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Comparison of Single Port Laparoscopic Inguinal Hernia Repair versus Open Herniotomy in Term of Recurrence and Postoperative Scrotal Hematoma

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ABSTRACT

Hernia repair is common surgical procedures, with techniques evolving to improve outcomes. Comparing laparoscopic and open approaches is crucial for determining the optimal method to reduce complications such as recurrence and postoperative scrotal hematoma. **Objective:** To compare the frequency of hematoma and recurrence in laparoscopic assisted inguinal hernian repair versus open herniotomy. **Methods:** This quasi experimental study was conducted after approval from CPSP (Ref No: CPSP/REU/PSG-2017-068-339, REU 37362) at Pediatric Surgery Department Services Hospital, Lahore, from October 2020 to March 2021 on 254 patients. Patients were divided into two equal groups; Group-A (single port needle assisted laparoscopic repair) and Group-B, (open repair). Patients were assessed after 24 hours to see scrotal hematoma and regular follow up for 3 months to see the recurrence. Data were analyzed using SPSS version 26.0. Independent sample t-test and chi square was applied to compare quantitative and qualitative variables between groups; p-value ≤0.05 as significant. **Results:** Postoperative hematoma formation was found among 2 patients (1.6%) of Group-A and in 13 patients (10.2%) of Group-B, (p=0.003). Postoperative recurrence between two groups was comparable and statistically insignificant (Group A 6.3% vs Group B 4.0%, p=0.393). (p=0.393). **Conclusions:** In conclusion, laparoscopic-assisted hernia repair and open herniotomy demonstrate comparable recurrence rates. However, laparoscopic-assisted repair is associated with a significantly lower incidence of postoperative hematoma. These findings indicate that laparoscopic repair may be a safer option with fewer postoperative complications, making it a favorable choice for pediatric inguinal hernia surgery.

INTRODUCTION

Inguinal Hernia (IH) is a common presentation to pediatric surgeons, with an incidence ranging from 0.8%-4.4% [1]. It is typically caused by incomplete closure of the processus vaginalis [2]. Given the risk of incarceration and potential complications, surgical intervention is recommended for all children diagnosed with inguinal hernia [3]. For IH, open herniotomy serves as the basic modality of care for children. This method is renowned for its ease of performance, high success rate, and low rate of complications [4, 5]. According to a survey conducted in 2014 on the management of IH, 83% of participants favored the open approach for treating pediatric inguinal hernia [6]. However, recently, laparoscopic hernia repair has become common practice in many centers. Laparoscopic herniorrhaphy was introduced by Montupet in 1993. Recent advancements in technology and surgical instruments have highlighted the advantages of laparoscopic herniorrhaphy, including reduced post-operative pain, shorter surgery duration, minimal tissue damage, easier identification of contralateral patent processus vaginalis,

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and improved cosmetic outcomes [7]. However, there are ongoing debates about whether laparoscopic herniorrhaphy is superior due to concerns over potentially higher recurrence rates and the risk of testicular vessel injury leading to atrophy [8, 9]. While open herniotomy remains the gold standard according to some authors, laparoscopic herniorrhaphy has been shown to be equally safe and offers additional benefits. These advantages suggest that pediatric surgeons should consider it as part of their routine practice, rather than limiting its use to selected cases. This conclusion is supported by an analysis conducted by Isabel Bada-Bosch et al [10]. Given the ongoing debate regarding the safety of various surgical approaches, previous data on the subject has been controversial.

Therefore, this study was being conducted with the objective of comparing the frequency of hematoma and recurrence between laparoscopic-assisted inguinal hernia repair and open herniotomy.

METHODS

This quasi experimental study was performed at Paediatric Surgery Department, Services Hospital Lahore from October 2020 to March 2021 after taking synopsis approval from CPSP (Ref No: CPSP/REU/PSG-2017-068-339, REU 37362). 254 patients (127 in each group) sample size was planned at 5% significance level, 80% power of test, and frequency of scrotal hematoma taken as after single port laparoscopic repair 1.5% and 8.2 % after open herniotomy [11]. Patients were enrolled using non-probability consecutive sampling. All male children with ipsilateral inguinal hernia (confirmed clinically i.e. reducible and cannot get above the swelling), aged between 3 months to 10 years were included. Patients with obstructed hernia, undescended testes, recurrent hernia (previously managed surgically) and hernia in syndromic patients were excluded. Before recruitment written informed consent was taken from parents/guardians. Pre-designed performa was used to collect data. Demographic information (name, age and weight) was recorded. Patients were divided in to two equal groups using lottery method; Group A and B. Patients in Group A have single port needle assisted laparoscopic repair and Group B patients had open repair. To minimize selection bias, allocation concealment was ensured by having independent individual conduct the lottery draw. All procedures were performed by same surgical team expert in relevant filed for minimum 5 years. Patients were assessed after 24 hours to see scrotal hematoma (collection of blood inside the scrotum on clinical examination and USG) and regular follow up for 3 months to see the recurrence (re-appearance of inguino-scrotal swelling within 3 months after surgery assesses clinically). To analyze data, SPSS version 26.0 was used. While frequency and percentage were used to summarize qualitative data, mean and standard deviation were computed for quantitative variables. Independent sample t-test and chi-square test were used for continuous and categorical data among groups, with a p-value ≤0.05 considered significant. Normality of continuous data was assessed before applying parametric tests, and if violated, an appropriate non-parametric test was used.

RESULTS

As shown in table 1, mean age of the patients calculated was 6.3 ± 2.99 and 6.6 ± 2.78 years in group A, and B, respectively. Mean weight calculated was 7.62 ± 3.23 kg and 8.21 ± 2.29 kg, respectively.

Table 1: Comparison of Demographic Characteristics (n=254)

Age (Year)	Group A Frequency (%)/(Mean ± SD)	Group B Frequency (%)/(Mean ± SD)	p-Value
1 to 5 Years	62 (48.8%)	55 (43.3%)	0.378
>5 to 10 Years	65 (51.2%)	72 (56.7%)	
Age	6.3 ± 2.99 Years	6.6 ± 2.78 Years	0.400
Weight	7.62 ± 3.23 kg	8.21 ± 2.29 kg	0.090

As showed in table 2, postoperative scrotal hematoma formation was found only in 2 patients (1.6%) of Group A 95% CI: 0% to 3.74% versus 13 patients (10.2%) of Group B 95% CI: 4.96% to 15.51%, (p=0.003).

Table 2: Comparison of Postoperative Hematoma Formation (n=254)

Postoperative Hematoma Formation	Group A Frequency (%)	Group B Frequency (%)	p-Value
Yes	2 (1.6%)	13 (10.2%)	0.003
No	125 (98.4%)	114 (89.8%)	

Postoperative recurrence between two groups was comparable and statistically insignificant Group A 6.3% (95% CI: 2.07% to 10.52%) vs Group B 4.0% (95% CI: 0.55% to 7.32%), p=0.393)(Table 3).

Table 3: Comparison of Postoperative Recurrence (n=254)

Postoperative Recurrence	Group A Frequency (%)	Group B Frequency (%)	p-Value
Yes	8 (6.3%)	5 (4.0%)	0.393
No	119 (93.7%)	122 (96.0%)	

DISCUSSION

Inguinal hernia repair is common practice, in pediatrics, and choice of technique can significantly impact patient outcomes. In this study, we have compared single-port laparoscopic inguinal hernia repair (Group A) with open herniotomy (Group B), specifically evaluating recurrence rates and the incidence of postoperative scrotal hematoma. According to results of our study, postoperative scrotal hematoma formation was found significantly less in Group-A versus 10.2% in Group-B, and recurrence rate was 6.3% and 4%, respectively. However, this variance in recurrence rate was not significant statistically. Similar to current findings, in a study by Zhang *et al.*, in 2023 scrotal hematoma was reported in none

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following laparoscopic repair, versus 3.7% in open repair [12]. In contrast to current observations, in study by Pillai and Nair, recurrence was observed only in single patient who underwent open repair, whereas no recurrence was noted in laparoscopic repair. Additionally, minor complications, including hematoma formation, were noted more among laparoscopic repairs (19%), and compared to those who had open repair (14.7%) [13]. Further supporting our results, in another study, the recurrence rate noted was higher (1.5%) with the laparoscopic approach versus 0.4% with the open approach [14]. However, other studies have indicated that the recurrence risk varies, ranging from 0% to 6% in open repair and 0% to 15.5% in laparoscopic repair [15]. Compared to open herniorrhaphy, laparoscopic repair resulted in fewer testicular complications without raising the risk of ipsilateral hernia recurrence. Therefore, it was found to be a viable and less invasive option for inguinal hernia repair in boys [16]. A review of 13 RCTs revealed several advantages of laparoscopic repair compared to open repair, among them shorter operative time for bilateral hernia repairs, lower complication rate, and reduced wound complications. However, similar to our results, no significant differences were observed between the two techniques for recurrence rates [17]. Recurrence in inguinal hernia repair can arise due to insufficient ligation of the internal ring, damage to the inguinal canal, a weak hernia sac, or hematoma formation. In laparoscopic repair, it may result from incomplete closure of the patent processus vaginalis or the use of absorbable sutures [3, 18]. Open herniorrhaphy can be challenging in children due to the thin hernia sac, which may tear during dissection. In contrast, laparoscopic repair avoids the need for extensive dissection of the inguinal canal, leading to shorter operating times and potentially lower recurrence rates due to its simpler approach [19, 20]. Consistent with other studies, laparoscopic repair showed fewer complications and is considered a less invasive and viable option for paediatric inguinal hernia repair. Limitations of this study were that patients were not followed for late recurrence and not have been compared for the duration of surgery between single-port laparoscopic repair and open herniotomy. Surgical time was important factor that can influence patient outcomes, including anesthesia duration and recovery time. Future studies should incorporate this variable to provide more comprehensive assessment of benefits and drawbacks of each technique.

CONCLUSIONS

In conclusion, laparoscopic-assisted hernia repair and open herniotomy demonstrate comparable recurrence rates. However, laparoscopic-assisted repair is associated with significantly lower incidence of postoperative hematoma. These findings indicated that laparoscopic repair may be a safer option with fewer postoperative complications, making it a favorable choice for pediatric inguinal hernia surgery.

Authors Contribution

Conceptualization: HUR, QD, BC
Methodology: HUR, QD, MN, MS, BC, MN
Formal analysis: HUR, QD, MN, MS, BC, MN
Writing, review and editing: MN, MS

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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