



Clinical Characteristics of Inguinal Hernia Repair in Children: A Retrospective Study

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General Note



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ABSTRACT

Inguinal hernia (IH) is one of the most common surgical conditions seen in pediatric age group and managed only surgically. *Aim:* The aim of our study was to investigate clinical characteristics of IH in children. *Methods:* This is a retrospective observational study based on medical charts carried out at a secondary hospital in southern region period between January 2013 and July 2019. We included all patients younger than 13 years and attend to pediatric surgery clinic and underwent to IH repair. *Results:* A total of 272 children were diagnosis with inguinal hernia repair, of them, 256 could be analyzed. Ages range from days to 12 years with mean age of 2.5 ± 3.2 years old. Majority of the children were males (75%; 192). The most frequent signs and symptoms were Reducible swelling (76%) followed by irreducible swelling (12%), cough impulse (11%), swelling with crying (11%). *Conclusion:* In present study we found that an inguinal hernia with irreducible sac contents, tenderness, and obstruction was more among preterm young children with very low birth weight.

Keywords: Inguinal hernia, Pediatric, Clinical features, Preterm

1. INTRODUCTION

Inguinal hernia (IH) is the commonest condition and surgical repair in infants and children with a higher incidence in preterm and very low birth weight than the general population (Grosfeld, 1989; Rajput et al., 1992). IH repair in children different between countries, In United States 500,000 every year while in the United Kingdom estimated 100,000. IH in represented more frequently in preterm than a term babies with 30% and 5%, respectively. IH in children is more prominent in males with 4-10 times (Chen et al., 2018). Clinical features of IH in children usually observed from parents or carers have notice lump or swelling in the inguinoscrotal region with sometimes varies in size, and the size tends to be more prominent with cough or crying. Many differential diagnoses for groin masses, therefore, taking a good history from patients and her/his parents accompanied by clinical examination can often reveal a diagnosis and help to exclude other conditions like undescended testes and hydrocele (Yeap et al., 2020). On our findings, there is no available data about pediatrics IH in Khamis Mushayt. Hence, the aim of this study is to investigate the clinical characteristics of pediatric IH.

2. METHODS

This was a retrospective observational study based on medical charts was conducted at Armed Forces Hospital southern region (AFHSR), Khamis Mushayt, Saudi Arabia, between the period of January 2013 and July 2019. Khamis Mushayt is a big city in southwestern region. It contains two hospitals. AFHSR is a secondary and main hospitals in southern region. It provides service to the military- affiliated community and healthcare providers work at hospital. A total of 272 children were diagnosis with inguinal hernia repair during the study period. Of them, 256 could be analyzed. *The inclusion criteria comprised:* all children attended to pediatric surgery department younger than 13 years and underwent to inguinal hernia repair. *The exclusion criteria:* patients above age of 13 years old, Missing data, patient having unconfirmed diagnosis of inguinal hernia repair and referred patient to another hospital. After we obtained ethical approval from ethical research committee at hospital the patients' data were extracted from their medical records using their medical record number. The collected data included the following: a) gender; b) age at delivery (term and preterm); c) birth weight (normal, low birth weight, very low birth weight); d) age at referrals, age at surgery and duration between age at referrals and surgery; e) side of the inguinal hernia (right, left or bilateral); f) signs and symptoms at presentation; g) surgical technique (open, and laparoscopic), (herniotomy & herniorrhphy); h) duration of hospital stay. *Data analysis:* After data were extracted, it was revised, coded, and fed to statistical software IBM SPSS version 22(SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including children demographic data, clinical presentation, and management methods. Cross tabulation was used to assess distribution of inguinal hernia clinical presentation with personal and clinical data. Relations were tested using Pearson chi-square test.

3. RESULTS

A total of 256 children were included whose ages range from days to 12 years with mean age of 2.5 ± 3.2 years old. Majority of the children were males (75%; 192). As for age at surgery for the hernia, 110 children (43%) underwent the surgery below the age of one year and 34.4% underwent the surgery at the age of 4 years or above. As for duration between diagnosis and surgery, 114 (44.5%) of

the children waited for months till undergoing surgery and 26.6% underwent the surgery within days while 19.1% waited years. Regarding gestational age, 193 (75.4%) were born full-term while 24.6% were born at preterm condition. As for birth weight, 63.7% had normal birth weight, followed by 30.5% had low birth weight while 5.9% had very low birth weight (Table 1).

Table 1. Bio-demographic data of study included children with inguinal hernia, Saudi Arabia

Child bio-clinical data	No	%
Age in years		
< 1 year	124	48.4%
1-3	55	21.5%
4-12	77	30.1%
Gender		
Male	192	75.0%
Female	64	25.0%
Age at surgery		
< 1 year	110	43.0%
1-3	58	22.7%
4-12	88	34.4%
Duration between diagnosis and surgery		
Days	68	26.6%
Weeks	25	9.8%
Months	114	44.5%
Years	49	19.1%
Age at delivery		
Preterm	63	24.6%
Full-term	193	75.4%
Birth weight		
Very low birth weight	15	5.9%
Low birth weight	78	30.5%
Normal	163	63.7%

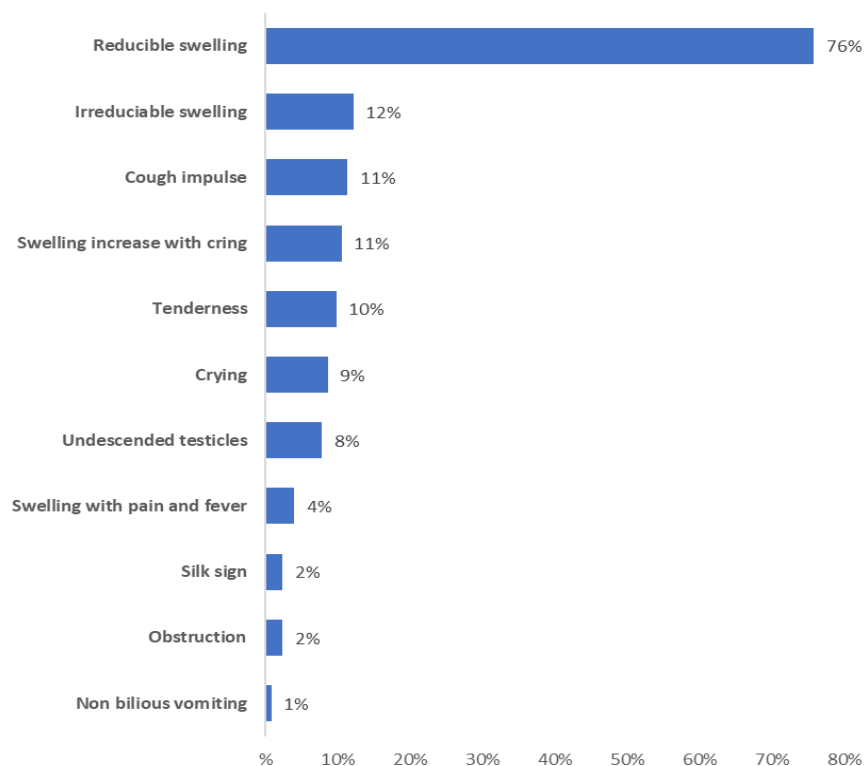


Figure 1. Clinical presentation of hernia among study children, Saudi Arabia

Figure 1 illustrates clinical presentation of hernia among study children. Reducible swelling was the most common symptom (76%) followed by irreducible swelling (12%), cough impulse (11%), swelling with crying (11%), tenderness (10%), absent testes (8%), and painful swelling with fever (4%).

Table 2 demonstrates clinical management and hospital stay among children with inguinal hernia. Herniotomy was the most underwent surgical intervention (96.9; 248) while only 8 (3.1%) children undergone Herniorrhaphy. Regarding the procedure, open surgery was recorded for 164 (64.1%) children while 67 (26.2%) underwent laparoscopic intervention and 25 (9.8%) underwent open surgery with laparoscopy. As for hospital stay, 42.6% of the children stayed for one day and 33.2% stayed for 2-3 days while 13.7% were discharged within hours.

Table 2. Clinical management and hospital stay among children with inguinal hernia, Saudi Arabia

Hernia management	No	%
Management of procedure		
Herniorrhaphy	8	3.1%
Herniotomy	248	96.9%
Surgery of procedure		
Laparoscopic	67	26.2%
Open	164	64.1%
Both	25	9.8%
Duration of hospital stay (days)		
Hours	35	13.7%
1 day	109	42.6%
2-3	85	33.2%
4-6	27	10.5%

Table 3 shows distribution of presenting symptoms according to children bio-clinical data. The most presenting symptom at children who underwent surgery below the age of 1 year was reducible swelling (78.2%) compared to 69.3% of those who aged 4-12 years ($P=.001$). Also, irreducible swelling was detected among 14.7% of those who waited for days to undergo the surgery compared to 6.1% of those who waited for years. Exact of 25.4% of preterm children had irreducible swelling compared to 7.8% of full-term children ($P=.004$). Besides, laparoscopic surgery was done for 4.5% of children with irreducible swelling compared to open-surgery (15.2%; $P=.023$). All other factors were insignificantly related to child's main complaints.

Table 3. Distribution of presenting symptoms according to children bio-clinical data

Factors	Presenting signs and symptoms						P-value
	Reducible Swellings		Irreducible swelling		Others		
	No	%	No	%	No	%	
Gender							.729
Male	145	75.5%	26	13.5%	104	54.2%	
Female	49	76.6%	5	7.8%	38	59.4%	
Age at surgery							.001*
< 1 year	86	78.2%	22	20.0%	65	59.1%	
1-3	47	81.0%	5	8.6%	20	34.5%	
4-12	61	69.3%	4	4.5%	57	64.8%	
Duration between diagnosis and surgery							.164
Days	58	85.3%	10	14.7%	34	50.0%	
Weeks	19	76.0%	3	12.0%	11	44.0%	
Months	86	75.4%	15	13.2%	68	59.6%	
Years	31	63.3%	3	6.1%	29	59.2%	
Age at delivery							.004*
Preterm	47	74.6%	16	25.4%	39	61.9%	
Full-term	147	76.2%	15	7.8%	103	53.4%	

Birth weight							.211
Very low birth weight	11	73.3%	5	33.3%	9	60.0%	
Low birth weight	62	79.5%	11	14.1%	43	55.1%	
Normal	121	74.2%	15	9.2%	90	55.2%	
Management of procedure							.316
Herniorrhaphy	8	100.0%	2	25.0%	4	50.0%	
Herniotomy	186	75.0%	29	11.7%	138	55.6%	
Laparoscopic	0	0.0%	0	0.0%	0	0.0%	
Surgery of procedure							.023*
Laparoscopic	50	74.6%	3	4.5%	35	52.2%	
Open	119	72.6%	25	15.2%	95	57.9%	
Both	25	100.0%	3	12.0%	12	48.0%	

P: Pearson X^2 test

* $P < 0.05$ (significant)

Regarding assessment of hospital stay according to type of underwent surgery, most cases who underwent open surgery stayed for 1 day (48.2%) compared to 38.8% of those who underwent laparoscopic surgery. The most reported stay duration for those who underwent laparoscopic surgery was 2-3 days (44.8%) compared to 26.2% of children with open surgery.

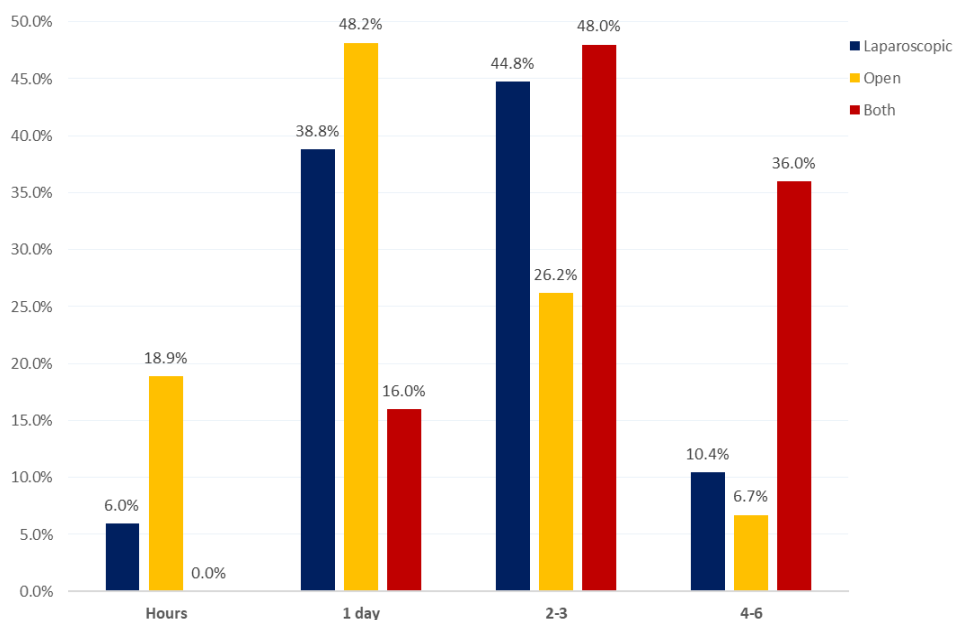


Figure 2. Hospital stay according to type of surgery for children with inguinal hernia, Saudi Arabia

4. DISCUSSION

IH is a common problem in children required surgical repair. The study aimed to assess pattern, and clinical presentation of IH among children. The study revealed that most of the children were males and young below the age of one year. This was consistent with many studies findings that showed the incidence of IH by age and gender (Geiger et al., 2017; Burcharth et al., 2013; Salma et al., 2016; Al-Jazaeri et al., 2017). The study also revealed that one-quarter of the children were preterm, and one third were low birth weights, which are highly reported risk factors for IH in the pediatric age (Peevy et al., 1986; Kumar et al., 2002; DeCou et al., 2000; De Goede et al., 2015). Powell et al., (1986) conducted a study with the main question is Why do so many small infants develop an IH? in two years, survivors, 995 (93%) were assessed. Tends to be more in male had a hernia by three years of age, a total cumulative prevalence of 9.2%: it was significantly higher in patients with lower birth weight, to be male is risk factor, neonatal intravenous feeding, and lack of respiratory disease. As for age at surgery, the study showed that the majority of the children underwent surgery before one year of age. Suvera MS et al., (2013) reported that 21% of patients were diagnosed at less than two years. Nearly 44% of the children waited for months to undergo surgery while one out of each five children waited for years to do.

Regarding clinical presentation, the most reported swelling (nearly all cases), which was reducible among three-quarters of the cases, was irreducible among only 12%. The swelling was painful with fever among 4% of the children. Also, tenderness was detected among 10% of the children, and 8% were presented with swelling and absent testes. Intestinal obstruction was not a common clinical sign and so vomiting. These clinical presentations were, to some extent, concordant with what is known in the literature regarding IH clinical profile in infants (Wang et al., 2012; Deboer, 1957). On studying the distribution of the clinical presentation with children data, irreducible swelling was more reported among preterm young infants with low birth weight. This may be explained by being incarcerated sac so associated more with other symptoms, including pain, tenderness, and intestinal obstruction, and fever. Also, children with irreducible swelling waited for a shorter duration to undergo surgical repair as open herniorrhaphy was the most frequent technique. Locally, in Qurrayat, Saudi Arabia, Salma et al., (2016) reported that combined herniotomy and herniorrhaphy was carried out in most (98.8%) cases, herniotomy combined with appendectomy was performed in 0.6%, herniotomy combined with orchiectomy was performed in 0.4%, and herniotomy combined with hydrocele was performed in 0.2% of the cases.

These procedures were mainly done with open surgery (64.1%), while only 26.2% underwent the repair method using laparoscopy. However, 9.8% underwent to laparoscopy followed by open. Many cases of pediatric inguinal hernias and hydrocele treated at the University Hospital of the West Indies over five years have been reviewed. Herniotomy done for 92.6% of cases, while herniorrhaphy was done for large hernias and sliding hernias (Venugopal et al., 1993).

A Systematic Review and Meta-Analysis have been reported by Feng S et al., (2015) to study open versus laparoscopic inguinal herniotomy in children five randomized clinical trials with 553 children of those 278 underwent to open herniotomy (OH) while 275 underwent to laparoscopic herniotomy (LH). By Comparing with OH, demonstrates shorter operative time for unilateral hernias was reported in extraperitoneal approaches' group as well as for bilateral hernias whereas, LH group found to be less total postoperative complications, especially for major postoperative complications in male children.

The postoperative hospital stay was not too long, as nearly 43% of the children stayed for only one day, and one third stayed for 2-3 days. Figure 2 illustrated that children who undergo laparoscopic repair stayed in the hospital after surgery for a longer duration than those who underwent open surgery.

5. CONCLUSION

In conclusion IH is a common problem in children required surgical repair. In present study we found that an IH with irreducible sac, tenderness, and obstruction was more among preterm young children with very low birth weight. In addition, IH is more prominent in males.

Authors' contributions

Hamad Abdullah Hader: Primary author read and approved the final manuscript.

Tahani Alrashidi, Yazeed Alshehri, Majed Hosiky, Nawaf Abdulhadi Fayzah Alrazhi, Raghad Almuidh , Manar Alsaeedi, Anhar alQahtani, Jamilah Alshahrani Ahmed Alanazi are carried out this work in collaboration. All authors read and approved the final manuscript.

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Ethical approval

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Conflict of interests

The authors declare no conflict of interest.

Abbreviations

IH: Inguinal Hernia

OH: Open herniotomy

AFHSR: Armed Forces Hospital southern region
SPSS: Statistical Package for Social Sciences Software
VLBW: Very Low Birth Weight
LH: Laparoscopic herniotomy

Data and materials availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

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