

Comparison of Laparoscopic Needle Assisted Repair (LNAR) versus conventional repair of Pediatric Inguinal Hernia: - A Randomized controlled study of 60 cases

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I. Introduction

Pediatric inguinal hernia which caused by patent processus vaginalis is a common problem in children. The reported incidence of inguinal hernia in infant and children ranges from 1 to 5%. The incidence of an inguinal hernia in children less than 18 years of age ranges from 0.8% to 4.4%¹. Sixty percent of hernias occur on the right side of the body. Inguinal hernias are much more common in male individuals than in female individuals. The male-to-female ratio is estimated to be 4 to 8:1. It is generally present with an obvious bulge at the internal or external ring or within the scrotum². All pediatric inguinal hernias require operative treatment to prevent the development of complications, such as inguinal hernia incarceration or strangulation³. Advantages of laparoscopic repair include excellent visual exposure, evaluation of contralateral side with minimum dissection and avoidance of injury to vas and vessels and decrease operating time especially in obese child and in recurrent cases⁴. In the open hernia repair, initial time is spent in gaining access to 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 which makes surgery precise⁵. Various method of Laparoscopic repair has been described. Basic principle is close the internal inguinal ring either by intracorporeal or by extracorporeal suturing. In the present study we have describe a new technique for laparoscopic hernia repair with spinal needle in ligation of internal ring .The technique mentioned is reported with good outcomes in recent days⁶.

Therefore, this prospective randomized controlled study was conducted to compare the laparoscopic needle assisted hernia repair (LNAR) with conventional hernia repair in pediatric age group as regards to the following Operative time, Hospital stay ,Postoperative hydrocele formation ,Recurrence rate,Iatrogenic ascent of the testis,Testicular atrophy ,Cosmetic results.The present need is to know whether a significant difference exists in the surgical outcomes following either technique.

II. Method

This study was conducted in a tertiary care, teaching hospital from may 2017 to May 2019 with the approval of the hospital ethics committee. This was prospective randomized comparative interventional study. Patient aged from 1 year to 13 year with inguinal hernia were included for the study. Protocols for pre- and postoperative care were predetermined to ensure uniformity.

Preoperative Assessment

Patients were admitted the evening before surgery after they were screened for associated problems, such as undescended testis. Patients were kept fasting for 4 hours before surgery. No premedications were administered. Informed consent was obtained from the parents of all the patients. Consent for operation for bilateral site was taken in cases where we have found contralateral site hernia intraoperatively.

Anesthesia-

All operations for congenital inguinal hernia were performed with general anesthesia

Surgical Technique :- (LNAR)

Access was obtained through the umbilicus by inserting a 5 mm trocar (telescope) and 3 mm trocar at lateral border of the rectus abdominis muscle below umbilicus for maryland forcep insertion . Site of the internal inguinal ring closure was determined by finger pressure on abdominal wall at site of hernia .Skin and subcutaneous tissue were incised at that point by a pointed knife .A 22 gauge spinal needle threaded with a 2-0 prolene in form of loop was inserted through stab wound and pushed down along one side of IIR just beneath the peritoneum .Maryland forceps was used to lift the peritoneum and make it taught for easy passage of the needle and also to protect the vas deferens and spermatic vessels or round ligament .peritoneum was punctured by needle at 6 o'clock position of internal ring .Maryland forceps held the apex of prolene loop and the spinal needle was withdrawn.Then spinal needle was threaded just short of its tip with prolene.Needle was the reinserted through the same stab along other side of ring in similar fashion and peritoneum was punctured again at 6 o'clock position ,and prolene thread was pushed through , and the prolene thread was pushed through the needle for sufficient length . Thread was held by the Maryland forceps and the needle was withdrawn.Free end of second thread was the passed through prolene loop sufficiently . The prolene loop was then withdrawn from outside which kinked

the second prolene thread and pulled it out .by this maneuver ,second prolene thread was make a loop around the internal ring. This loop was tied subcutaneously to close internal ring . Before closing the ring ,any gas trapped inside the scrotum or labia was squeezed out and pneumoperitoneum was deflated .umbilical port and 3 mm port site was closed by absorbable suture .stab wound was not sutured.

Open herniotomy was done through an inguinal skin crease incision. High ligation of the sac was performed using 4/0, 3/0 absorbable (Monocryl) suture. The distal sac was slit open to prevent postoperative hydrocele formation. The wound was closed in layers, using absorbable suture.

Follow up

All patients were call for follow up visit at one week, three months and six months and one year . Parents were advised to contact to us ,if there were any concerns in the immediate postoperative period.

STATISTICAL ANALYSIS: -. Data were analyzed using the SPSS software package version 12. For continuous variables, data were expressed as mean \pm SD and comparison between the two groups were carried out using two-sided t-test. Categorical variables were expressed as frequency number and percent and comparison between these variables were carried out using χ^2 tests

III. Results

Age group of Patients in our study were in range of 1 to 13 years. They were divided in 3 groups, <5 , 5 to 10 and >10 years. It was seen that highest numbers of cases belonged to age group 5 to 10 years (66.67% in group Herniotomy and 80% in LNAR group) .Mean age of the study group is 6.23 ± 2.39 years.

In our study, 85% patients were males. There was no significant difference observed according to gender. ($P=0.096NS$).Operative time was more in herniotomy (24.67 ± 2.22) compare to laparoscopic group

There was no major complications in both groups intraoperatively .All patients tolerated feed after 6 hour . Analgesic were more required in Herniotomy group as compared to LNAR group.During follow up visit Recurrence were noted in 2 patients in herniotomy group after 6 months and both were repaired with laparoscopic approach .

IV. Discussion :-

In children, the standard surgical treatment of Inguinal hernia is limited to division and ligation of the hernial sac at the Internal inguinal ring without narrowing the ring ⁷.

The internal ring normally is reached by dissecting the hernial sac from the cord structures. Open herniotomy is an excellent method of repair in the pediatric population. However, it has the potential risk of injury of the spermatic vessels or vas deferens, hematoma formation, wound infection, iatrogenic ascent of the testis, testicular atrophy, and recurrence of hernia. It also carries the potential risk of tubal or ovarian damage which may cause infertility ⁸.

Laparoscopic approach is rapidly gaining popularity with more and more studies validating its feasibility, safety, and efficacy ⁸.

In this study we have present and describes a new technique, which is the use of Spinal needle in laparoscopic hernia repair in comparison with conventional hernia repair, to the best of our knowledge. This technique has been recently reported with good outcomes.

Recovery and discharge: -

In our study, Mean post operative stay was significantly higher in Herniotomy group ($1.93 \pm .583$ days) as compared to $.90 \pm .305$ days in LNAR group. ($P < 0.001S$)

A study by Mikes L Liem, Yolanda Van Der Graaf et al. in 1997 showed patients with inguinal hernias who undergo laparoscopic repair recover more rapidly than those who undergo open surgical repair ^{9,10}

Operative Time :-

In our study, mean operative time was significantly more 24.67 ± 2.22 min in Herniotomy group as compared to in LNAR group 15.17 ± 2.65 min. ($P < 0.001S$).

Chan and Tam found that laparoscopic surgery is marginally quicker (5 min), but this difference appears insignificant, both statistically and in practice .

A study by McNally MP, Byrd KA, et al. in 2009 showed Laparoscopic inguinal hernia repair is associated with longer operative times(surgeon skills) but shorter recovery periods¹¹.

In our study ,the operative time is less than that reported in the literature as we use an easy simple and rapid technique for extracorporeal suture ligation using spinal needle , which can be done with far great ease in a very short time.

Postoperative Pain:-

In our study, mean pain score (image 1) was significantly more 5.93 ± 0.74 in Herniotomy group as compared to in LNAR group 2.07 ± 0.94 ($P < 0.001S$)

A study by Bill Zepf, et al. in 2005 showed Laparoscopic repair of inguinal hernias is associated with less pain and quicker return to activity than an open technique¹².

A study by A Eklund, A Montgomery, et al in 2010 showed 5 years after surgery only a small proportion of patients still report moderate to severe chronic pain¹³.

Laparoscopic inguinal hernia repair leads to less chronic pain than open repair

Contralateral Patency :-

Contralateral site visualization during the procedure were present in 30 % in LNAR.

Lee et al indicated that use of laparoscopy as the modality with which to explore the contralateral ring has increased from 6% in 1996 to 37% in 2005. Use of laparoscopy to explore the contralateral groin has likely increased since then¹⁴.

A meta-analysis by Miltenburg et al. showed that laparoscopy has a sensitivity of 99.4% and a specificity of 99.5% regardless of patient age, gender, or side of presentation in detection of contralateral patent processus vaginalis and other various forms of hernia¹⁵.

Esposito et al and Lima et al. (2012) stated that it is extremely easy to identify a direct hernia in laparoscopy as for the technical point of view, to perform direct hernia repair, first of all, it is important to identify and resect the hernia sac which is easier in Laparoscopic repair¹⁶.

Recurrence and Testicular Damage :-

Open herniotomy in children has been reported to have recurrence rates of 0.8–3.8% . While in laparoscopic hernia repair it is ranged from 0.7% to 4.5%. That is may be due to the presence of skip areas during placement of purse-string sutures as well as the tension resulting from intracorporeal knotting particularly in closure of large defects. The critical steps of hernia sac neck transaction at the IIR were not achieved in many laparoscopic procedures unlike during OH. Thus, transient or persistent hydrocele was unavoidable after these laparoscopic techniques.

Yang et al. in their meta-analysis stated that the recurrence rate of laparoscopic hernia repair was higher than OH in 2 studies lower in 3 studies and equal (zero) in 2 studies¹⁷.

Shalaby et al. (2010) had further compared the intracorporeal purse string suture with extracorporeal closure using reverdin needle And had reported a lower reoccurrence rate (0.8%) after laparoscopic repair by RN (reverdine needle) and 2.4% recurrence after open herniotomy¹⁸.

In the present study, recurrence rate was 3.33 % (1/30) in group L at 1 year follow up, while in group O the recurrence rate was 6.66 % (2/30).

Postoperative complications :-

Transient hydrocele followed by seroma than stitch abscess .Cases were 0% seroma present in group LNAR as compared to 20% in group Herniotomy. (P=0.016S). No significant difference were observed according to complication transient hydrocele, stitch abscess.

Urinary retention cases were zero present in group LNAR as compared to 1.6 % in group Herniotomy. (P<0.001S)

We have observed that complete encirclement of ring ,emptying the sac and reducing abdominal pressure before tying may help inreducing hydrocele formation and recurrence of hernia .we have not encountered any hydrocele during 1 year follow up.

Cosmesis :-

According to VAST Score(image 2) for wound appearance, In LNAR group

Cosmetic outcome were significantly better compared to Herniotomy

Significantly VAST score was 1 was in LNAR group as compared to score 2 were observed in 96.67% (P<0.001S)

Five-millimeter incisions in LS were, indeed, cosmetically more appealingcompared with 2-cm incisions in OS. However, this significance gets lost because the scar in open surgery by virtue of its position, gets concealed by clothing¹⁹.

The natural history of the PPV in infants remains a controversial topic. Prior studies indicate that 40% of PPVs close spontaneously by two months of age and 60% by 2 years of age; however, the risk of incarceration is highest during infancy. While in some other series PPVs less than 2 mm were not closed²⁰.

Our approach has been to ligate all PPVs to avoid the development of metachronous hernia.

The 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 IIR level extremely safe even in patients with previous inguinal surgery .

V. Conclusion

A total of 60 patients of pediatric inguinal hernia were included for a period from May 2017 to May 2019 . Both groups were followed up to one year .We have concluded that Laparoscopic Needle assisted hernia repair (LNAR) is safe and rapid technique . it is superior than open with regard to post operative pain ,recovery and cosmesis .Laparoscopic hernia repair also enables the detection of contralateral hernias so that they can be repaired in same operative setting .Post operative complications were minimal in both the groups ,although long term follow up will be needed to determine validity of these results .So, we conclude that well-performed conventional herniotomy yields results similar to those of laparoscopic repair. But cosmesis and the ability to detect and simultaneously repair CPPV are the the main advantages of Laparoscopic surgery over open surgery.

Table 1: Demographic Data and Results Exclusively of Repairs

S No	Parameters	Open (n = 30)	Lap (n = 30)	P Value
1	Age	5.77 ± 2.668	6.70 ± 2.02	0.132
2	Sex			
	M	24 (80%)	27 (90%)	0.47
	F	6 (20%)	3 (10%)	0.47
	Side of hernia			
	Right	19 (63.3%)	15 (50%)	0.004
	Left	11 (36.6%)	6 (20%)	0.004

S No	Parameters	Open (n = 30)	Lap (n = 30)	P Value
	Bilateral	0	9 (30%)	
3	Time in minutes	24.6 ± 2.2	15.17 ± 2.6	0.001
4	Pain score			
	Nil	0	2 (5.7%)	
	Mild	28 (94.1%)	28 (95.3%)	0.449
	Moderate	2 (5.88%)		0.986
5.	Visualization of contralateral patent processus vaginalis (CPPV) Patency visualization		9(29.3%)	
6	Urinary retention	1 (3.3%)	0	0.605
7	Discharge			
	<12 hrs	22(92%)	30 (100%)	0.371
	>12 hrs	7 (.....)	0	
8	Complications	5/34 (14.7%)	4/35 (11.4%)	0.963
	Transient Hydrocele	2 (6.60%)	1 (3.3%)	
	Seroma	1(3.3%)	0	
	Port site hematoma	0	1(3.3%)	
	Stich abscess	1 (3.33%)	0	
	Recurrence	2(6.60)	0	
8	Cosmesis (wound appearance score –VAST)			
	1	0	28 (98%)	

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