

## Comparison of Laparoscopic Needle-Assisted Extra-Corporeal Inguinal Hernia Repair with Intracorporeal Inguinal Hernia Repair in Terms of Postoperative Recurrence

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### ABSTRACT

**Objective:** To compare laparoscopic needle-assisted extra-corporeal hernia repair regarding recurrence in children with intracorporeal repair.

**Study Design:** Retrospective longitudinal study.

**Place and Duration of Study:** Department of Paediatric Surgery, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jul 2019 to Dec 2020.

**Methodology:** Retrospectively, all patients who underwent laparoscopic herniotomy were searched through hospital records. Ninety-seven patients matched the inclusion criteria out of 148 laparoscopic surgeries. All patients were diagnosed with inguinal hernia based on history and clinical examination. Fifty-one patients underwent laparoscopic needle-assisted repair (LNAR) with extra-corporeal knotting, whereas 46 underwent repair with intracorporeal knotting of the deep inguinal ring. Pneumoperitoneum was created in all cases by open method. All patients were followed up for six months outdoors for recurrence.

**Results:** The age of patients ranged from 1-12 years; the mean age of study patients was 5.29±3.17 years. Regarding the inguinal hernia site, 45(46.4%) had a right-sided hernia, and 52(53.6%) had a left-sided hernia. All operations were completed laparoscopically. There were no intraoperative complications. A total of 2(3.53%) patients developed recurrence, one from each group, 2.17% in Group-A and 1.96% in Group-B, with no statistically significant difference between the two groups after six months of follow-up ( $p$ -value=0.942).

**Conclusion:** Extra-corporeal knotting in children with inguinal hernia is an effective, quick and safe technique. It is comparable to the standard intracorporeal knotting technique in terms of recurrence.

**Keywords:** Inguinal hernia, Laparoscopic repair, Needle assisted.

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### INTRODUCTION

Groin swelling is a very frequently seen presentation in pediatric surgery clinics. The most common reasons for this presentation are inguinal hernia and hydrocele.<sup>1</sup> Although the causative factor is the same in both, that is, patent processus vaginalis, the treatment approach differs. In hydrocele, the wait-and-watch policy is generally followed for 18-24 months.<sup>2</sup> If it persists beyond that age, a herniotomy can be performed. Early intervention can be done in case of a large tense hydrocele causing discomfort for the baby.<sup>3</sup>

The open procedure may pose a big challenge in the case of a thin sac but is still widely practised at centres where facilities for minimally invasive surgery are not available.<sup>4</sup> Since the evolution of minimal access surgery and more awareness about it amongst the parents, laparoscopic inguinal hernia repair in

children is also being practised widely, and at the same time, evaluation of many other techniques is also underway.<sup>5</sup>

Different laparoscopic techniques can be classified into two subtypes broadly.<sup>7</sup> The first technique involves intracorporeal purse string suturing the sac after dissection, followed by its division. Compared to open one, this technique has less tissue dissection and operative trauma.<sup>8</sup> Second is the extra-corporeal technique in which the patent processus vaginalis is ligated by internal ring approximation using percutaneous non-absorbable suture material without dividing the sac.<sup>9</sup>

Most laparoscopic surgeons prefer the extra-corporeal technique with subcutaneous suture knotting because it is easy to perform in less time with a short learning curve. However, others think it may be associated with stitch sinus formation and a higher recurrence rate. On the other hand, the intracorporeal suturing technique has a long learning curve and long

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operative time and needs the availability of special instruments and devices. Which laparoscopic technique is better than these two is still debatable, but the extra-corporeal technique is believed to be safe quicker, with minimal dissection and has comparable results.<sup>10</sup> The objective of this study was to compare the LNAR with intracorporeal knotting in our setup in terms of recurrence and to find out which technique offers lesser recurrence. We hypothesised that LNAR is a more feasible technique in children because of ease and better results.

## METHODOLOGY

The retrospective longitudinal study was conducted at the Department of Pediatric Surgery, Pak Emirates Military Hospital, Rawalpindi Pakistan, from July 2019 to December 2020 after seeking approval from the Hospital Ethical Review Committee (letter A/28/252/2021 dated 16 February 2021).

**Inclusion Criteria:** All children of either gender aged 1 year to 12 years of age and with unilateral inguinal hernia operated laparoscopically were included in the study.

**Exclusion Criteria:** Patients with cardiac or respiratory problems, weight less than 1.5kg, congenital bleeding disorders, recurrent/bilateral / incarcerated inguinal hernias and patients with undescended testis were excluded from the study.

Out of 148 patients who underwent laparoscopic hernia repair, 97 were included in the study who met the inclusion criteria. Patients were divided into two groups by lottery method. Group-A (n=46) included patients who underwent intracorporeal knotting, and Group-B (n=51) included extra-corporeal knotting. History and findings of physical examination confirming the diagnosis were obtained from the hospital papers. All the patients were evaluated with a complete blood picture and hepatitis serology. All the patients were kept nil per oral prior to surgery. All the surgeries were performed in a supine position under general anaesthesia. Group-A patients underwent intracorporeal knotting with purse string suture around the neck of the sac with prolene 3/0. Group-B patients had LNAR with extra-corporeal knotting. In these patients, a 2 mm incision was made in the groin crease to initially pass the spinal Needle and later bury the knot. The suture used in these patients was also prolene 3/0. All the patients were operated using the same laparoscopic equipment and by the same surgical team. 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 six-month intervals postoperatively to evaluate for recurrence.

## RESULTS

A total of 97 patients who met the inclusion criteria were included in the study. There were 80 (82.5%) male and 17(17.5%) female patients. The mean age of the study population was 5.29±3.17 years. Forty-six (47.4%) patients underwent intracorporeal knotting, whereas LNAR was done in 51(52.6%) patients. Left-sided hernia was found in 52(53.6%) patients, and 45(46.4%) had right-sided hernia. (Table-I) Only 2 (3.53%) patients had recurrence, 1 (2.17%) in Group-A and 1(1.96%) in Group-B. There was no statistically significant difference in recurrence when both modalities were compared ( $p$ -value=0.942) (Table-II).

**Table-I: Demographic Variables (n=97)**

|           |                | n(%)      |
|-----------|----------------|-----------|
| Gender    | Male           | 80(82.47) |
|           | Female         | 17(17.52) |
| Procedure | Intracorporeal | 46(47.42) |
|           | LNAR           | 51(52.57) |
| Side      | Left           | 52(53.6)  |
|           | Right          | 45(46.4)  |
| Age Group | 1-2 Years      | 29(29.89) |
|           | 2-5 Years      | 27(27.83) |
|           | 5-10 Years     | 23(23.71) |
|           | 10-12 Years    | 18(18.55) |

**Table-II: Recurrence in the Study Groups (n=97)**

| Group-A<br>(Intracorporeal Knotting)<br>n=46 | Group-B<br>(Extracorporeal Knotting)<br>n=51 | p-value |
|--|--|---------|
| 1  | 1  | 0.942   |

## DISCUSSION

This study was carried out in order to emphasize the role of minimally invasive surgery (MIS) in children in general and the importance of needle-assisted extra-corporeal repair of hernia in specific because, in this way, children can benefit from the advantages of MIS in a quick and safer way. In 1990, the first successful laparoscopic inguinal hernia repair was reported.<sup>11,12</sup> Since then, Minimal invasive surgery has gained worldwide popularity for managing inguinal hernias in the pediatric population.<sup>13,14</sup> Laparoscopic inguinal hernia repair has been found to be highly effective and safe.<sup>15</sup>

Ozgediz *et al.* proposed extra-corporeal knotting in laparoscopic inguinal hernia repair with minimal instrumentation. As a result, this procedure became even more minimally invasive and simpler to

perform.<sup>16</sup> Out of three hundred patients, 13 developed recurrence (4.3%). In our study, 51 patients underwent the same procedure as in the study mentioned above and one developed recurrence (1.9%). Our results seem superior, but the sample size is not comparable to the mentioned study. Conducting the study on a larger population gives a true number of recurrences.

Yin et al. conducted a study on 64 children in 3 years to find the feasibility of laparoscopic repair in incarcerated hernia.<sup>17</sup> They used the needle-assisted extra-corporeal method that we applied to our 51 patients. However, as our experience was limited and we excluded incarcerated hernia from our study, one study gives a very positive conclusion to go for minimally invasive surgery in incarcerated hernias in children that further broadens the horizon of laparoscopy.<sup>18</sup>

In our study, 46 patients underwent intracorporeal knotting but without posterior wall strengthening. One of our patients developed recurrence over a follow-up period of six months. Compared to the study mentioned, our sample size is small with one recurrence, but whether posterior wall strengthening had a role in it or not still needs more trials to be conducted, maybe at the multicenter level. Considering the primary pathology of inguinal hernia in children, patent processus vaginalis, whether posterior inguinal wall strengthening should be a routine procedure or not is also debatable.

In another study conducted in California, laparoscopic repair in children was carried out by needle-assisted extra-corporeal knotting, but a definite conclusion was not drawn regarding the recurrence rate.<sup>19</sup> In our study, 1 out of 51 developed recurrence. Maybe the study mentioned was conducted when pediatric laparoscopic techniques were in their inception, and no conclusive evidence could be given.

Another study was conducted by Gorsler et al. on 279 children with inguinal hernias, and intracorporeal knotting was used to close the defect. Follow-up was over 23 months, and 2.7% of patients developed recurrence.<sup>20</sup> In our study, recurrence was 2.17%, which is comparable to the study mentioned, but our sample size was small, i.e., 46, and follow-up was also short, i.e. 6 months.

In another study, 163 children with inguinal hernia were operated laparoscopically. Fifty-one patients were subjected to intra-corporeal knotting, and 112 were treated by extra-corporeal knotting. Recurrence was found to be 2.9 % and 4.8 %, respectively.<sup>21</sup>

In our study, these figures were 2.7% and 1.9%, respectively. These results are comparable, but our sample size was small compared to the study mentioned.

#### LIMITATION OF STUDY

The limitation of our study was that inclusion criteria were kept limited. Our study did not include complicated cases like patients with irreducible, incarcerated and recurrent hernias. Studies have mentioned the role of laparoscopy in such cases, so, with more experience, we should also judge the safety and efficacy of laparoscopic repair in such cases. Moreover, this was the first pilot study conducted at our centre, so patient selection was kept guarded.

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#### CONCLUSION

Compared to intracorporeal repair, LNAR of inguinal hernia in children is safe, more feasible and easy to perform with a short learning curve having a recurrence rate compatible with international data.

**Conflict of Interest:** None.

#### Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

JR: & SI: Data acquisition, data analysis, critical review, approval of the final version to be published.

ZA: & NA: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

IA: & AA: Concept, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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