Comparison Between Ferguson's Technique and Mitchelle Bank Technique for Inguinal Herniotomy in Children

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ABSTRACT

Objective: To assess the safety of the Mitchelle bank technique for herniotomy in children by comparing its recurrence rate with conventional Ferguson's technique.

Study Design: Quasi-experimental study.

Place and Duration of Study: Paediatric Surgery Department, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Sep 2018 to Sep 2019.

Methodology: Children below the age of 6 years coming to Paediatric Surgery Outpatient Department with inguinal hernia were included in the study. The patients were divided into two groups. Group-I underwent herniotomy by Mitchelle bank technique (MBT-group) while Group-II by Ferguson's technique (FT-group). The demographic characteristics of the studied population, operative time, and intra-operative and post-operative complications were recorded.

Results: The mean age of the patients was 25.94 ± 17.06 months in Ferguson's technique-group and 24.76 ± 16.63 months in the Mitchelle bank technique-group. The mean operative time was less in the Mitchelle bank technique-group (13.17 ± 1.47 minutes) as compared to Ferguson's technique-group (16.23 ± 1.51 minutes) (p<0.05). Early complications such as hydrocele, seroma and hematoma were seen in 5 (2.3%), 6 (2.6%) and 3 (1.3%) cases in Ferguson's technique-group, and 15 (6.9%), 8 (3.7%), and 9 (4.1%) cases in the Mitchelle bank technique group, respectively. Late complications such as orchitis, testicular atrophy, and recurrence were seen in 5 (2.3%), 6 (2.6%), 2 (0.9%) in Ferguson's technique group, and 6 (2.6%), 4 (1.8%), and 3 (1.3%) in the Mitchelle bank technique group (p>0.05).

***Conclusion*:** Mitchelle bank technique is safe for herniotomy in children with less operative time and no increase in recurrence rate.

Keywords: Congenital, Ferguson's technique hydrocele, Inguinal hernia, Mitchelle bank technique.

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INTRODUCTION

Inguinal hernias in the children are characterized by protrusion of abdominal contents through patent Processus Vaginalis or a peritoneal sac.[1] Inguinal herniotomy is the most common pediatric surgical procedure in children,[2] which involves dissection and ligation of patent Processus Vaginalis. Inguinal hernias occur in 30% of preterm and 5% of full-term infants, and boys are affected 4 to 10 times more frequently than girls.[3] The risk of incarceration is high in infants than in older children due to tight superficial ring.[4]

The steps of elective pediatric inguinal hernia repair surgery may differ between the surgeons, but ligation of the sac at the highest point after dissecting the Vas and vessels from it is believed to be the main point of surgery by all of them.[5] Incising the external oblique aponeurosis to dissect the sac from the cord is the most common surgical technique described by Ferguson.[6] However, another group of Pediatric surgeons uses the Michelle banks technique, which involves dissection of the hernia sac from the cord contents at the superficial ring without incising the external oblique to open the inguinal canal.[7] It is known that the main cause of hernia recurrence is an inadequate sac closure close to the deep ring.[8] Whether dividing the external oblique to open the inguinal canal is essential for herniotomy or it can be performed without, it as described by Mitchelle bank is a moot point.

The rationale of this study was that Ferguson's technique had managed almost all children with inguinal hernias at our institution, and MBT has not been assessed here. Therefore, we aimed to compare the two conventional methods of pediatric inguinal herniotomy, with and without incising external oblique aponeurosis, especially in terms of recurrence of the hernia.

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METHODOLOGY

In this quasi-experimental study, approval from the Hospital Ethical Committee was taken vide letter number (A/28/PEMH/EC-19-26). The study duration was one year, from September 2018 to September 2019. The sample size was calculated using the WHO sample size calculator, taking the anticipated population proportion-1 (P1) 9 2.3%, anticipated population-2 (P2) 9 2.9%, absolute precision 0.06 and confidence level 95%. After informed written consent from parents of the patients, 432 children with indirect inguinal hernia presenting in the Paediatric surgery Out-patient department, Pak Emirates Military hospital, was recruited by non-probability consecutive sampling.

Inclusion Criteria: Children of age 0-5 years with indirect inguinal hernia were included in the study.

Exclusion Criteria: Children with hydrocele, undescended testis, sliding, recurrent, and incarcerated hernia, underlying diseases like connective tissue disorder, cystic fibrosis, ascites, patients with ventriculoperitoneal shunts, and peritoneal dialysis were excluded from the study.

The patients were divided into two groups with 216 children in each by convenient sampling technique. In Group-I, the Mitchelle bank technique of herniotomy was performed without incising external oblique aponeurosis. In Group-II, the patients underwent herniotomy by Ferguson's technique with incising external oblique aponeurosis and opening the inguinal canal. It was a doubleblinded study as patients and outcome assessors were unaware of the procedure. Surgeons blinding was not possible as they were performing surgery. The main outcome of this study was to evaluate the hernia recurrence rate in each of two surgical procedures of pediatric herniotomy. Hernia recurrences six months after surgery were evaluated. Secondary outcomes included the comparison of other herniotomy complications in the two groups. Demographic variables like age, gender and clinical variables like operative time, intraoperative complications like tearing of the sac and ilioinguinal nerve damage (as observed by the sur-geon), and post-operative complications like hema-toma, seroma, hydrocele, testicular atrophy, ischemic orchitis, and recurrence rate were recorded. The patients were evaluated on the first post-operative day, at one month and six months.

The Data was entered on SPSS version 23 and analyzed. The means of age and operative time of the two groups were compared using independent sample t-test. The frequency of different early and late complications was compared using the Chi-square test, and the *p*-value of <0.05 was considered significant.

RESULTS

A total of 432 patients were studied, with 216 children in Group-I undergoing herniotomy without incising external oblique and 216 children in Group-II with herniotomy by incising external oblique.The demographic characteristics of the studied population are given in Table-I.

Table-I: Demographic features of studied population.

Parameters	Inguinal Hernia Repair without Opening the Canal (Group I) n=216	Inguinal Hernia Repair After Opening External Oblique (group II) n=216	*p*-value
Age			
Months	24.76 ± 16.63	25.94 ± 17.06	0.47
Gender			
Male Female	176(81.5%) 40 (18.5%)	177(81.9%) 30 (18.1%)	1.00

The mean age of the patients in Group I was 24.76 ± 16.63 and 25.94 ± 17.06 in Group II. There was no statistically significant difference between the mean age of the population studied in the two groups (*p*-value 0.47). Children were between the ages of 1 month to 5 years, most of them between 2 months and two years.

The gender distribution was also similar between the two groups (*p*-value 1.0). The male to female ratio in Group-I was 4.4:1and 5.9:1 in Group-II.

The mean operative time was less in Group-I (13.17 ± 1.47 minutes) than in Group-II (16.23 ± 1.51 minutes). The difference was statistically significant with a *p*-value of 0.01.

The frequency of intra-operative complications was not statistically different for the two groups, with a *p*-value of 0.38 regarding ilioinguinal nerve injury and 0.25 for tearing of sac.

The post-operative hydrocele and hematoma were more common in Group-I (n=15, 6.9% and n=9, 4.1%) as compared to Group II (n=5, 2.3% and n=3, 1.3%) with a *p*-value of 0.01and 0.03 respectively.

The two groups were statistically similar in rest of the post-operative complications in relation to the different groups-without and with incising external oblique aponeurosis the results were, respectively: a)

hernia recurrence, n=3 (1.3%) vs. n=2 (0.9%) with *p*-value of 1.00; b) seroma, n=8 (3.7%) vs. n=6 (2.6%) with *p*-value of 0.57; c) ischemic orchitis, n=6 (2.6%) vs. n=5 (2.3%) with *p*-value of 1.0 and d) testicular atrophy, n=4 (1.8%) vs. n=6 (2.6%) with *p*-value of 0.45. The intra and post-operative complications are shown in Table-II.

Table-II: Complications in Group-I and Group-II

Parameters		Inguinal Hernia Repair without Opening the Canal (Group I), n=216	Inguinal Hernia Repair after Opening External Oblique (Group II), n=216	*p*- value
Intra-Operative Complications	Ilioinguinal Nerve Injury	2 (0.95%)	4 (1.9%)	0.38
	Tearing of Sac	7 (3.2%)	3 (1.3%)	0.25
Post-Operative Complications	Hematoma	9 (4.1%)	3 (1.3%)	0.03
	Seroma	8 (3.7%)	6 (2.6%)	0.57
	Hydrocele	15 (6.9%)	5 (2.3%)	0.001
	Orchitis	6 (2.6%)	5 (2.3%)	1.00
	Atrophy	4 (1.8%)	6 (2.6%)	0.45
	Recurrence	3 (1.3%)	2 (0.9%)	1.00

DISCUSSION

Groin hernias and patent Processus Vaginalis with hydrocele are among the most common congenital pathologies in the Paediatric population. The technique of surgical repair differs with different operating surgeons with variable outcomes. However, high ligation of the sac close to the deep ring is considered the single most important step to prevent a recurrence. For this reason, most paediatric surgeons incise the external oblique to reach close to the deep ring and ligate the sac after dissecting it from the cord contents. The proponents of the Mitchelle bank technique argue that some characteristics of the inguinal canal-like small channel length (4-23mm up to the age of 12 years), less oblique plane in anterior-posterior direction and involvement of more elastic tissue provide some appropriate conditions for surgeons for moving the spermatic cord to reach the deep ring from the external ring without incising external oblique.[10-13]

Considering these characteristic features of the paediatric population, various studies favour the Mitchelle bank technique of inguinal herniotomy without opening the canal. For example, Jabłoński *et al*,[10] compared Ferguson's technique with MBT and found statistically significantly reduced recurrence rates (0.952% vs 1.68%) with other techniques.

Overall, the complication rate in inguinal herniotomy is low and considered 2% in most studies.[14] In general, the reported recurrence rate for uncomplicated hernia repair is 0% to 0.8%, testicular atrophy 0% to 1%, injury to the vas deferens 1.6% and iatrogenic undescended testicle 0.2%.[14]

In our study, the complication rate was relatively high. This is probably because of relatively small sample size than other studies. For example, Turk *et al*, [9] compared the two techniques with large sample size of 4520 patients, the overall complication rate shown by them was 2.3% in the FT group and 2.9% in the MBT group (*p*>.05). On the other hand, Shahnam *et al*,[15] conducted a randomized control trial in 2017, comparing these two techniques for inguinal herniotomy with a sample size comparable to our study. There results with MTB and FH were, respectively: a) hernia recurrence, n=4 (1%) vs. n=4 (1%); b) hematoma, n=5 (1.3%) vs. n=13 (3.3%); c) nerve damage, n=2 (0.5%) vs. n=9 (2.3%); d) abdominal viscera damage, n=0 (0%) vs. n=2 (0.5%0, *p*=0.499 no significant); e) hydrocele, n=24 (7.4%) vs. n=52 (15.9%); f) testicular size change, n=1 (0.3%) vs. n=6 (1.8%); g) ischemic orchitis, n=2 (0.6%) vs. n=4 (1.2%); h) vas deferens damage, n=2 (0.6%) vs. n=2 (0.6%). These results are close to what we had found in our study.

An inguinal hernia repair or recurrence is the most important aspect of the complications. Various factors are considered responsible for recurrence, including technical errors and infection,[16] injury to the floor of the inguinal canal and usage of inappropriate suture materials,[17] concomitant diseases and in carceration.[18] Vogels *et al*, considered the inadvertent opening of the hernia sac during its dissection of the Vas and vessels and the larger size of the hernia to be significant factors in recurrence. The overall recurrence rate in their study was 0.69%.[19]

In our study, tearing of the sac was seen in 3.2% (n=7) and 1.3% (n=3) cases, while the recurrence rate was 1.3% (n=3) and 0.9% (n=2) in Groups I and II, respectively. The difference was statistically insignificant

(p>0.05). The tearing of the sac was easily identified during surgery and repaired, and it had no effect as such on the recurrence rate in our study.

The operative time was reduced in the Mitchelle bank technique in our study because the external oblique was not incised and repaired. A similar result of reduced operative time was shown by Nazem *et al*,[6] in 2015 by MBT compared to Ferguson's technique. Ibrahim *et al*,[20] had shown that it would also contribute to the reduction in post-operative pain.

Although hydrocele and minor hematoma were more in the Mitchelle bank technique than in Ferguson's in our study, almost all hydroceles and hematomas resolved within a month without any further active surgical intervention.

CONCLUSION

The Mitchelle bank technique is safe and effective for inguinal herniotomy, and children can be benefitted from it instead of conventional, more interventional herniotomy techniques.

Conflict of Interest: None.

Author's Contribution

SR: Conception design analysis, interpretation of data, IA: Revising it critically for important itellectual content, SHA: Fianl approval, ZA: Interpretation of data, MS:, TA: Acquisition of data.

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