



LAPAROSCOPIC GUIDED NEEDLE ASSISTED CONGENITAL HERNIA REPAIR:TECHNIQUE AND OUTCOME

General Surgery

Dr. Dinesh Prasad

MS, FMAS, FIAGES, FICS, FICP Additional professor, SMIMER, Surat. Department of General Surgery, SMIMER, Surat, Gujarat, India.

Dr. Savan jivani*

Second Year Resident, Department of General Surgery, SMIMER, Surat, Gujarat, India
*Corresponding Author

ABSTRACT

Our method for inguinal hernia repair using laparoscopic techniques has comparable outcomes to the standard open technique. Hernia repair is accomplished with a Laparoscopic single-port needle-assisted congenital hernia repair. After identification of a patent processus vaginalis, the internal ring is encircled in an extraperitoneal plane using a 18G-Touhy needle for placement of a encircling suture, tied extracorporeally, and buried beneath the skin. The technique was standardized for all cases. On six months to twelve months follow up no Recurrence was recorded till submission of this manuscript for 30 cases of Laparoscopic single-port needle-assisted congenital hernia repair. Furthermore, laparoscopy objectively identifies asymptomatic or occult contralateral defect, uses a smaller incision, and eliminates dissection of the cord structures potentially reducing the risk of cord injury.

KEYWORDS

BACKGROUND

Congenital inguinal hernia and hydrocele repair is a common paediatric surgical procedure that was documented since 1871 by Marcy describing the high ligation of the hernia sac that forms the basis of paediatric hernia repair to date. Conventional description of open inguinal hernia repair in children requires that, the external inguinal ring should be incised; the processus vaginalis or hernia sac be dissected, twisted and doubly ligated.

Laparoscopic repair of inguinal hernias in paediatric patients was first described in 1997 by El-Gohary. Initially this operation was performed only in female patients because the safety of the vas and vessels are of concern in males. Montepuot and Esposito were the first to use laparoscopy in the repair of inguinal hernias in male children using an intracorporeal purse-string suture to close the inguinal ring, while Schier described intracorporeal Z-suture closure first in girls only (1998) and then in boys (2000).

In groin hernia repair, recurrence is the most important aspect of the complications. Factors attributed to complications and recurrences vary. In 1994, Wright in his analysis of thirteen recurrences over a 16-year period attributed technical errors and infections to play a role.[16] In addition, Grosfeld and others elaborated factors contributing to recurrences in congenital inguinal hernia repair to include postoperative wound infection, haematoma, injury to the floor of the inguinal canal and usage of inappropriate suture materials.[17]

With increasing interest in laparoscopic inguinal hernia repair, several treatment techniques have developed over the past two decades, aimed at improving the outcome. The various techniques differ in their approach to the inguinal internal ring, suturing and knotting techniques, number of ports used in the procedure, endoscopic instruments used, mode of dissection of the hernia sac, and gender of the patient as well. The emerging technique show a tendency for extracorporeal suturing and knotting technique and diminished use of endoscopic ports and instruments. Laparoscopic inguinal hernia repair has an established role in the management of this condition in children in trained hands. Indeed, it is fast becoming the gold standard for the treatment of inguinal hernia in children. The laparoscopic technique has the advantage that it is simple, feasible, and safe. Also, the contralateral internal inguinal ring and other hernia sites such as femoral, obturator, or internal hernia can be diagnosed and treated at same sitting and other occult pathologies may be diagnosed. The risk of injury to the vas deferens and cord structures in this procedure is lesser when compared to the conventional open technique. The general advantages of laparoscopic technique such as cosmesis, low wound infection, less pain, and short hospital stay, all apply here.¹⁹

Laparoscopic Techniques With increasing interest, there has been a proliferation of various techniques in the laparoscopic repair of

inguinal hernia in children. This proliferation has been orchestrated by refinements in methods of ligation of the patent processus vaginalis at the internal inguinal ring in order to improve results and the outcome of treatment. The various techniques are: extracorporeal or intracorporeal suturing and knotting, three- or single-port procedure, sac inversion and ligation technique in girls, flip-flap technique, and use of tissue adhesives.

Extracorporeal suturing and knotting technique: The review shows that extracorporeal technique is currently being adopted by many paediatric surgeons. The two-port technique using nonabsorbable suture material is employed. The trend is shifting toward this technique because it is simple, safe, feasible, and reproducible. This method particularly has low recurrence rates (0–2.0%), and more importantly, knotting does not require any special skill because it is done externally in the subcutaneous tissue in the conventional manner.¹⁹

Intracorporeal suturing and knotting technique: This was the initial method adopted at the inception of laparoscopic inguinal hernia repair in children. The technique employs three ports and uses nonabsorbable suture materials. In this method, intraperitoneal knotting is performed to close the internal inguinal ring. The closure is achieved by applying a suturing in purse-string fashion and knotting tight the internal inguinal ring. Sometimes interrupted suturing is done to close the ring. This method has a high recurrence rate (0–5.7%) and is not as simple and easy as the extracorporeal technique. Here, good intracorporeal laparoscopic knotting skill is required.¹⁹

Three-port or single-port technique: The pioneer procedures for inguinal hernia repair in children by laparoscopy used the three-port method. Recently, with refinements in technology, the single procedure is currently attracting attention. In their experience with modified single-port laparoscopic procedures in children, Rothenberg et al. found very encouraging outcome.²⁰ This report corroborates with a study by Chang on technical refinements single-port laparoscopic surgery of inguinal hernia in infants and children.²¹ In a comparison study by Bharathi et al., single-port technique was preferred to the three port due to better outcome.²²

Now time has come to introduce simple, safe, and efficacious for paediatric inguinal hernia repair. A new and innovative technique for repair of inguinal hernia in young children using a total laparoscopic approach has been described. The technique is described as laparoscopic needle-assisted repair.

AIMS AND OBJECTIVES:

1. Describe technical details
2. Evaluation of outcome in terms of:-

I. Mean operative time

- II. Post operative pain score
- III. Recurrence
- IV. Local complication and
- V. Cosmetic results.

METHODOLOGY

We have done this study at SMIMER HOSPITAL SURAT from November 2018 to July 2019, during this period of time 30 cases of reducible Congenital hernia were included in the study and evaluated for outcomes on follow up for 6 months to 12 months. The patients were assessed at 24 hours, 7 day, 6 month and 12 months.

INCLUSION CRITERIA

1. All the patients with reducible congenital hernia between age 1 to 16 years

EXCLUSION CRITERIA

1. Irreducible congenital hernia
2. Congenital hernia with hydrocele
3. Congenital hernia with undescended testis
4. Patient unfit for general anaesthesia.

PRE OPERATIVE ASSESMENT

Patients were admitted on the evening before surgery after they were screened for associated problems, such as irreducibility of hernia, associated hydrocele undescended testis. Patients were kept fasting for 4 hours before surgery. No pre medications were administered. Informed consent was obtained from the parents of all the patients.

ANESTHESIA

All operations for CIH were performed with the patient under general anaesthesia (GA).

MATERIALS AND METHODS

Patients were admitted in the evening before surgery and discharged within 24 hours following surgery. Thirty children underwent laparoscopic inguinal hernia repair. The patients were placed in a supine position. An umbilical 5 mm incision was made after creating pneumoperitoneum with Verres needle. Pneumoperitoneum was established and maintained at 8-10 mmHg. A 5-mm/4 mm scope was then placed at the umbilicus through 5.5/4.5 mm trocar. Both groin areas were examined to confirm diagnosis. Laparoscopic ring closure (LRC) was done with Proline 2-0 suture. Technical steps included formation of loop inside needle before insertion. Sutures were taken directly through the anterior abdominal wall just above and lateral to deep inguinal ring. The needle is inserted vertically through abdominal wall layers up to extraperitoneal space where the needle tip is visible through intact peritoneum. Gradually needle is moved medially in extraperitoneal space under vision (needle tip visible through the peritoneum). The needle is advanced under peritoneum and testicular vessels till vas deferens, where we puncture the peritoneum lateral to vas deferens and advanced the proline loop inside the needle into peritoneal cavity. The needle withdrawn leaving the loop inside peritoneal cavity. Now, the same needle is passed through previous needle puncture site into extraperitoneal space medially superomedial to deep inguinal ring. The needle is advanced medial to deep inguinal ring avoiding injury to inferior epigastric and vas deferens up to the previous peritoneal puncture site, where needle is pushed into the previously placed proline loop. Separate proline 2-0 suture is passed through the needle to emerge inside peritoneal cavity through the previously placed proline loop which is used to pull the one end of the thread outside abdomen. Now as we have encircled the hernial sac at the deep inguinal ring. We tie the thread at skin puncture site and bury the knot inside sub cutaneous tissue. Hereby, we achieve hernial sac ligation and fixation with anterior abdominal wall without exposing suture material inside peritoneal cavity.



INSTRUMENTS (UPWARDS TO DOWNWARDS)

1. Proline 2-0
2. 18G-Touhy needle

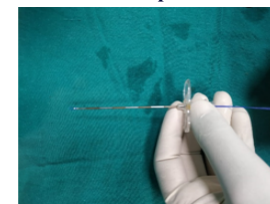
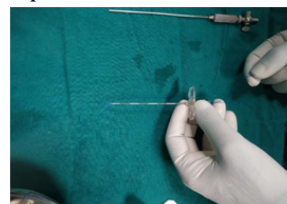
3. Verres needle
4. 5 mm Laparoscopic Trocar
5. 5 mm Laparoscopic camera

FORMATION OF PROLINE LOOP



Step 1

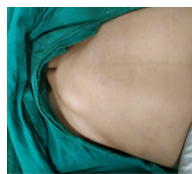
Step 2



Step 3

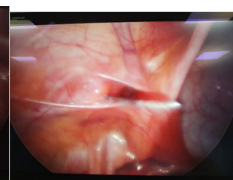
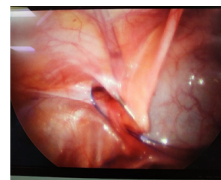
Step 4

PRE OPERATIVE, INTRA OPERATIVE, POST OPERATIVE IMAGES

Left inguinal hernia
(after pneumoperitoneum)

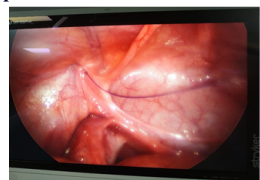
Deep inguinal ring

LAPROSCOPIC GUIDED NEEDLE ASSISTED CONGENITAL HERNIA REPAIR



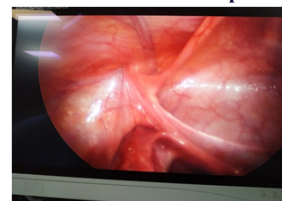
Step 1

Step 2

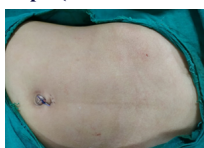


Step 3

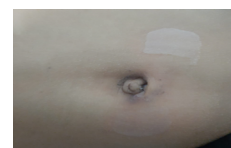
Step 4



Step 5 (Obliteration of Internal ring)



At Completion of surgery

At the end of 7 day (after
stitch removal)

RESULTS

30 patients who underwent laparoscopic guided needle assisted hernia repair Surgery, among them 18 patients were male and 12 patients were female, 8 patients have bilateral hernia. There were no major complication during surgery. All patients have tolerated feed after 6 hours. Postoperative scrotal edema was minimal even in cases with large hernias. During follow-up visits, there was no case of testicular atrophy, testicular ascent, or hydrocele. 5-mm port sites healed with no or minimal scar hidden in umbilicus, making the procedure apparently scar less. Nil recurrence was recorded till period of 12 month follow up.

1	Mean operative time	22 minutes
2	Intra and post operative complication	Nil
3	Mean pain score	4
4	Contralateral occult hernia	6
5	Mean length of Hospital stay	1 day
6	Mean scar size	4.5mm
7	Recurrence	Nil
8	Cosmetic aspect	No scar visible
9	Follow up	6-12 Months

DISCUSSION

In children, the standard surgical treatment of inguinal hernia is limited to ligation of the hernia sac. Internal ring is normally reached by dissecting the hernia sac from the cord structures, which bears potential risk of injuring the spermatic vessels and the vas deferens, hematoma formation, wound infection, iatrogenic testicular ascent, testicular atrophy, and recurrence of the hernia. It also carries potential risk of damaging the tubes and ovaries which may lead to infertility. Laparoscopic repair of hernia in children has emerged recently as an alternative method of treatment and is rapidly gaining popularity with more and more authors endorsing its feasibility, efficacy, and safety. Advantages of laparoscopic repair include excellent visual exposure, ready evaluation of the contralateral side, minimum dissection and avoidance of injury to vas and vessels and iatrogenic ascent of the testis, and decreased operating time especially in obese child and in recurrent cases. In the open hernia repair, initial time is spent in gaining access to the internal ring by localizing and dissecting the sac from the cord structures. Whereas, in laparoscopy internal ring is visualized directly from within the abdomen which makes the area of dissection bloodless, and magnification renders anatomy very clear, making surgery precise. In addition, the incidence of testicular atrophy is rare in laparoscopic hernia repair because of the multiple collaterals of the testis which are not disturbed. Different laparoscopic techniques of inguinal hernia repair in children have been described, among them Laparoscopic guided needle assisted congenital hernia repair has good results and nil recurrence reported till date. Laparoscopic hernia repair by Touhy's needle resulted in a marked reduction of operative time and excellent cosmetic results with low recurrence rate. Common features of all the laparoscopic repairs are ligation of the internal ring by an encircling suture. On these footings, we devised an innovative technique of encircling the internal ring by a 18G Touhy needle which is readily available. This method does not need any special needle or hook and can be performed by a surgeon with basic laparoscopic skill without knowledge of intracorporeal knotting techniques. We believe that complete encirclement of the ring, emptying the sac, and reducing the abdominal pressure before tying may help in reducing hydrocele formation and recurrence of hernia. We have not encountered any hydrocele during the 6month to 1 year follow-up. Due to learning period, we took longer time at the beginning but it is significantly reduced at present (from 35 to 18 min). Contralateral exploration for patent processes vaginalis (PPV) remained a controversial topic. But during laparoscopy, it becomes obvious automatically. Some authors suggest that PPVs less than 2 mm may be left alone, but other had routinely ligated it to avoid development of metachronous hernia. In our series, contralateral hernias were detected in six cases by laparoscopy and were repaired at the same time.

TABLE-1 COMPARISON BETWEEN EXTRACORPOREAL AND INTRACORPOREAL TECHNIQUES¹⁹

TECHNIQUE	NO.OF PORTS	SUTURES	DURATION (MIN)	RECURRENCE	REMARKS
EXTRACORPOREAL	1 or 2	NONABSORBABLE	23.8-40.2 UNILATERAL 40.2 BILATERAL	NIL	DOES NOT REQUIRE LAPAROSCOPIC SUTURING SKILLS

ITRACORPOREAL	3 or	NONABSORBABLE	48.5+4 UNILATERAL 61.0+13.8BILATERAL	NIL	REQUIRES GOOD LAPAROSCOPIC SUTURING SKILLS
---------------	------	---------------	--	-----	--

IN OUR STUDY

SINGLE PORT LAPAROSCOPIC GUIDED NEEDLE ASSISTED CONGENITAL HERNIA REPAIR

TECHNIQUE	NO.OF PORTS	SUTURES	DURATION (MIN)	RECURRENT	REMARKS
EXTRACORPOREAL	1	DELAYED ABSORBABLE	22	NIL	DOES NOT REQUIRE LAPAROSCOPIC SUTURING SKILLS

TABLE 2 COMPARISON BETWEEN SINGLE AND THREE PORT¹⁹

PORT	SAMPLE SIZE	COSMETIC OUTCOME	OPERATION TIME (MIN)	RECURRENT RATE	LIMITATION
THREE	51	GOOD	15-25	2.9%, p=0.49	Suturing and knotting
SINGLE	112	BETTER	25-40	4.8%, p=0.49	Wide ring >10mm

IN OUR STUDY

SINGLE PORT LAPAROSCOPIC GUIDED NEEDLE ASSISTED CONGENITAL HERNIA REPAIR

PORT	SAMPLE SIZE	COSMETIC OUTCOME	RECURRENT RATE	LIMITATION
SINGLE	30	BEST	NIL	NIL

CONCLUSION

We conclude that our technique is simple, safe, and efficacious for paediatric inguinal hernia repair. It does not need any special equipment and the procedure can be performed by surgeons with basic laparoscopic skill as it does not require intra corporeal knotting.

REFERENCES

- Shchebenkov MV. The advantages of laparoscopic inguinal herniorrhaphy in children. Vestn Khir Im I Grek. 1997;156(1):94–96 [PubMed] [Google Scholar]
- Schier F. Direct inguinal hernia in children: the laparoscopic aspect. J Pediatr Surg. 2000;16:562–564 [PubMed] [Google Scholar]
- Esposito C, Montupet P. Laparoscopic treatment of recurrent inguinal hernia in children. Pediatr Surg Int. 1998;14(3):182–184 [PubMed] [Google Scholar]
- Palanivelu C. Laparoscopic pediatric hernia repair. In: Operative Manual of Laparoscopic Hernia Surgery. Coimbatore, IN: Gem Foundation; 2004;195–205 [Google Scholar]
- Schier F. Laparoscopic surgery of inguinal hernias in children—initial experience. J Pediatr Surg. 2000;35(9):1331–1335 [PubMed] [Google Scholar]
- Ger R. The management of certain abdominal herniae by intraabdominal closure of the neck of the sac. Ann R Coll Surg Engl. 1982;64:342–344 [PMC free article] [PubMed] [Google Scholar]
- Ger R, Monroe K, Duvicier R, et al. Management of indirect inguinal hernias by laparoscopic closure of the neck of the sac. Am J Surg. 1990;159:370–373 [PubMed] [Google Scholar]
- Schier F, Montupet P, Esposito C. Laparoscopic inguinal herniorrhaphy in children: a three-center experience with 933 repairs. J Pediatr Surg. 2002;37:395–397 [PubMed] [Google Scholar]
- Montupet P, Esposito C. Laparoscopic treatment of congenital inguinal hernia in children. J Pediatr Surg. 1999;34:420–423 [PubMed] [Google Scholar]
- Arregui ME, Navarrete J, Davis CJ, et al. Laparoscopic inguinal herniorrhaphy—Techniques and controversies. Surg Clin North Am. 1993;73(3):513–527 [PubMed] [Google Scholar]
- Dion YM, Morin J. Laparoscopic inguinal ring closure. Can J Surg. 1992;35:209–212 [PubMed] [Google Scholar]
- Spaw AT, Ennis BW, Spaw LP. Laparoscopic hernia repair: The anatomical basis. J Laparosc Surg. 1991;1:269–277 [PubMed] [Google Scholar]
- Gazayerli MM. Anatomical laparoscopic hernia repair of direct of indirect inguinal hernias using the transversalis fascia and iliopubic tract. Surg Laparosc Endosc. 1992;2(1):49–52 [PubMed] [Google Scholar]
- Nyhus LM. The preperitoneal approach and iliopubic tract repair of inguinal hernia. In: Nyhus LM, Condon RE, editors. (eds). Hernia. Philadelphia, PA: JB Lippincott; 1989;154–188 [Google Scholar]
- Miltenburg DM, Nuchtern JG, Jaksic T, Kozinetz C, Brandt ML. Laparoscopic evaluation of the pediatric inguinal hernia—A meta-analysis. J Pediatr Surg. 1998;33(6):874–879 Vol. 9, No. 34 [PubMed] [Google Scholar]
- Wright JE. Recurrent inguinal hernia in infancy and childhood. Pediatr Surg Int. 1994;9:164–6. [Google Scholar]
- Grosfeld JL, Minnick K, Shedd F, West KW, Rescorla FJ, Vane DW. Inguinal hernia in children: Factors affecting recurrence in 62 cases. J Pediatr Surg. 1991;26:283–7. [PubMed] [Google Scholar]

18. Miltenburg DM, Nuchtern JG, Jaksic T, et al. Laparoscopic evaluation of the pediatric inguinal hernia--a meta-analysis. *J Pediatr Surg*. 1998 Jun. 33(6):874-9. [Medline].
19. Surgical techniques of laparoscopic inguinal hernia repair in childhood: A critical appraisal. *Christophers Lukong*.
20. Rothenberg SS, Shipman K, Yoder S. Experience with modified single port laparoscopic procedures in children. *J Laparoendosc Adv Surg Tech A* 2009;19:695-8.
21. Chang YT. Technical refinements in single port laparoscopic surgery of inguinal hernia in infants and children. *Diag Ther Endosc* 2010; 2010:392847.
22. Bharathi RS, Dabas AK, Arora M, Baskaran V. Laparoscopic ligation of internal ring--three port versus single port technique.