

NEEDLE ASSISTED LAPAROSCOPIC REPAIR (NALR) OF INGUINAL HERNIAS IN CHILDREN: OUR EXPERIENCE AT A TERTIARY CARE HOSPITAL

Muhammad Mudasir Saleem, Iftikhar Ahmed Ch, Safdar Hussain Awan, Naveed Ahmed, C. Aqeel Safdar, Tamoor Afzal, Omair Arshad Dar, Shehla Kanwal Kiani

Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To evaluate the effectiveness of needle assisted laparoscopic repair (NALR) of inguinal hernias in children.

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Department of Pediatric surgery, Pak Emirates Military Hospital, Rawalpindi, from Aug 2017 to Apr 2018.

Material and Methods: A total of 50 patients were included in the study. All the patients were diagnosed with inguinal hernias on the basis of history given by parents and clinical examination. All patients underwent NALR of inguinal hernias after preoperative workup and informed written consent. Pneumoperitoneum was created in all cases by open method. Transumbilical 3mm port was used for telescope along with a single 3mm port in lower abdomen for grasping forceps. Internal inguinal ring was closed by transfixing it with a loop suture using 22 G spinal needle and 2/0 prolene suture. Operative time and presence of contralateral processus vaginalis was noted. Patients were followed up at four weeks and three months for postoperative complications.

Results: Age of the patients ranged from 12 years, Mean \pm SD was calculated as 40.36 ± 37.74 . Regarding inguinal hernia site, n=17 (34%) have right sided hernia, n=13 (26%) have left sided hernia while bilateral hernia were present in n=20 (40%), 9 patients (18%) were found to have occult patent processus vaginalis peroperatively. Mean operative time ranged from 9 minutes to 25 minutes with Mean \pm SD calculated as 15.94 ± 5.30 . All operations were completed laparoscopically without need of conversion to open herniotomy. There were no intraoperative complications; No case of matachronous contralateral inguinal hernia or hydrocele formation and wound related complications during follow up at 4 weeks and 3 months.

Conclusion: LNAR of inguinal hernias in children is an effective, quick and safe technique which can be easily learnt due to its simplicity to perform. This technique can be employed in both male and female pediatric population with promising results. One main advantage is the ability to pick up the occult patent internal ring which can be repaired in the single stage to prevent the development of metachronous inguinal hernia in the later age.

Keywords: Inguinal hernia, Laparoscopic repair, Needle assisted.

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INTRODUCTION

Inguinal hernia repair is one of the most commonly performed surgical procedures in pediatric population worldwide¹. The basic etiology in the development of pediatric inguinal hernia is persistence of processus vaginalis that usually closes between the 36th and 40th week of gestation². Open inguinal herniotomy through a groin skin crease incision with high ligation of

hernial sac following reduction of contents has remained the gold standard treatment for decades³. First successful laparoscopic inguinal hernia repair was reported in 1990⁴. Since the evolution of laparoscopic inguinal hernia repair in children, a number of techniques have been evaluated to close the internal inguinal ring by passing a suture around it in minimal access fashion⁵. However, these laparoscopic techniques have been broadly classified into two subtypes. One is intracorporeal technique that is quite similar to the open inguinal hernia repair involving dissection, ligation, and division of the

Correspondence: Dr Muhammad Mudasir Saleem, Classified Surgical Specialist, PEMH Rawalpindi Pakistan
Email: mudasirsaleem759@yahoo.com

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sac but with less tissue dissection and operative trauma⁶. The other one is extracorporeal techniques involving just ligating the patent processus vaginalis by percutaneous internal ring approximation with non-absorbable suture material without dividing the sac⁷. Although no definite consensus exists favoring any of these two laparoscopic techniques but extracorporeal technique is found to be safe, involves even less tissue dissection, less operative time, and is much easier to learn with equal outcomes⁸.

We conducted this study to to evaluate the effectiveness of NALR of inguinal hernia repair in children in our setup in terms of safety, recurrence rate and to evaluate the contralateral internal ring with incidence of metachronous inguinal hernia in postoperative period.

PATIENTS AND METHODS

This cross-sectional analytical study was carried out at department of Pediatric surgery department, Pak Emirates Military Hospital, Rawalpindi from 1st August 2017 to 30th April 2018. Life time incidence of inguinal hernia in children is 10%⁹, so anticipated population proportion (p) was 0.10%⁹, confidence level was 90% and absolute precision required (d) was 0.08, thus calculated sample size was 50 by using WHO sample size calculator.

Both male and female children between 2 months to 12 years of age who presented with unilateral or bilateral inguinal hernias were included in the study by using non probability consecutive sampling. Patients having weight less than 1.5 kg, with cardiac or respiratory problems, with congenital bleeding disorders, with recurrent or incarcerated inguinal hernias and those with undescended testis were excluded from the study. Detailed history was obtained from parents along with general physical examination confirming the diagnosis. Informed written consent was obtained from the parents for laparoscopic hernia repair after explaining the possible complications of the procedure and risk of conversion into open herniotomy. All the patients were evaluated with blood complete

picture and hepatitis serology. All the patients were kept nil per oral for at least four hours prior to surgery. A single dose of prophylactic antibiotic of third generation cephalosporin (50ml/kg) was given before the surgery. Patients were placed in supine position and the laparoscopic monitor was placed on the opposite side of hernia. All the surgeries were performed under general anesthesia. Pneumoperitoneum was created by open method with 3mm port through a transumbilical incision used for telescope. After initial assessment of the hernia defect and contralateral ring, another 3 mm port was inserted for grasper in the lower abdomen on the contralateral side of hernia. A 22 G spinal needle along with 2/0 prolene loop was inserted through a small stab incision which was marked in the groin skin over the internal ring. Spinal needle was manipulated around the internal ring to transfix the ring by taking small bites of peritoneum by lifting it with grasper. Extreme care was taken to avoid damage to vas deferens and gonadal vessels at this stage in male patients. The prolene loop was brought out after completing the circumferential bites of internal ring. The suture was tied in an extracorporeal manner and was buried under the skin. Port incisions were sutured with vicryl 3/0 suture. The small punctured wound in groin was closed with steristrip. All the patients were discharged from the hospital once they were able to tolerate feed and had passed urine. All the patients were followed up at one week, four week and at three months interval postoperatively to evaluate for any complications.

The data was entered into the Statistical Package for Social Sciences (SPSS) version 16.0 and analyzed. Mean and standard deviation was calculated for quantitative variables like age and operative time. For qualitative variables like gender and site of lesion, frequency and percentage were presented.

RESULTS

A total of 50 patients were included in the study including n=31 (62%) male and n=19 (38%)

female. Age of the patients ranged from 2-132 months, Mean \pm SD was calculated as 40.36 ± 37.74 . Regarding the site of hernia with regard to sex, n=17 (34%) have right sided hernia (11 male, 6 female), n=13 (26%) have left sided hernia (10 male, 3 female) while bilateral hernia were present in n=20 i.e. 40% of cases (10 male, 10 female) (fig-1). Among the 20 patients operated for bilateral hernia, n=11 (22%) were preoperatively diagnosed as having bilateral inguinal hernia

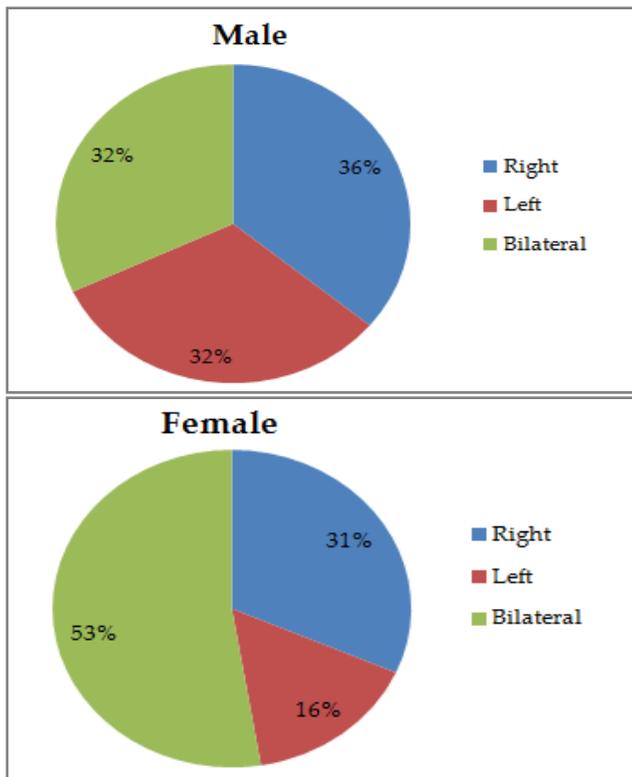


Figure-1: Site distribution with regard to sex.

while n=9 (18%) were found to have patent contralateral deep inguinal ring peroperatively (n=3 on right side, n=6 on left side).

A total of 70 hernias were operated in 50 patients. Mean operative ranged from 9 minutes for unilateral hernia to 25 minutes for bilateral hernias with Mean \pm SD calculated as 15.94 ± 5.30 . For right sided unilateral hernia, Mean \pm Sd was 12.17 ± 1.55 (range 10-15 minutes). For left sided unilateral hernia, mean \pm sd was 11.54 ± 1.51 (range 9-14 minutes) and for bilateral hernias it was 22.01 ± 2.10 (range 18-25 minutes) (fig-2).

All cases were successfully completed without need of conversion into open Herniotomy. There was no case of any complication associated with trocar access or injury to vas deferens and gonadal vessels peroperatively. In follow up, n=2 (4%) had recurrence of ipsilateral operated hernia and there was no case of meta-chronous contralateral inguinal hernia in patients operated on one side. There was no case of wound infection, stitch granuloma and hydrocele formation postoperatively.

DISCUSSION

Indirect inguinal hernia is a common consideration in pediatric population due to the persistence of peritoneal reflection providing a passage for testicular descend from abdomen to scrotum. A number of risk factors have been implicated in its development like prematurity, low birth weight, undescended testis, lung disorders and use of ventilator for mechanical ventilation¹⁰. The most dangerous complication of inguinal hernias in children is their risk of incarceration and strangulation, the risk of which is highest in the infant period¹¹. Therefore, early elective repair of hernias is advocated in children to avoid these complications which have high morbidity and mortality. Herniotomy with high ligation of hernia sac through inguinal skin crease incision had remained the gold standard treatment for years. Main drawbacks of this open technique are access trauma, more tissue dissection causing testicular atrophy, technical difficulties in small babies with large hernias, danger of injury to vas deferens and spermatic vessels and inability to access the contralateral side requiring the need of another incision in contralateral groin increasing the postoperative morbidity¹².

Minimal invasive surgery in the form of laparoscopy has gained worldwide popularity for the management of impalpable testis and inguinal hernias in pediatric population in the recent years¹³. Ozgediz *et al* provided the idea of minimal instrumentation with extracorporeal knotting in laparoscopic inguinal hernia repair thus making this minimally invasive surgery

more minimally invasive and simple¹⁴. Laparoscopic inguinal hernia repair has been found to be highly effective and safe in children because of less trauma of access, less dissection, decreased postoperative pain, less bleeding and early resumption of daily activities¹⁵.

We conducted this study at pediatric surgery department, military hospital Rawalpindi from

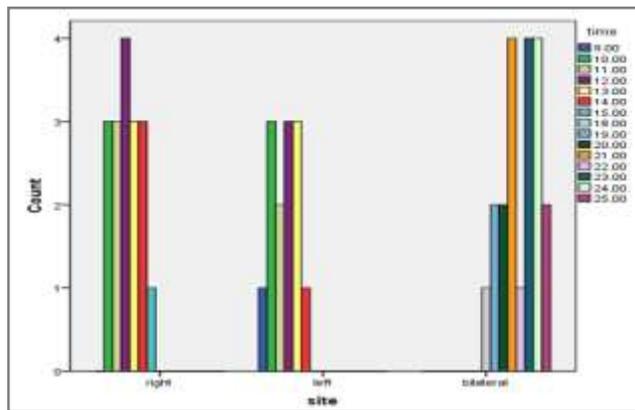


Figure-2: Distribution of operative time with regard to site.

1st August 2017 to 30th April 2018 in order to access the efficacy and safety of inguinal hernia repair in pediatric population. A total of 50 patients fulfilling the inclusion criteria were included in the study. Among our study group, there was male dominance (n=31, 62%), a finding confirmed by study conducted by Yin *et al*¹⁶. In our study, a total of 70 hernias were operated in 50 patients. Out of these 70 hernias, right sided hernia was most common with 17 patients diagnosed preoperatively and 3 patients were found to have patent processus vaginalis on right side peroperatively (n=20, 40%), this was in accordance to the findings in other studies¹⁷.

One main advantage of laparoscopic repair over open herniotomy is the identification and repair of contralateral patent internal ring which is basically occult hernia with potential to develop metachronous hernia in future. The reported incidence of occult patent processus vaginalis found during laparoscopic hernia repair is upto 23%¹⁸. In our study, the incidence of

occult hernia was found to be 18% (n=9). This finding was in accordance to a study conducted by Kumar A and colleagues which showed that occult hernia incidence to be 16.67%¹⁹. None of the patients in our study developed metachronous inguinal hernia on the contralateral side of repair as by seeing the contralateral deep ring during laparoscopic repair the risk of developing metachronous inguinal hernia is virtually zero. Open herniotomy is considered as the gold standard but it has been found to a high recurrence rate which is found to be between 2-6.3%²⁰. Another advantage of laparoscopic hernia repair is its simplicity and efficacy which is measured in terms of low recurrence rate as compared to open repair with estimated reported incidence between 1.2-5.3% by three port technique²¹. More refinement in laparoscopic techniques by using single port has further decreased the recurrence rate to 0.9-4.8%²². In our study, only two patients (4%) had recurrence which is comparable to the reported incidence.

Another main advantage of laparoscopic hernia repair over open techniques is far less operative time in both unilateral and bilateral repairs. In our study, the operative time was found to be 9 minutes to 25 minutes (Mean \pm SD 15.94 \pm 5.30) for unilateral and bilateral repairs respectively. Even in expert hands, the mean operative times in a 3 port laparoscopic technique were found to be much high as compared to needle assisted laparoscopic repair possibly because of more time consumed in trocar insertion and tissue dissection²³. In a single port needle assisted laparoscopic hernia repair involving 31 cases and 37 repairs, mean operative time was 13.20 minutes (range 8-25 minutes) for unilateral repair and 20.66 minutes (range 17-27 minutes) for bilateral repair²⁴. Yang *et al* compared the mean operative time between needle assisted laparoscopic and open inguinal hernia repair involving 1583 children with conclusion that mean operative time was much less in single port laparoscopic repair (19.3 \pm 6.1 vs. 28.0 \pm 8.9) with calculated *p*-value < 0.05, showing statistically significant difference between the two groups²⁵.

Another study conducted by Shalaby and colleagues involving 150 children undergoing needlescopic herniotomy revealed that operative time for unilateral and bilateral hernia repair was 20.6 ± 4.65 minutes and 26.4 ± 1.6 min respectively²⁶. Findings in our study are comparable to results in these studies. Mean operative time in our study was less as compared to these studies because all the procedures were performed by an expert pediatric laparoscopic surgeon who is performing these procedures for quite long resulting in much less operative time seen in our study.

The reported incidence of trocar associated visceral and vascular injuries during creating pneumoperitoneum is 0.41% to 1.58%²⁷, fortunately in our study no such access complication had occurred. Similarly, there was no case of perioperative injury to gonadal vessels or vas deferens depicting the safety of the laparoscopic inguinal hernia repair as gonadal vessels and vas deferens were clearly visualized and safeguarded during the procedure. There was no case of wound infection and stitch granuloma formation as only two 3 mm stab incisions were used in the surgery for telescope and working instrument along with small stab incisions used in groin for extracorporeal knotting and later on these knots were buried under the skin in subcutaneous tissue. There was no reported case of hydrocele formation in postoperative period in our study possibly because of the tight purse string effect created on the internal ring making it water tight.

Limitation in our study was that patients with recurrent and irreducible/incarcerated hernias were not included in our study as safety and efficacy of laparoscopic repair should also be evaluated in such cases.

CONCLUSION

LNAR of inguinal hernia in children is an effective, quick and safe technique which can be easily learnt due to its simplicity to perform. This technique can be employed in both male and female pediatric population with promising results. One main advantage is the ability to

pick up the occult patent internal ring which can be repaired in the single stage to prevent the development of metachronous inguinal hernia in the later age.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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