Laparoscopic Extracorporeal Needle-Assisted Repair of Inguinal Hernia in Paediatrics: Our Experience in Prince Rashid Bin Al-Hassan Hospital

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ABSTRACT

Background: Inguinal hernia repair is the most common elective operation performed in the paediatric age group. Laparoscopic techniques are rising as an effective, simple and safe alternative to conventional open repair. Closure of the internal ring is the key step of laparoscopic inguinal hernia repair and can be performed by either intracorporeal or extracorporeal suturing.

Objective: To describe one of the modalities of laparoscopic surgery in paediatric inguinal hernia repair, the laparoscopic extracorporeal needle-assisted technique, and to evaluate the outcome of the procedure.

Method: A retrospective study on 54 patients who underwent laparoscopic extracorporeal needle-assisted inguinal hernia repair in Prince Rashid Bin Al-Hassan Hospital from October 2015 to October 2016 was performed. Multiple variables were studied including age, duration of operation, hospital stay, contralateral patent processus vaginalis (PPV), complication rate and post-surgery clinic follow-up.

Result: A total of 54 patients were included in the study, with age ranging from 1 to 13 years (mean: 4.3 years); 35 patients (64.8%) had unilateral hernia repair and 19 patients had bilateral repair (35.1%). The mean operative time was 12 minutes for unilateral hernias and 20 minutes for bilateral hernias. The mean hospital stay was 8 hours. Contralateral PPV was detected in 14% of patients. The overall complication rate was 5.5%. Complications were minor and included recurrence, transient hydrocele and stitch sinus.

Conclusion: Extracorporeal needle-assisted laparoscopic inguinal hernia repair is a safe and simple option for inguinal hernia repair in paediatrics. It has both lower short-term and long-term complication rates. However, hospital stay is the same when compared to open repair, and its cost is higher.

Keywords: Paediatric Inguinal Hernia, Laparoscopic Hernia Repair, Extracorporeal Knot.

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INTRODUCTION

The overall incidence of inguinal hernia in children is about 0.8–4.4%, with a higher incidence rate in premature babies of up to 30% [3]. Incarceration of inguinal hernias in paediatric patients with subsequent strangulation carries a high morbidity rate, particularly in the first year of life [4]. Therefore, repair of an inguinal hernia is indicated as soon as possible.

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Open herniotomy is the most popular procedure worldwide. It is well-practised by almost all paediatric surgeons as a safe and simple day case surgery. However, injury of the vas deferens and spermatic vessels is a well-recognized complication. Testicular ischaemia can result from excessive manipulation in large inguinal hernias[5].

An inguinal hernia will not resolve spontaneously, so surgical intervention is always indicated. Elective herniotomy is indicated to prevent incarceration and subsequent strangulation. Hernia repair is an outpatient procedure in the otherwise healthy, full-term infant or child.

Laparoscopic repair of inguinal hernias has been fairly commonplace in adults for a number of years [1]. Montupet and Esposito reported the first successful use of laparoscopic hernia repair in boys. A laparoscopically placed purse-string stitch was placed around the neck of the sac. Care was taken to deliberately exclude the vas deferens and spermatic vessels (Figure A). Laparoscopic techniques are gaining more popularity in paediatric inguinal hernia repair. The proposed advantages of the laparoscopic approach include visualization of a contralateral patent processus vaginalis (PPV); identification of other less common types of abdominal wall hernias, including direct, femoral and pantaloon hernias; diminished postoperative pain; more rapid return to normal function; and improved cosmesis. Most studies of inguinal hernia repair published in the last 20 years have focused on the laparoscopic approach and its diverse techniques. Laparoscopic inguinal hernia repair (LIHR) options can be categorized as either intracorporeal or extracorporeal/percutaneous based on the suturing technique of the internal inguinal ring. [2]

Our study demonstrates the extracorporeal needle-assisted laparoscopic approach is a simple and efficient procedure with excellent outcomes.

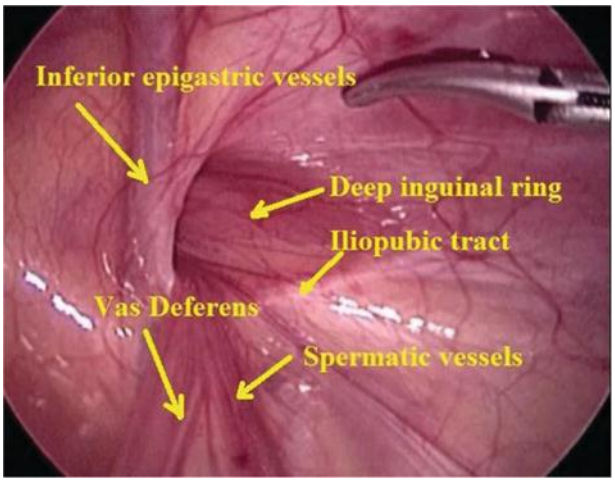


Figure A.

METHODS

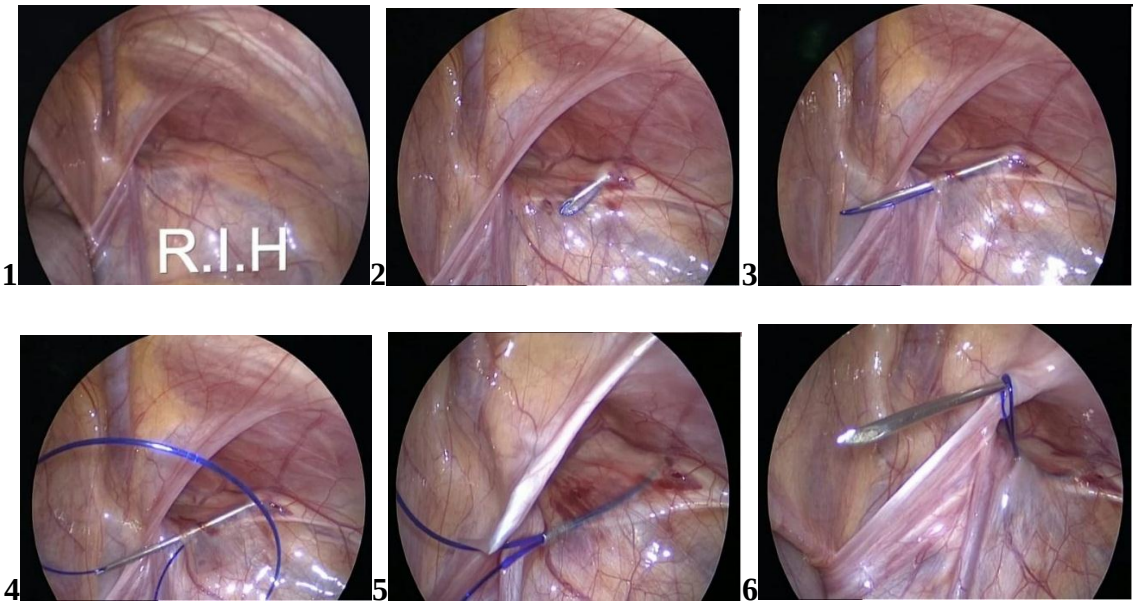
We have performed a retrospective study on 54 patients who underwent laparoscopic extracorporeal needle-assisted inguinal hernia repair in Prince Rashid Bin Al-Hassan Hospital from October 2015 to October 2016.

The medical records were reviewed, and the relevant data wanalyzed. Multiple variables were studied including age, duration of operation, hospital stay, presence of contralateral PPV, complication rate and post-surgery clinic follow-up. All patients were followed up for 6 months in the outpatient clinic. The first clinic visit was at 2 weeks postoperatively. Patients with incomplete medical records were excluded from the study.

Procedure

The procedure was performed in paediatric patients under general anaesthesia and endotracheal intubation. The patient was placed in the 20° Trendelenburg position. After prepping and draping, a urinary catheter was inserted to decompress the bladder. A small supraumbilical stab incision was created, through which a Veress needle was introduced to establish CO_2 pneumoperitoneum in the closed technique. A 5-mm trocar was inserted, through which a 5-mm scope with a 0º lens was used to visualize the internal inguinal ring and vital structures, confirm the presence of a PPV and exclude the presence of occult contralateral hernia.

The internal inguinal ring was localized, and the hernia contents were reduced back to the abdomen (Figure 1). A 22 G spinal needle preloaded with a 2-0 Prolene suture was inserted percutaneously under direct laparoscopic vision (Figure 2). Both ends of the suture should be maintained extraperitoneally. The needle was then advanced into the peritoneum around the lateral half of the internal ring (Figure 3). The suture was advanced into the peritoneal cavity, creating a loop (Figure 4). The needle was then removed, leaving the loop in place. Through the same skin puncture, the needle was advanced again around the medial half of the internal ring while avoiding injury to the vas deferens and spermatic vessels (Figures 5 and 6). Another 2-0 Prolene suture was applied into the hollow of the needle and advanced into the previously created loop (Figure 7). The needle was then withdrawn gradually, and the suture end was caught up in the loop. The loop was withdrawn along with the suture end extracorporeally, obliterating the internal ring (Figure 8). The knot was made subcutaneously extracorporeally. The contralateral side was assessed for an occult PPV (Figure 9)



Figures 1 through 8: The technique of laparoscopic needle-assisted extracorporeal repair of a right-sided inguinal hernia repair; Figure 9: An asymptomatic left-sided patent processus vaginalis (PPV).

RESULTS

The total number of children included in the study was 54. The ages of the patients ranged from 1 to 13 years, with a mean age of 4.3 years; 35 patients (64.8%) had a preoperative diagnosis of unilateral hernia, 21 hernias were right-sided (38.8%) and 14 hernia were left-sided (25.9%). Nineteen patients had bilateral hernias (35.1%). Five patients of the 35 presumed to have unilateral hernias preoperatively were found to have an occult contralateral PPV intraoperative. the duration of the operation for unilateral inguinal hernia repair ranged from 10 minutes to 15 minutes, with a mean duration of 12 minutes. For bilateral hernia repair, the mean duration was 20 minutes. The mean hospital stay was 8 hours. All patients were followed up for 6 months in the outpatient clinic. The first clinic visit was at 2

weeks postoperatively. The postoperative pain was minimal, . All patients received subcutaneous Marcaine (Bupivacaine hydrochloride) and paracetamol 250 Mg suppository at induction of anaesthesia ,and discharged on simple pain killer Recurrence was reported in one patient who had underwent bilateral hernia repair and had recurrence on the right side. One patient had a postoperative hydrocele that self-resolved within 1 month. One patient developed a stitch sinus. Fortunately, no cases of wound infection were reported.The cosmetic outcome is excellent with a small wound hidden in the supraumblical skin fold,Using single port laparoscopic surgery in the treatment of inguinal hernia lead to reduced cost of treatment due to less hospital stay ,morbidity and mortility . The overall complication rate was 5.5%.

DISCUSSION

Since the introduction of laparoscopic techniques to the field of inguinal hernia surgery in the early 1990s, it has been gaining more popularity as a safe and effective option[6]. Recently, more surgeons have adopted the laparoscopic technique as their favourite modality of treatment for inguinal hernias. More evidence is supporting its use and suggesting better outcomes [7]. The key step in laparoscopic inguinal hernia repair in paediatrics is ligation of the PPV at the deep inguinal ring. This step can be achieved by either intracorporeal or extracorporeal suturing [9,10]. Intracorporeal suturing is relatively difficult to perform, especially by unexperienced surgeons, and may carry a risk of injury to the vas deferens, spermatic vessels or visceral organs. Extracorporeal suturing is easier to perform, even by junior surgeons. Many authors encourage its use as a safe and efficient alternative [1,2,8,9]. Our study demonstrates one of the modalities of extracorporeal laparoscopic inguinal hernia repair. In laparoscopic needle-assisted repair (LNAR), the internal inguinal ring is ligated using a suture introduced through a needle and tied subcutaneously extracorporeally.

The most important advantage of LNAR is the exceedingly rare incidence of injury to the vas deferens and spermatic vessels owing to their direct visualization. Another advantage is the ability to detect and treat an occult potential contralateral hernia or PPV. The reported rates of occult PPVs in the literature are 23-37% [8]. In our study, out of the 35 patients who were diagnosed preoperatively with unilateral inguinal hernia, only five were found to have asymptomatic contralateral PPVs. These patients were treated in the same surgery. The relatively low incidence rate of contralateral PPV (14%) can be explained by having an older age group in our sample population, which does not include neonates or preterm babies. The need to repair an asymptomatic contralateral PPV is controversial. Some authors do not recommend closing an asymptomatic contralateral PPV due to the low incidence of clinically detectable metachronous inguinal hernias (9). However, in our study, we repaired all asymptomatic PPVs detected intraoperatively.

The operative time in our study ranged from 10 to 15 minutes for unilateral hernias. The mean operative duration was 12 minutes for unilateral hernias and 20 minutes for bilateral hernias. The operative time varied according to the experience of the operating surgeon. Operative time for unilateral LNAR repair reported by other series ranged from 17 to 20 minutes for unilateral hernias and 20 to 26 minutes for bilateral hernias.[10,11]

The length of hospital stay was the same for open and laparoscopic inguinal hernia repair as both of them are day-case surgeries. The incision needed in LNAR is much smaller when compared to open repair [5]. Postoperative pain and the need for analgesia was significantly less in LNAR as compared to open repair. Parents or caregivers satisfaction was high in LNAR which is consistent with the results of other studies.[13,14]

We have reported one case of hernia recurrence after LNAR (1.8%). The reported recurrence rate by other studies ranged from 1% to 4.4%[9,15]. One patient developed postoperative hydrocele, which was self-limiting within 4 weeks. The reported incidence of hydrocele after laparoscopic repair is generally up to 4%. No port site wound complications were recognized, as the technique depends on a single port. However, one case of stitch abscess was documented and was treated by simple incision and drainage.

As inguinal hernia surgery is quite common and every paediatric surgery list includes several patients with this condition, the use of the laparoscopic equipment is limited due to sterilization issues. The costs of laparoscopic techniques in general are still relatively high in our country.

CONCLUSION

We conclude that extracorporeal LNAR is a simple, safe and effective modality of treating inguinal hernias in paediatric patients. The postoperative pain is minimal and cosmetic outcomes are excellent. The technique is safe and easy to learn by junior surgeons. The hospital stay is the same as open repair. The routine use of the technique is limited by the cost of the laparoscopic equipment.

REFERENCES

1. Coran AG, Caldamone A, Adzik NS, Krummel TM, Laberge JM, Shamberger R, editors. Pediatric surgery. 7th ed. Amsterdam: Elsevier; 2012.
2. Holcomb GW III, Murphy JP, St. Peter GW. Holcomb and Ashcraft's pediatric surgery. 7th ed. Amsterdam: Elsevier; 2019.

3. Warner BW. Pediatric surgery. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston textbook of surgery. Philadelphia: Elsevier; 2004. p. 2117-9.
4. Ozgediz D, Roayaie K, Lee H, Nobuhara KK, Farmer DL, Bratton B, *et al.* Subcutaneous endoscopically assisted ligation (SEAL) of the internal ring for repair of inguinal hernias in children: report of a new technique and early results. Surg Endosc. 2007 Aug;21(8):1327-31.
5. Stylianos S, Jacir NN, Harris BH. Incarceration of inguinal hernia in infants prior to elective repair. J Pediatr Surg. 1993 Apr;28(4):582-3.
6. Harrison MR, Lee H, Albanese CT, Farmer DL. Subcutaneous endoscopically assisted ligation (SEAL) of the internal ring for repair of inguinal hernias in children: a novel technique. J Pediatr Surg. 2005 Jul;40(7):1177-80.
7. Korkmaz M, Güvenç BH. Comparison of single-port percutaneous extraperitoneal repair and three-port mini-laparoscopic repair for pediatric inguinal hernia. J Laparoendosc Adv Surg Tech A. 2018 Mar;28(3):337-42.
8. Zallen G, Glick PL. Laparoscopic inversion and ligation inguinal hernia repair in girls. J Laparoendosc Adv Surg Tech A. 2007 Feb;17(1):143-5.
9. Geiger S, Bobylev A, Schädelin S, Mayr J, Holland-Cunz S, Zimmermann P. Single-center, retrospective study of the outcome of laparoscopic inguinal herniorrhaphy in children. Medicine (Baltimore). 2017 Dec;96(52):e9486.
10. Shalaby R, Ismail M, Dorgham A, Hefny K, Alsaied G, Gabr K, *et al.* Laparoscopic hernia repair in infancy and childhood: evaluation of 2 different techniques. J Pediatr Surg. 2010 Nov;45(11):2210-6.
11. McClain L, Streck C, Lesher A, Cina R, Hebra A. Laparoscopic needle-assisted inguinal hernia repair in 495 children. Surg Endosc. 2015 Apr;29(4):781-6.
12. Hannan MJ, Hoque MM. Needle-assisted laparoscopic inguinal hernia repair in children: experience in Chittagong, Bangladesh. Bangladesh J Endosurg. 2013 May;1(2):7-10.
13. Gause CD, Casamassima MGS, Yang J, Hsiung G, Rhee D, Salazar JH, *et al.* Laparoscopic versus open inguinal hernia repair in children ≤3: a randomized controlled trial. Pediatr Surg Int. 2017 Mar;33(3):367-76.
14. Hasanein A, Rabea M, Fathi M, El Sayed A. Laparoscopic purse-string suture sac closure is appropriate procedure for children with unilateral indirect inguinal hernia: comparative study versus laparoscopic sac excision and closure procedure. Egypt J Surg. 2017 Oct-Dec;36(4):394-7.
15. Bharathi RS, Arora M, Baskaran V. Pediatric inguinal hernia: laparoscopic versus open surgery. JSLS. 2008 Jul-Sep;12(3):277-80.