

Original Research Article

Comparative study: repair of congenital inguinal hernia with and without opening the inguinal canal

Tamer Fakhry, Hassan Ibrahim Elhaw*, Ahmed Nabil Fawzy

Department of Pediatric Surgery Unit, General surgery, Menoufia University, Menoufia, Egypt

Received: 25 December 2020

Revised: 09 January 2021

Accepted: 11 January 2021

***Correspondence:**

Dr. Hassan Ibrahim Elhaw,

E-mail: elhawhassan@gmail.com

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ABSTRACT

Background: Inguinal herniotomy is the most common surgery performed by paediatric surgeons.

Methods: 100 Male and female cases with congenital inguinal hernia aging from one month till the age of two years. randomly allocated into two groups for undergoing two types of hernia repair techniques, with and without opening the external oblique muscle fascia. Surgical complications such as fever, scrotal oedema and hematoma, and wound infections classified as early complication. The rates of mentioned early complications and operative time were compared in the two interventional groups. In this study, 100 cases were selected and allocated to the two interventional groups.

Results: The prevalence of early complications in two studied groups were not different significantly in two interventional groups. Operation time was significantly shorter in inguinal repair techniques without opening the external oblique muscle fascia than the other studied technique

Conclusions: The findings of our study indicated that though early complications of the two repair methods were similar, but the time of procedure was shorter in herniotomy without opening the external oblique muscle both methods are safe and feasible, choosing one of them depend on surgeon prefer.

Keywords: Hernia, Herniotomy, Inguinal

INTRODUCTION

Inguinal hernia is identified as a protrusion of an intra-abdominal content in the groin region. They are indirect in more than 99% of cases. Indirect inguinal hernia has incidence of 0.8-4.4%.¹

It requires closing the opened vaginalis processus, in other words, herniotomy. This type of hernia in a child is considered indication for surgery. Hernioplasty in adults requires the inguinal canal reconstruction and, due to this reason, it is different from pediatric hernioplasty. Inguinal hernia in men is more common than in women and, in men, occurs more often on the right side than the left. In infants due to inguinal hernia ring tight, there is a

high risk of hernia incarceration.² The incidence is highest during the first year of life and then gradually decreases thereafter, so one third of children undergoing surgery for hernia are less than six months of age. Premature infants have an even higher risk of developing inguinal hernia with incidence of 9-11 and 35-55% of these cases are bilaterally.³

In this research our main concern is to compare between modified Ferguson and Mitchell-Banks technique. In the first technique which is described as modified Ferguson technique it depends on high ligation of the sac following an opening the inguinal canal through an incision in the external oblique aponeurosis (with or without opening the

external ring). This technique can be applied to all age groups with very low complication rate.⁴

In the other technique which is described as Mitchell-Banks technique it also depends on high ligation of the sac with no need to open the inguinal canal depending on that the canal in pediatric age is short and the superimposing of the internal and external rings. In such a very common surgical operation that is nearly done every day it's our duty to choose the safest and the best technique for the children to improve their quality of life.⁵

The aim of the work was to compare between congenital inguinal hernia repair with vs without opening the inguinal canal regarding operative time, intraoperative complications (bleeding, cord injury) and postoperative complications (edema, hydrocele, hematoma formation, ascending testis, recurrence).

METHODS

Between July 2019 till July 2020, 100 patients presented with congenital inguinal hernia were included. They were selected by random serial number method from Mataria teaching hospital outpatient clinic and Menoufia university hospital. Informed consent was taken from the parents or child guardian. These patients were randomly divided into two equal groups whereas group A will undergo the repair with opening the inguinal canal while group B will undergo the repair without opening the canal. Each patient was coded with a number and after fulfilling all the research data, statistics were done.

Diagnosis was based on the history from children's parents, which was accomplished by clinical examination. All patients underwent abdominopelvic and groin ultrasound for confirmation of clinical diagnosis, complete blood count and international normalized ratio.

Surgical procedure

General anesthesia was induced through face/laryngeal mask or the endotracheal tube. The inguinal canal was accessed through a groin-crease incision placed just above and lateral to the pubic tubercle.

Male technique

Surgical technique was the same in both group A and B except in group A the inguinal canal was opened. Division of the superficial camper fascia with proper hemostasis. The superficial epigastric vessels were retracted or tied, and the Scarpa's fascia was incised with scissors.

Blunt dissection down to the external oblique aponeurosis was done then retractors were placed to expose the aponeurosis probably. In group A: (opening the inguinal canal) A short incision was made in the external oblique

aponeurosis. The edges were lifted, and a closed curved mosquito or scissors was inserted cranially and caudally prior to extending the cut. This was done to protect the ilioinguinal nerve from injury. The external inguinal ring is left intact, obviating the need for subsequent closure (this step was done in group A only). Delivering and separation of the spermatic cord from the posterior wall of the canal was done through the external oblique aponeurosis incision in group A or through the external ring in group B. Division of the cremasteric muscle layer and internal spermatic fascia. Dissection of the sac, which is usually the first layer, pearly white in color and anteromedial to the vas. Peeling the vessels and the vas from the sac was started with one of the prongs of a fine dissecting forceps and continued in a conventional manner with extra care to avoid tearing and entering the sac and the vas is never grasped with an instrument to avoid injury to its delicate wall or its blood supply. Once a safe window has been established between the hernia sac and the elements of the cord, the sac was cross-clamped with a straight mosquito (but not until the vas has again been clearly visualized and the absence of an intraabdominal structure in the sac, such as omentum, had been confirmed).

The proximal hernia sac is then lifted (gentle traction) with gentle counter traction on the cord. to be dissected up to its proper neck cranially to the level of the internal ring. Transfixion of the sac at the deep ring after twisting it for several times was then done. using synthetic absorbable suture material (4:0 or 3:0). Excision of the redundant sac was done allowing the stump to retract behind the lowermost fibers of the internal oblique muscle. The distal sac was incised; however, in pubocele cases the redundant sac was completely excised. Traction was applied to the scrotum to replace the testicle if it was pulled up during the dissection. In group A: reapproximating of the aponeurosis of the external oblique using synthetic absorbable suture material (4:0 or 3:0) was done. Reapproximating of camper and Scarpa's fascia using synthetic absorbable suture material (4:0 or 3:0). Subcuticular sutures for the skin closure and dressing were done.

Female technique

Same steps except those related to spermatic cord delivery and dissection.

Operation time was recorded by trained personnel in the operation room. After hernia repair, the patients were followed up on the day of surgery, 1-week for early complication. The rates of mentioned operative time and early complications were compared in the two interventional groups.

RESULTS

The present study included 100 male and female children the age of the patients ranged from 2-24 months with a mean value 11.24 ± 4.93 months in group A and ranged from 1-21 months with a mean value 10.88 ± 5.47 months.

The age was insignificantly different between both groups ($p=0.730$). 42 (84%) patients were male and 8 (16%) patients were female in group A and 38 (76%) patients were male and 12 (42%) patients were female in group B. Sex was insignificantly different between both groups ($p=0.317$). As regard to gestational age, 7 (14%) patients were preterm and 43 (86%) patients were full term in group A while 9(18%) patients were preterm and 41 (82%) patients were full term in group B. The comparison between both groups showed insignificant difference between both groups ($p=0.585$). As regard to the side of operation, 37 (74%) patients were right and 13 (26%) patients were left in group A. and 35 (70%) patients were right and 15 (30%) patients were left in group II. The comparison between both groups showed insignificant difference between both groups ($p=0.656$).

Operative time ranged from 18-30 min with a mean value 23.7 ± 3.44 min in group A and ranged from 13-28 min with a mean value 20.6 ± 3.8 min in group B. Operative time was significantly higher in group A than group B ($p<0.001$) (Table 1).

Table 1: Operative time in both groups.

Operative time (min)	Group A	Group B	P value
Mean \pm SD	23.7 \pm 3.44	20.6 \pm 3.8	<0.001*
Range	18-30	13-28	

Post-operative complications, minimal scrotal edema occurred in 7 (14%) in group A and in 8 (16%) in group B, Surgical wound site infection occurred in 2 (4%) in group A and in one patient (2%) in group B and minimal labial edema occurred in 0 (0%) in group A and in one patient (2%) in group B. The comparison between both groups showed an insignificant difference between both groups ($p=0.509$) (Table 2).

Table 2: Post-operative complications in both groups.

Post-operative complications	Group A (%)	Group B (%)	P value
Minimal scrotal edema	7 (14)	8 (16)	0.509
Surgical wound site infection	2 (4)	1 (2)	
Minimal labial edema	0 (0)	1 (2)	

DISCUSSION

Congenital inguinal hernia repair is the commonest paediatric surgical procedure done by paediatric surgeons; however, there is still no uniform consensus on the surgical repair.⁶

The modified Ferguson technique considers easier as it exposes the field properly which is usually narrow in the infancy age group. Also, this technique allows transfixing

the sac at the proper neck and this may help to reduce the occurrence of complications.

Mitchell-Banks technique depends on the fact that the inguinal canal in infancy is poorly developed and both the internal and external rings are nearly superimposed which allows easy accessibility to the neck of the inguinal sac with no need to incise the external oblique aponeurosis. This may save time and reduce the manipulation which may help to reduce the occurrence of complications.

In our study, there was an insignificant difference between both group A and B concerning the age factor. All cases were beneath the age of 2 years and meanwhile the period of the pathology is nearly similar. Also, all the patients underwent the repair within one month or two after appearing of the concomitant hernia, not to mention that the anatomy at this age is nearly similar so even the significant difference of the age factor could be neglected.

Concerning the operative time factor, there was a significant difference between both groups. Group A with modified Ferguson technique (23.7 ± 3.44 min) appears to consume more time than group B with Mitchell-Banks technique (20.6 ± 3.8 min), this could be due to the additional step of opening and closing the inguinal canal.

A study was done by Nazem et al, to compare the outcome of two methods of inguinal hernia repair among male children. 80 patients were enrolled, from which 66 patients were selected and allocated to the two interventional groups. The time of the procedure (min) was partly shorter in Mitchell-Banks technique (13.83 ± 0.52) comparing to with modified Ferguson technique was (15.15 ± 0.57).⁷ This is similar to our study.

Concerning the early complications, in both group A and B the short outcome appears to be similar as there was no significant difference between both groups concerning the occurrence of one week postoperatively complications which were the minimal scrotal oedema 7 (14%) in group A and 8 (16%) in group B Surgical wound site infection occurred in 2 (4%) in group A and one patient (2%) in group B and minimal labial oedema occurred in 0 (0%) in group A and one patient (2%) in group B.

In Nazem et al study, early complications were scrotal oedema, scrotal hematoma and wound infection in 5 (15.2 %), 1 (3%) and 1 (3%) in the Ferguson technique group and 1 (3%), 2 (6,1%) and 1 (3%) in the Mitchell-Banks techniques group.⁷

A retrospective study was done by Türk et al comparing inguinal hernia repair in an age group older than 2 years using modified Ferguson and Mitchell-Banks techniques show that both techniques are simple and safe. This study included 4520 cases that underwent hernia repair in a multicenter between 1997-2012. (40.2%) were operated

on by a modified Ferguson technique, while (59.8%) by Mitchell-Banks techniques. Early complications were wound infection, scrotal edema, and hematoma in 13 (0.8%), 15 (1%), and 10 (0.6%) in the Ferguson technique group, and 12 (0.5%), 18 (0.7%), and 15 (0.6%) in the Mitchell-Banks techniques group, respectively ($p>0.05$), so there was no significant difference between both groups which matches with our research results except that we recorded occurrence of scrotal edema with a higher rate comparing to their results (14% in group A and 16% in group B, compared to their results 1% and 0.7%), but the sample size is far away smaller than their sample size.⁸

The rate of complications in our study and Nazem et al study was higher than reported by Turk et al.⁸ It may be due to the differences in the method of study as well as the low sample size of our studied population comparing with the study of Turk et al.⁸ It seems that further multicenter studies with larger sample size would provide us more accurate results, regarding the rate of different complications.

Hughes et al are done a retrospective study to review the complication rates following inguinal herniotomy. This study reviews all inguinal hernia performed in infants under 12 months of age over 5 years at a tertiary pediatric surgery center comparing premature (gestation <36 weeks) and term infants. Four hundred and eight (480) patients underwent inguinal hernia, 197 were premature and 211 were term. No significant difference was found in complication rates between premature and term infants despite significantly more premature infants presenting with incarcerated hernias. In our study we did not record early complications in preterm cases maybe due to their low percent (16%) of total cases. Early complications were defined as those occurring within 30 days of inguinal hernia, and late complications were those occurring more than 30 days after surgery. Early postoperative complications rate was 2.8% including Wound infection, scrotal hematoma, laparotomy for obstruction/perforation, prolonged ileus and Residual hydrocoele.⁹

In general, the findings of our study indicated that though early complications of the two repair methods were similar. But the time of procedure was partly shorter in herniotomy without opening the external oblique muscle.

Limitations

There were some limitations in this study. First, we focused only on early postoperative complications, late complications have been not possible break of COVID-19. Second, there might be a selection bias as a result of comparing mix of male and female cases though there are anatomy differences affect results as regarding time of the operation. Also, number of cases were not large enough. All this need to be evaluated in future studies.

CONCLUSION

There are no significant differences between both techniques regarding the intra operative complications and post-operative complications in short term follow up; however, modified Ferguson technique appears to consume more time than Mitchell-Banks technique. Each technique is feasible and safe. The technique of choice basically depends on the surgeon's preference.

ACKNOWLEDGEMENTS

Authors would like to thank to Dr. Mohamed Said Elsharkawy for data analysis.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Menoufia faculty of medicine

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Cite this article as: Fakhry T, Elhaw HI, Fawzy AN. Comparative study of repair of congenital inguinal hernia with and without opening the inguinal canal. *Int Surg J* 2021;8:459-62.