ORIGINAL ARTICLE

Herniotomy to Treat Inguinal Hernia in Children: Analysis of Clinical Outcome of One Decade Experience

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ABSTRACT

Objective: Evaluation of the clinical outcome of inguinal herniotomy in children at a single center.

Study Design: Retrospective cross-sectional study.

Place and Duration of Study: Department of surgery, Northern Area Armed Forces Hospital Hafer al Batin, Saudi Arabia, from July 10, 2011, to Oct. 10, 2021.

Materials and Methods: A total of 256 patients admitted with inguinal hernia underwent inguinal herniotomy. All the patients were treated by single senior pediatric surgeon. The age ranged from 2 months to 13 years. The data was collected regarding age at operation, gender, location, investigations performed, operative procedure, and complications of the surgical intervention. The follow up was also done in the outpatient clinic for 12 months to assess the complications and outcome of the procedure. The data was analyzed by IBM® SPSS® version 26.0. The Fischer exact test was applied to evaluate the association of site of inguinal hernia with gender. The *p* value less than 0.05 was considered statistically significant.

Results: One hundred and seventeen (46%) patients had right sided inguinal hernia, 124 (48%) had left sided and 15 (6%) were having bilateral inguinal hernia. There was no per-operative and post-operative complication. There was no testicular atrophy. There was no recurrence of inguinal hernia during follow up of 12 months after surgery. All the children had successful clinical outcome on follow up of 12 months period. Fischer exact test was applied to find the association of type of inguinal hernia with gender and the *p* value was 0.166 which is considered statistically nonsignificant.

Conclusion: Early inguinal herniotomy on next available elective list is safe, effective and feasible procedure to treat children with inguinal hernia.

Key Words: *Inguinal Hernia, Inguinal Herniotomy, Recurrence, Testicular Atrophy.*

Introduction

Inguinal hernia is a common pediatric surgical problem which needs surgical intervention.[1]The child usually presents with inguinoscrotal swelling. Thus, in children it is always indirect herniation with contents passing through the deep ring.[2] It occurs due to inability of closure of processus vaginalis.[3] In female children persistence of canal of Nuck is its counterpart.[4] The congenital origin of etiology and its surgical management was described by Ambroise Pare about 400 years back.[5]

The incidence of this condition in full term children is 3% and in preterm babies, the incidence is 30%.[6]

In a simple hernia, differential diagnosis includes hydrocele, undescended testis, retractile testis and lymphadenopathy.[7] Amyand's hernia with appendix as content of sac occurs in 1% of the cases of inguinal hernia. It was described by Claudius Amyand in 1735.[8]

The inguinal herniotomy is the most common elective surgery performed by the pediatric surgeons.[9]The herniotomy is indicated as elective surgery to prevent complications like incarceration leading to strangulation of its contents.

Baird *et al.,* [10] reported increased risk of apnea of prematurity after surgery. The risk of apnea in premature infants with corrected age less than 45 weeks is reported to be 5 times higher after surgery as compared to the infants operated after the corrected age of 45 weeks. Thus overnight observation of premature infants with less than 45

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weeks of corrected age is recommended.

The procedure of herniotomy involves transfixation of patent processus vaginalis at the deep ring. The vas and testicular vessels are at risk of injury during the procedure. Testicular atrophy may also occur after inguinal herniotomy.[11] Recurrence of inguinal hernia has been seen in 0.02 to 2.5 % of patient.[12]This fact prompted the authors to analyze the clinical outcome of inguinal herniotomy in children performed by single pediatric surgeon over a period of past one decade.

Materials and Methods

This retrospective cross-sectional study was conducted at Northern Area Armed Forces hospital Saudi Arabia from July 10, 2011 to Oct.10, 2021. All the children diagnosed as a case of reducible inguinal hernia ranging from 2 months to 13 years of age were scheduled through outpatient clinic for inguinal herniotomy as elective surgery. Moreover, the patients included were only elective cases, without any comorbid condition. The cases presenting with incarceration or strangulation and with associated genital or abdominal wall pathology were excluded from the study. The herniotomy was advised only when the inguinal hernia was clearly evident on clinical examination. The children were admitted through out- patient clinic one day prior to surgery. Complete blood picture, coagulation profile and hepatitis screening tests were done for all the cases. All the children were treated by inguinal herniotomy under general anesthesia by a single pediatric surgeon.

We adopted the policy of not exploring the contralateral side with unilateral inguinal hernia. The surgery was performed through standard small skin crease transverse groin incision. The external oblique aponeurosis was divided only in children more than one year of age. The hernial sac was identified and dissected away from surrounding cord structures saving the vas and vessels with high transfixation at the neck of the sac at the deep ring (Figure 1-3). The hospital stay was 24 to 48 hours. The patients were discharged home on first post-operative day in good health, with a follow up visit in outpatient clinic at one week, 6 months and one year of intervals.

Data regarding age at operation, gender, location of hernia, investigations undertaken, operative procedure, and postoperative complications was collected from electronic hospital record and was analyzed by the operating pediatric surgeon. The results were analyzed to evaluate the clinical outcome of inguinal herniotomy. The IBM® SPSS® version 26.0 was used for data analysis. Fischer exact test was applied to see the association of type of inguinal hernia with gender. The *p* value ≤ 0.05 was considered statistically significant.

Results

There were 98 (38%) infants below the age of one year in our study, whereas 96 (38%) patients were between the ages of one to five years, 56 (22%) patients were between the age of 6 - 10 years and 6 (2%) patients were between the ages of 11 - 13 years. (Table-II). The mean age of patients in our study was 3.5 years.

One hundred ninety-seven (77%) patients were male, and 59 (23%) patients were female. The M: F ratio was 76.95:23.04. (Table I). One hundred and seventeen (46%) children had right inguinal hernia, 124 (48%) children had left inguinal hernia and 15 (6%) patients had bilateral inguinal hernia. Amyand's hernia with appendix as content of the sac was found in 2 (0.8%) patients. Both were treated by appendectomy and herniotomy.

There was no per-operative complication. Only 4 (2%) patients had mild wound infection treated by a short course of oral antibiotic with wound care. Three (1%) patients had mild scrotal hematoma which resolved spontaneously. There was no testicular atrophy (0%). No recurrence of inguinal hernia is seen in this series (0%). All the patients had successful outcome of inguinal herniotomy on follow up of more than one year. Only 5% children developed contralateral inguinal hernia during follow up of 12 months, which were treated as elective cases. Fischer exact test was applied with *p* value 0.166, which is non-significant, inferencing that there is no significant association of gender with the site of inguinal hernia.

Table I: Association of Site of Inguinal Hernia with Gender

Gender	Inguinal Hernia Type			*p* value
	Right (n=117)	Left (n=124)	Bilateral (n=15)	
Male (n=197)	85	98	14	0.166
Female (n=59)	32	26	1	

The *p* value ≤ 0.05 was considered statistically significant.

Table II: Age Range of the Patients

Age Range	Number of Patients
Less than one year	98 (38 %)
1-5 years	96 (38 %)
6-10 years	56 (22 %)
11-13 Year	6 (2 %)

Figure 1. Hernial Sac being Separated

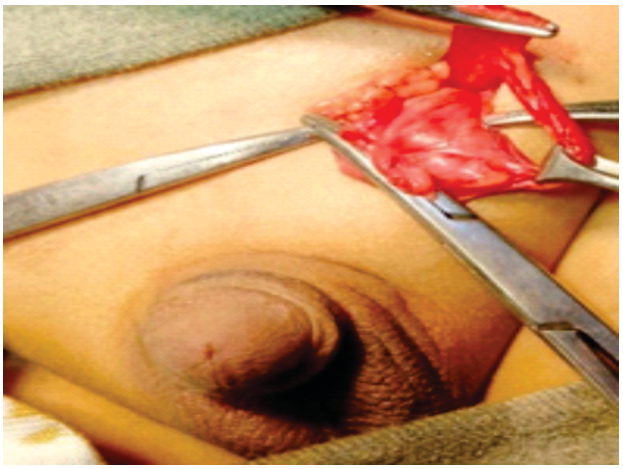

Figure 2. Vas deference being Saved

Figure 3. Testicular Vessels being Separated

Discussion

Our study showed that 38% children present with inguinal hernia before one year of age. Right sided inguinal hernia was present in 46 % and left sided inguinal hernia was seen in 48% cases. Bilateral inguinal hernia was present in only 6 % of patients. In this series, 0.8% patients showed right sided Amyand's hernia with appendix as content of sac found at operation. There was no peroperative complication (0%).There was no recurrence (0%) of inguinal hernia and no case of testicular atrophy (0%) was found in this study during follow up of more than 12 months period.

The male to female ratio is 11.3:1.[13] In our series, male to female ratio was 3.3:1. Most of the hernias occur in males. The difference in ratio may be due to data from a single center. Tan SS *et al.,*[14] reported that 33 % patients present within one year of age. In our series, 38% children presented within one year of age.

Ramachndran V et al.,[15] found that 60 % of inguinal hernias occur on the right side. In our series, right sided inguinal hernia was found in 46 % of the patients. The left sided inguinal hernia was seen in 48% cases and bilateral inguinal hernia was found in 6 % of patients. The inguinal hernia may be unilateral or bilateral. There is variation of data at single centers. Thus, there is need of meta-analysis from different centers.

Contralateral herniotomy has been recommended in the literature.[16,17] We followed the policy of not exploring the contralateral side with unilateral inguinal hernia to avoid unnecessary surgery, and herniotomy was advised only when the inguinal hernia was clear on clinical examination. We found that only 5% cases developed contralateral inguinal hernia during follow up of 12 months. Thus, our study indicates that routine contralateral exploration is unnecessary.

Morini F *et al.,*[18] found that Amyand's hernia occurs in 1% of the cases of inguinal hernia and is more common on right side. In our series, 0.8% patients had right sided Amyand's hernia with appendix as content of sac found at operation.

Walsh CM ., at al[19] reported per-operative complications of inguinal herniotomy including injury to testicular vessels and vas deferens. We didn't have any injury to testicular vessels or vas

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deference in this series. Baird *et al.,*[20] reported 5 times increased risk of apnea of prematurity after surgery in premature infants with post-conception age less than 45 weeks. In this series, overnight observation of infants less than 45 weeks of corrected age was found as a safe practice. Edon O et al.,[21] reported postoperative complications including scrotal hematoma, recurrence of inguinal hernia and testicular atrophy. There was no post-operative complication in this series

Minimal mobilization of cord and floor of inguinal canal is recommended to prevent postoperative complications of inguinal herniotomy.[22,23] This factor was found most relevant in this study to avoid per operative and postoperative complications of herniotomy.

Despite of large sample size, this study was a single centered study. However, this data is reliable as it covers a large population.

Conclusion

Early inguinal herniotomy on next available elective list is safe, effective and feasible procedure to treat children with inguinal hernia. Minimal mobilization of cord and floor of inguinal canal is recommended to prevent postoperative complications of inguinal herniotomy

Conflict of Interest

Authors declare no conflict of interest in publication of this article.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.