into intra-corporeal and extracorporeal suture ligation of DIR.[19] Few studies have described only excision of hernia sac leaving behind a raw area that is supposed to heal by scarring and fibrosis causing closure of deep ring.[20,21] Yet, other studies have described only suture ligation of DIR without removal sac with good outcomes.[22] Some more studies have mentioned the technique of only thermal cauterisation of DIR which is expected to heal by fibrosis causing closure of deep ring.[23] However, the excision of sac followed by suture ligation of peritoneal cuff proximal or distal to DIR is widely practiced technique.[4,24]

In this retrospective observational study, we performed laparoscopic inguinal hernia repair by excision of sac followed by suture ligation of DIR with absorbable suture. In one Group (A), we performed disconnection of hernia sac proximal to DIR and in other Group (B), disconnection of hernia sac was done distal to DIR. We studied the outcomes in terms of post-operative pain, duration of hospital stay and recurrence with different levels of disconnection of hernia sac. In our study, we found that there was a high incidence of post-operative pain in the case of proximal disconnection of hernia sac whereas it was minimal with distal disconnection ($P = -0.001$). The probable reason for more pain in proximal disconnection may be high tension over suture line or tight closure.

The average duration of stay in the hospital was also more in the proximal disconnection group as compared to the distal disconnection group ($P = 0.0076$). The possible cause of this prolonged stay could be increased incidence of post-operative pain in Group A. There were overall four recurrences (8%) in Group A whereas it was absent in Group B. In the initial phase of the study, we were doing only proximal disconnection. All 50 patients in Group A were operated on during the initial phase of surgery. Due to little experience and learning curve as well as suturing under tension in cases of proximal disconnection, we can explain the recurrences in Group A. However, with experience, we did not see any recurrence in Group B, as we had sufficient experience and suture closure of distal disconnection was without tension.

Overall, there were good results with distal disconnection of peritoneal cuff in terms of post-operative pain, duration of hospital stay and hernia recurrence. However, the difference in recurrence is not significant. More studies with large sample size need to be done to achieve a significant difference between the two groups.

Conclusion

The disconnection of hernia sac distal to DIR is associated with less post-operative pain and shorter duration of hospital stay. There is less recurrence seen in distal disconnection of hernia sac as compared to proximal disconnection; however, to achieve the level of significance, a large cohort study is required.

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Conflicts of interest

There are no conflicts of interest.

References

1. Wang KS, Committee on Fetus and Newborn, American Academy of Pediatrics, Section on Surgery, American Academy of Pediatrics. Assessment and management of inguinal hernia in infants. Pediatrics 2012;130:768-73.
2. Schier F. Laparoscopic inguinal hernia repair-a prospective personal series of 542 children. J Pediatr Surg 2006;41:1081-4.
3. Schier F. Laparoscopic herniorrhaphy in girls. J Pediatr Surg 1998;33:1495-7.
4. Montupet P, Esposito C. Fifteen years experience in laparoscopic inguinal hernia repair in pediatric patients. Results and considerations on a debated procedure. Surg Endosc 2011;25:450-3.
5. Boo YJ, Han HJ, Ji WB, Lee JS. Laparoscopic hernia sac transection and intracorporeal ligation show very low recurrence rate in pediatric inguinal hernia. J Laparoendosc Adv Surg Tech A 2012;22:720-3.
6. Molina Vázquez ME, Sánchez Abuín A, Aguilar Cuesta R. Laparoscopic assisted percutaneous treatment of inguinal hernia in infants. Cir Pediatr 2012;25:4-8.
7. Guner YS, Emami CN, Chokshi NK, Wang K, Shin CE. Inversion herniotomy: A laparoscopic technique for female inguinal hernia repair. J Laparoendosc Adv Surg Tech A 2010;20:481-4.
8. Becmeur F, Philippe P, Lemandat-Schultz A, Moog R, Grandadam S, Lieber A, *et al*. A continuous series of 96 laparoscopic inguinal hernia repairs in children by a new technique. Surg Endosc 2004;18:1738-41.
9. Zallen G, Glick PL. Laparoscopic inversion and ligation inguinal hernia repair in girls. J Laparoendosc Adv Surg Tech A 2007;17:143-5.
10. Fuenfer MM, Pitts RM, Georgeson KE. Laparoscopic exploration of the contralateral groin in children: An improved technique. J Laparoendosc Surg 1996;6 Suppl 1:S1-4.
11. Grossmann PA, Wolf SA, Hopkins JW, Paradise NF. The efficacy of laparoscopic examination of the internal inguinal ring in children. J Pediatr Surg 1995;30:214-7.
12. Pellegrin K, Bensard DD, Karrer FM, Meagher DP Jr. Laparoscopic evaluation of contralateral patent processus vaginalis in children. Am J Surg 1996;172:602-5.
13. Rescorla FJ, West KW, Engum SA, Scherer LR 3rd, Grosfeld JL. The "other side" of pediatric hernias: The role of laparoscopy. Am Surg 1997;63:690-3.
14. Wolf SA, Hopkins JW. Laparoscopic incidence of contralateral patent processus vaginalis in boys with clinical unilateral inguinal hernias. J Pediatr Surg 1994;29:1118-20.
15. Zitsman JL. Transinguinal diagnostic laparoscopy in pediatric inguinal hernia. J Laparoendosc Surg 1996;6 Suppl 1:S15-20.
16. Bhatia AM, Gow KW, Heiss KF, Barr G, Wulkan ML. Is the use of laparoscopy to determine presence of contralateral patent processus vaginalis justified in children greater than 2 years of age? J Pediatr Surg 2004;39:778-81.
17. Schier F, Montupet P, Esposito C. Laparoscopic inguinal herniorrhaphy in children: A three-center experience with 933 repairs. J Pediatr Surg 2002;37:395-7.
18. Chan KL. Laparoscopic repair of recurrent childhood inguinal hernias after open herniotomy. Hernia 2007;11:37-40.
19. Ostlie DJ, Ponsky TA. Technical options of the laparoscopic pediatric inguinal hernia repair. J Laparoendosc Adv Surg Tech A 2014;24:194-8.
20. Blatnik JA, Harth KC, Krpata DM, Kelly KB, Schomisch SJ, Ponsky TA. Stitch versus scar – Evaluation of laparoscopic pediatric inguinal hernia repair: A pilot study in a rabbit model. J Laparoendosc Adv Surg Tech A 2012;22:848-51.
21. Riquelme M, Aranda A, Riquelme-Q M. Laparoscopic pediatric inguinal hernia repair: No ligation, just resection. J Laparoendosc Adv Surg Tech A 2010;20:77-80.
22. Lee DY, Baik YH, Kwak BS, Oh MG, Choi WY. A purse-string suture at the level of internal inguinal ring, taking only the peritoneum leaving the distal sac: Is it enough for inguinal hernia in pediatric patients? Hernia 2015;19:607-10.
23. Novotny NM, Puentes MC, Leopold R, Ortega M, Godoy-Lenz J. The burnia: Laparoscopic Sutureless inguinal hernia repair in girls. J Laparoendosc Adv Surg Tech A 2017;27:430-3.
24. Wheeler AA, Matz ST, Schmidt S, Pimpalwar A. Laparoscopic inguinal hernia repair in children with transperitoneal division of the hernia sac and proximal purse string closure of peritoneum: Our modified new approach. Eur J Pediatr Surg 2011;21:381-5.