 Gombe NMA J, 1 (1): 1 - 4 (2024)

Original Article

Postoperative Outcomes Between Patients Who Had Modified Ferguson with Those Who Had Mitchell Bank's Herniotomy

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ABSTRACT

Background: The commonest inguino-scrotal ailments in children are hernia and hydrocele. Hence, herniotomy remains the commonest operative procedure performed by the Paediatric surgeons. The main objective is to compare early post-operative complications especially scrotal oedema or haematoma following the modified Ferguson (incision of the external oblique) and Mitchell Bank (non-incision of the external oblique).

Materials and methods: It's a prospective and single blind study carried out between May 2017 and April 2018 at the University Ilorin Teaching Hospital Ilorin, Kwara state. A total of 70 patients were randomized into 2 groups; modified Ferguson (n=35) and Mitchell Bank (n=35) methods of herniotomy. The patients were then followed up for 30 days to study the outcome. Data generated was analysed using SPSS software and 95% confidence interval was used, a p value <0.05 was considered statistically significant.

Results: The age range of the subjects was 2-15 years with a median of 4.13 years, majority had normal (71.4%) weight, while 20.6% were underweight. About 74.3% had right sided hernias/hydrocele. The mean duration of the surgery was 22.9±6.3 and 33.5±10.3 for MBH and MFH (P<0.001), length of surgical incision was longer in MFH (3.11 ± 0.55 cm) compared to MBH (2.22 ± 0.41 cm) (P< 0.001); There were 4 and 5 postoperative complications noted among those with MBH and MFH respectively, however, it was not statistically significant. (P=0.761)

Conclusion: The study showed that the incidence of post-operative complications was similar between the 2 groups, however, the duration of surgery and length of incision was longer in MFH compared to MBH. Therefore, when there is time constraint MBH is preferred.

KEYWORDS: Modified Ferguson Herniotomy, Mitchell Bank Herniotomy, Scrotal Oedema, Haematoma

INTRODUCTION

A hernia is an abnormal protrusion of a viscus or part of a viscus through a defect in the wall of its containing cavity[1] Hydrocele is an abnormal collection of serous fluids in the processus vaginalis or its remnants; inguinal hernia and hydroceles in children are pathologies related to persistence of processus vaginalis and they are the commonest inguino-scrotal swellings seen in paediatric age group; their treatment is same which is herniotomy, thus making herniotomy as the commonest surgical procedures[2,3]. Hydrocele is seen in 1-5% of term neonates and 7-35% of preterm neonates underscoring its relationship to the processus vaginalis. Herniotomy (high ligation of the processus vaginalis) remains the treatment of hydroceles and hernias in children. Once a diagnosis of either hernia or hydrocele is made, herniotomy should be done to avoid complications such as obstruction, bowel strangulation and testicular infarction[1]. The traditional methods of repair are Ferguson and Mitchell

Bank which involve inguinal approach; however, the Ladd's and Gross modification of Ferguson is now the choice by many paediatric surgeons[3,5,6]. Ladd's and Gross modifications of Ferguson entails opening the inguinal canal, dissecting and ligating the sac is at the deep ring. Its proponents argue that it gives good exposure of the operating field and ensures ligation of the sac at the deep ring, while those against it feel that it increases the chance of injuries to the neuro-vascular structures thus increasing haematoma and oedema of the scrotum[3,5,7]. On the other hand, however, the MB methods involve dissecting the spermatic cord at the external ring and ligating the sac without opening the inguinal canal. This is based on the fact that the inguinal canal is short or non-existent in infants because the superficial ring is superimposed with the deep ring[3,6-8]. However, some authors doubt the effectiveness of the MB method in older children and increase risk of residual sac[9] thus increasing chances of recurrence. However, its proponents believe that it is easy to perform and the complications are similar[5,7]. There are still controversies continued as to which method carries less complications and superior across the centres [2,5-7]. The aim is to compare the incidence of post-operative scrotal oedema and scrotal haematoma between the MFH & MBH.

MATERIALS AND METHODS

Study Site

The study was carried out at University of Ilorin Teaching Hospital, a 650 bedded tertiary health centre that caters for patients in Kwara and neighbouring states like Ekiti, Niger and Kogi. The Paediatric Surgery division which was founded in 1998, has three paediatric surgeons and has additional patronage from Ogun and Osun states as well as parts of Lagos state. The division performs about one hundred open herniotomies annually, and routinely as day operations.

Study Design

The study was a prospective randomized controlled single-blind hospital-based study.

Study Population

All children who attended Paediatric Outpatient Department clinic of University of Ilorin Teaching Hospital between May 2017 and April 2018.

Inclusion Criteria

Cchildren between the age of 2-15 years that present to the Paediatric Surgery Outpatient Department clinic with hydrocele or inguinal or scrotal hernia,

Exclusion Criteria

1. Patients with complicated hernia such as incarceration
2. Patients with recurrent hydrocele or hernia or previous groin surgeries
3. Patients scheduled to have other surgeries simultaneously such as circumcision or umbilical herniorrhaphy.

Sample Size Determination

Sample size for the study was estimated using the basic formula for a comparative study of two proportions.[16]

$$n(sample\ size\ per\ group) = \frac{2\left(Z_\alpha + Z_\beta\right)^2 P(1-P)}{(P_1 - P_2)^2}$$

Sampling Technique

Simple random sampling by balloting was used to recruit 70 children who were equally allocated into the 2 group (35 ballots for each method) A ballot was picked by a neutral theatre staff at each herniotomy. Those randomized into the Mitchell Banks method were designated the 'MBH' group and those randomized into the modified Ferguson method, the 'MFH' group.

Data Collection Method

Preoperative Care

Preoperative evaluation of the patients was carried out; where the clinical details were obtained from the patient which include the bio-data, duration, and site of groin swellings, co-morbidities and extent of the swellings; diagnosis made and recorded. Basic investigations such as packed cell volume (PCV) and haemoglobin electrophoresis, PCV >30% was considered as the minimum acceptable value. For the sickle cell disease patients their stable PCV 21-27% was accepted for the operation. After proper counselling of the parent or guardian about the surgical procedure, anaesthesia and the study; consent was obtained for both the procedure and the study. Routine fasting guidelines were followed, the patients were admitted into the paediatric surgical wards, intravenous 4.3% Dextrose in 0.18% saline was set up.

Operative procedure

The Modified Ferguson Herniotomy (MFH) Group

The oblique incision made on the lower skin crease or 1cm from the mid line. The incision deepened to the Campers and Scarpers layers. With blunt dissection the external oblique aponeurosis and external ring were exposed. The inguinal canal was opened by making a nick along the fibres of the aponeurosis with a new blade. With a pair of Mc-Indoe scissors, the incision was extended to the external ring after either the edges of the cut aponeurosis; thus, exposing the inguinal canal. After lifting the spermatic cord with a pair of Babcock forceps, the cremasteric fascia was divided along the length of the cord and stripped off; with sharp and blunt dissection the sac was dissected and continued proximally till the pre-peritoneal fat was seen. The sac was divided between clamps, the proximal stump was opened to ensure it was empty; the distal stump and transfixed with vicryl 3/0 at the level of the pre-peritoneal fat. The distal stump was then slit open along an avascular plane. The aponeurosis and subcutaneous tissues were closed in layers with vicryl 3/0; subcuticular skin closure was subsequently done with vicryl 3/0.

The Mitchell Bank's (MMB) group

An oblique incision made (measured and documented) was made over the site of the external inguinal ring lateral and superior to the public tubercle, and deepened through the subcutaneous layers. With sharp and blunt dissection, the external oblique aponeurosis and the external inguinal ring were exposed. Through the external inguinal ring the cord indentified without opening the external olique aponeurosis; the sac was dissected off the cord structures, proximal dissections were done with gentle traction on the sac till the pre-peritoneal and the procedure was completed as in MFH, the sac dissected with gentle traction to the pre-peritoneal fat. The procedure was completed as in MFH.

Post Operative Care

In both groups, wound dressing was done with a single piece of gauze and the patients taken to the recovery room, from where they were sent to the ward after recovery. The patients were discharged when they were fully awake and were seen on the 2nd day post operatively. A soft diffuse swelling of the scrotum which resolves within the 2nd post-operative week was considered as scrotal oedema, when it becomes discrete at the groin or scrotum was considered as haematoma. On the 5th, 14th, and 30th post-operative days the patients were further assessed for other complications such as surgical site infections.

Data Analysis

All data generated was processed and analysed using Statistical Package for Social Sciences (SPSS) version 20. Socio-demographic data were presented as proportions while quantitative data were described using means and standard deviations. Chi-square was used to determine any relationship between socio-demographic characteristics and certain variables, t-test was used to determine any significant difference between dependent and independent variables. A 95% confidence interval was used in this study and a $p<0.05$ was considered statistically significant.

Ethical Consideration

Ethical clearance was obtained from the University of Ilorin Teaching Hospital ethics and research committee, permission to conduct the study was sought and obtained from parents and caregivers of each child. The essence and contents of the study was explained to each parent as well as the benefit before a child was enrolled.

RESULTS

Of the total 70 subjects were enrolled (35 subjects for each group), 64 (91.4 %) were males and six (8.6 %) females. The MBH group and the MFH group had 32 males and 3 females each. Their age ranged between 2 to 15 years (median age was 4.13 years). The mean ages for the MBH and MFH groups were 5.11±0.7 years and 4.8 ±1.4 years respectively(p=0.665). Majority had a normal BMI (71.4%) while a few (8.6%) were overweight. There was no statistically significant difference between the two groups. (Table 1) In terms of site of diagnosis 52 children (74.3%) had right sided hydroceles/hernias and 18 were on the left. The mean duration of the surgery was 22.9±6.3 and 33.5±10.3 with a range between 15-44 minutes and 15-64 minutes for MBH and MFH respectively (<0.001). The length of incision was 2.22±0.41cm and 3.11±0.55cm for MBH and MFH respectively (p< 0.001). One patient in MFH had sliding hernia (bladder). Intra or post operatively there were no adverse effects. (Table 2)

Post-operative scrotal oedema was seen in 4 patients (2 in each group), haematoma was noted in 3 subjects (1 in MBH group and 2 in the MFH group) and 1 surgical site infection was noted in each of the groups. A total of 4 and 5 poor outcomes were noted across the 2

groups respectively. There was no significant association between the 2 procedures and outcome of surgery. (p=0.761) (Table 3).

Table 1 Socio-demographic characteristics of respondents in MBH and MFH groups

Variables	*MBH n=35 n(%)*	MFH n=35 n(%)	X^2-value	P-value
Age group (years)				
< 5	19 (44.2)	24 (55.8)		0.450
5 - < 10	14 (60.9)	9 (39.1)		
10 - 15	2 (50.0)	2 (50.0)		
Sex				
Male	32 (50.0)	32 (50.0)		0.999
Female	3 (50.0)	3 (50.0)		
BMI percentile group				
< 3	6 (42.9)	8 (57.1)		0.263
3 - 95	24 (48.0)	26 (52.0)		
> 95	1 (16.7)	5 (83.3)		

Post-operative outcome between MBH and MFH

Table 2 Comparison of duration of surgery and length of incision between MBH and MFH

Variable	MBH	MFH	P value
Mean Duration of surgery (minutes)	22.9±6.3	33.5±10.3	<0.001
Range Duration of surgery (minutes)	15-44	15-64	
Mean incision I Length (cm)	2.22±0.41	3.11±0.55	<0.001
Range of incision length (cm)	1.8-3.0	2.0-4.0	

Table 3: Comparison of the post-operative outcome between MBH and MFB

Outcome	Group MBH n=35(%)	MFH n=35(%)	X^2	P-value
Poor	4 (44.4)	5 (55.6)	0.500	0.761*
Good	31 (50.8)	30 (49.2)		
Total	35 (100)	35 (100)		

*Fisher's exact test

DISCUSSION

The socio- demographic features were similar in both groups this therefore eliminates any bias from poorly matched subjects. In a study Nmadu[11] the pathology s more on the right, this is what we also found here (74.3%). Similarly, the age range is 2-15 years (median 4.13 years) as was noted in other series[7]. The duration of the surgery was 28.2=10.0 minutes with range of 15- 64 minutes, which is similar to other studies such as Ibrahim et al 31.15minutes[9] and Okoro et al 32.9minutes[10]. However, Usang[11] reported a longer period of 41 minutes. The mean length of incision was 2.22=0.41cm in MBH while in MFH was 3.11=0.55cm. Therefore, duration of Surgery and length of incision were shorter and smaller respectively in MBH than MFH, Similar findings were noted by Ibrahim et al[9] and Al-Jazaeri et al[12], smaller incision may mean less dissection, less tissue trauma and perhaps less complication. Scrotal oedema which means diffuse swelling in the scrotum was noted in 5.71% in this study, they were noticed on the 2nd post-operative day, this is similar to what was noted by Nazem et al[5], TÜrk et al[7] and Ibrahim et al[9]. However, scrotal haematoma was noted in 4.28% of the study but the two groups were MBH 2.85%, MFH 5.7% though statistically no difference (p>0.999), the haematoma resolved spontaneously by 2 weeks post operatively without intervention. This is comparable to what was noted by Sarin et al 5.8%[13]. However, TÜrk et al 0.55% (7), Askapoir et al 1.2%[14], Ibrahim et al 1.9%[9] noted lower rates while Okoro et al[10] on the other hand noted high rate (21%).

CONCLUSION

The rate of scrotal oedema and haematoma in both MBH and MFH were similar; and the scrotal haematoma resolve spontaneously without intervention and therefore whichever method one chooses, it remains acceptable; however, where there is time constraint or a large number of patients needed to be operated on as in a situation of surgical outreach then MBH is preferred over MFH.

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