



Surgical management of pediatric inguinal hernia repair

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General Note



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ABSTRACT

Background: Inguinal hernia (IH) is considered the most common surgical procedure performed in pediatric patients. IH is more prominent in males. **Objective:** The purpose of this study to investigate the epidemiology and outcomes of IH in our center. **Methods:** A five- year retrospective study carried out at, Tabuk, SA since 2015 in all the patients who underwent to IH repair. **Results:** This study included 150 patients who underwent surgical management for an IH. Males were more prominent. A 40% of patients were preterm. Approximately half of the patients were delivered with a low birth weight (LBW). Most of the patients were younger than one year (59.3%). Right IH is the most common side. Incarcerated hernia was reported in 7 patients (4.7%), and a strangulating hernia was reported in 2 patients (1.3%). However, an obstructed hernia was only reported in one patient (0.7%). Postoperative complications were not observed in the majority of patients. **Conclusion:** In the present study, the presentation of IH was more frequent in children younger than one year in age. Approximately half patient delivered with LBW.

Keywords: Epidemiology, inguinal Hernia, Pediatrics, Low Birth Weight, Preterm Patients.

1. INTRODUCTION

Inguinal hernia (IH) is considered the most common surgical procedure performed in pediatric patients. IH is more common in males than in females (Akruwala and Sharma, 2013). The incidence of IH in term infants is 3% to 5%, while the incidence of IH in preterm infants born at less than 33 weeks of gestational age is 13% (Wang et al., 2012). IH occurs unilaterally and bilaterally, and 85% of cases of IH are unilateral (Esposito et al., 2016). After the diagnosis of an IH, it is necessary to perform surgery to avoid incarceration of the hernia. The incidence of incarceration of a hernia in children and infants not treated with surgery ranges from 6% to 18%, but it increases to approximately 30% in 1-year-old children (Wang et al., 2012; Esposito et al., 2016). In patients with unilateral IH, after a repair, there is a chance of developing another hernia on the opposite side, and the incidence varies between 5% and 20%. IH is a clinical diagnosis obtained by taking an adequate history and performing a physical examination. Most mothers notice bulging in the groin area that appears suddenly. The intermittent bulge is usually associated with crying and defecation; however, children with incarcerated hernias have irreducible swelling and symptoms and signs of intestinal obstruction including vomiting, abdominal distention, and a mass in the inguinal area that may be seen in the labia in females (Esposito et al., 2016). There are rare complications associated with IH repair, including hernia recurrence, injury to the vas deferens, and atrophy testis; however, long-term complications are chronic pain and infertility in adulthood (Wang et al., 2012). It is not uncommon to see an IH involving an ovary with or without a fallopian tube in females younger than one year of age (Karadeniz et al., 2015).

Aim of the Study

To investigate the epidemiology of hernias, postoperative complications, and coexisting medical conditions in Tabuk

2. METHODS

Study design and setting

This was a retrospective observational study reviewed the hospital files of children who were diagnosed with IH and underwent an operation at KSAFH in Tabuk, SA, between January 1, 2015, and May 30, 2019. We enrolled all children with an IH aged from birth to 13 years who underwent surgery within the specified time frame. The present study was conducted in Tabuk, Saudi Arabia. Tabuk city contains three large hospitals. The KSAFH is a secondary hospital and considered one of the major hospitals in Tabuk City received many cases. It was established in 1979, with a bed capacity 900 beds. The inclusion criteria were patients who underwent IH surgery and patient age younger than 13 years old at the time of IH repair. The exclusion criteria were patients older than 13 years old at the time of IH repair and incomplete data in hospital medical records.

Data collection and analysis

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; c) birth weight; d) age at diagnosis; e) side of the inguinal hernia (right, left or bilateral); f) mode of surgery (day-case, emergent, or elective); g) type of operation; h) preoperative complications; i) postoperative complications; and j) associated comorbidities and anomalies. The patients' data were tabulated, and statistical analysis was performed using Statistical Package for Social Sciences software (SPSS, version 22; SPSS Inc., Chicago, IL, USA). The description of the studied categorical variables was achieved with frequencies and absolute numbers (figure 1).

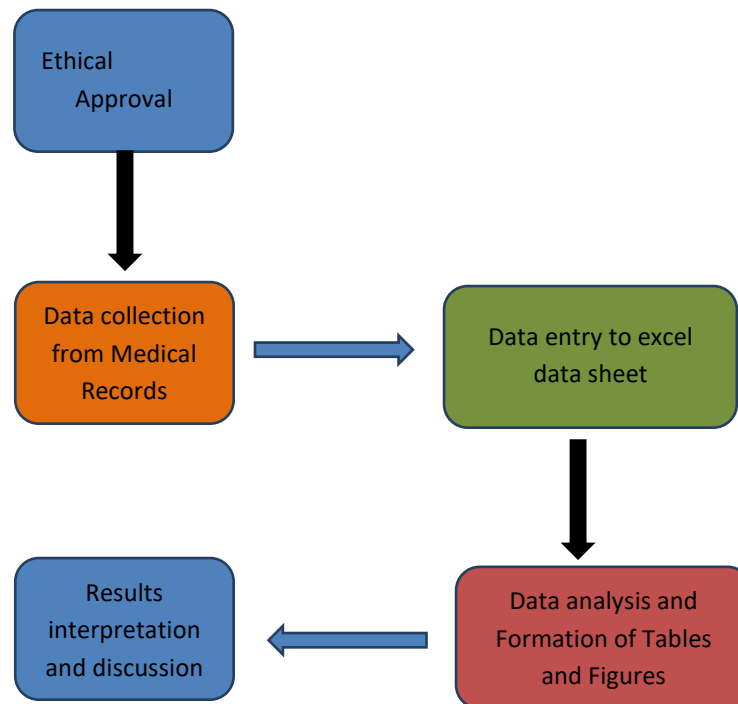


Figure 1 Flowchart for Methodology of Study

3. RESULTS

This study included 150 patients who underwent surgical management for an IH. The majority of the patients were males (103 of 150, 68.7%), and the rest (47 of 150, 31.3%) were females. The age at delivery of most patients was full term (90 of 150 patients, 60% of the patients). However, 60 of 150 patients (40% of the patients) were preterm. Approximately half of the patients were delivered with a low birth weight (79 of 150, 52.7%), 37.4% were delivered with a normal weight (56 of 150), and only 15 patients were delivered with a very low birth weight (10%). We divided the patients into four groups based on the age at diagnosis: most of the patients were diagnosed at equal to or less than one year of age (89 of 150, 59.3%), 18.7% were diagnosed at more than five years of age (28 of 150) and 14.7% were diagnosed between two and three years of age (22 of 150). However, only 11 patients were diagnosed between 4 and 5 years of age. The time between diagnosis and operation was 1 - 3 months in approximately half (44%) of the patients, less than one month in 30% of the patients, 4 - 12 months in 20% of the patients, and 1-3 years in 4% of the patients (Table 1).

Table 1 gender, age at delivery, birth weight, congenital anomalies and associated conditions and site of the hernia among the studied children

| | No. | % |
|-----------------------|-----|------|
| Gender | | |
| Male | 103 | 68.7 |
| Female | 47 | 31.3 |
| Age at delivery | | |
| Preterm | 60 | 40.0 |
| Full term | 90 | 60.0 |
| Birth weight | | |
| Normal weight | 56 | 37.4 |
| Low birthweight | 79 | 52.7 |
| Very low birth weight | 15 | 10.0 |
| Age at diagnosis | | |
| < 1 year | 89 | 59.3 |
| 2-3 years | 22 | 14.7 |

| | | |
|--------------------------------------|----|------|
| 4-5 years | 11 | 7.3 |
| More than 5 years | 28 | 18.7 |
| Time between diagnosis and operation | | |
| Less than 1 month | 45 | 30.0 |
| 1 - 3 months | 66 | 44.0 |
| 4 - 12 months | 31 | 20.7 |
| 1 – 3 years | 6 | 4.0 |
| More than 3 years | 2 | 1.3 |

Concerning the site of the hernia, in 48.7% of the patients, it was on the right side; in 40.7%, it was on the left and in 10.7%, it was bilateral. Regarding the mode of surgery, 65.3% of the patients underwent day-case surgery, 30.7% underwent elective surgery, and 4% underwent emergency surgery. Most patients in this study underwent herniotomy (98.7%), (Table 2). An incarcerated hernia was reported in 7 patients (4.7%), and a strangulating hernia was reported in 2 patients (1.3%); however, an obstructed hernia was only reported in one patient (0.7%). Postoperative complications were not observed in the majority of the patients. Wound infection alone was reported in two patients (1.3%), (figure 2). Regarding congenital anomalies and associated conditions, our study found that there were no associated conditions in 56.7% of the patients, hydrocele was reported in 10.7%, undescended testes were reported in 8.7%, umbilical or para-umbilical hernias were reported in 5.3%, and asthma was reported in 4.7% (Table 3).

Table 2 age at diagnosis, time between diagnosis and operation, mode of surgery and type of operation among the studied patients

| | No. | % |
|------------------------------|-----|------|
| Site of hernia | | |
| Bilateral | 16 | 10.7 |
| Left | 61 | 40.7 |
| Right | 73 | 48.7 |
| Mode of surgery | | |
| Day-case surgery | 98 | 65.3 |
| Elective | 46 | 30.7 |
| Emergency | 6 | 4.0 |
| Type of operation | | |
| Herniorrhaphy | 1 | .7 |
| Herniotomy | 148 | 98.7 |
| Herniotomy and Herniorrhaphy | 1 | .7 |

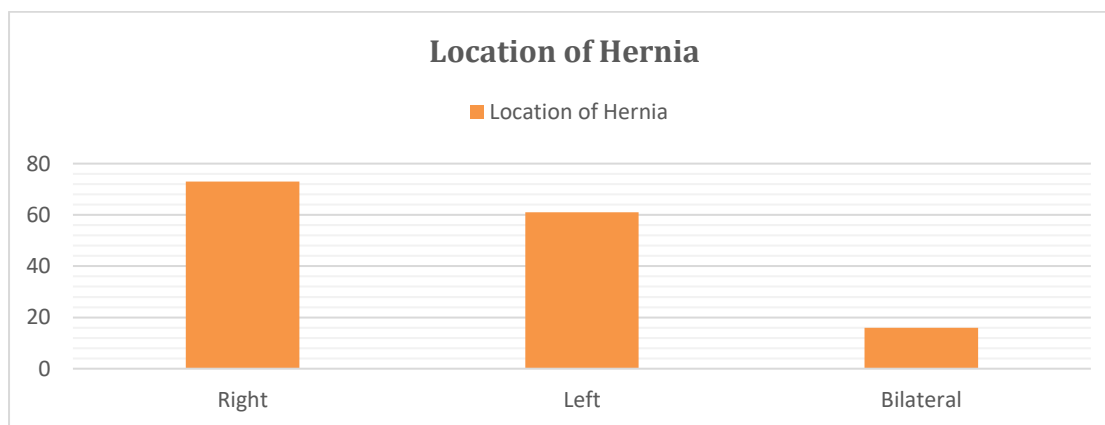


Figure 2 Site of Hernia

Table 3 preoperative and postoperative complications of operation among the studied patients

| | No. | % |
|------------------------------------------------|-----|------|
| Preoperative complications | | |
| No complications | 140 | 93.3 |
| Incarcerated hernia | 7 | 4.7 |
| Obstructed | 1 | .7 |
| Strangulations | 2 | 1.3 |
| Postoperative complications | | |
| No complications | 144 | 96.0 |
| Wound infection | 3 | 2 |
| Recurrence | 1 | .7 |
| Wound infection and contralateral occurrence | 1 | .7 |
| Wound infection and Recurrence | 1 | .7 |
| Congenital anomalies and associated conditions | | |
| No | 85 | 56.7 |
| Undescended testes | 13 | 8.7 |
| Congenital heart diseases | 8 | 5.3 |
| Hydrocele | 16 | 10.7 |
| Asthma | 7 | 4.7 |
| Umbilical and para-umbilical hernia | 8 | 5.3 |
| Other | 19 | 12.7 |

4. DISCUSSION

Pediatric IH is one of the most common diseases treated with surgery in children, and it presents most commonly during the first year of life (Lao et al., 2012). A hernia is defined as a protrusion of an organ through an abdominal opening in the muscle wall of the cavity that surrounds it (Sultan et al., 2009). The present study included 150 patients who underwent surgical management for an inguinal hernia from 2015 to May 2019. The majority of the patients were males (103 of 150, 68.7%), and the rest (47 out of 150, 31.3%) were females. Previous studies conducted in SA Umme Salma and Aymen Al-Jazaeri reported that the majority of patients were male (Salma et al., 2016; Al-Jazaeri et al., 2017). Several studies from around the world have reported that pediatric IH is observed in preterm patients in 33 - 30% of cases, while it is observed in term patients in 66 - 70% of cases (Ravikumar et al., 2013; Chen et al., 2018). In the present study, the age at delivery of most patients (60% of the patients) were full term. However, 40% of the affected patients were preterm.

Approximately half of the patients were delivered with a low birth weight (79 of 150, 52.7%), 37.4% of patients were delivered with a normal weight (56 of 150), and only 15 patients delivered with a very low birth weight (10%). SezinUnal et al. reported that the incidence of IH was 10.1% in VLBW infants and 16.1% in extremely low-birth-weight infants (Isik et al., 2017). We divided patients into four groups based on the age at diagnosis: most of the patients were diagnosed at equal to or less than one year of age (89 of 150, 59.3%), 18.7% were diagnosed at more than five years of age (28 of 150) and 14.7% were diagnosed between two and three years of age (22 of 150). However, only 11 patients were diagnosed between 4 and 5 years of age. Suvera MS et al. reported that 21% of patients were diagnosed at less than two years, 47% were diagnosed from 2 to 6 years, and 32% were diagnosed from 7 to 12 years (Suvera et al., 2013).

In our series of patients, the most common side affected in patients with pediatric IH was the right side (48.7% versus 40.7% on the left side), and only 10.7% of cases were bilateral. This finding corresponds to the results of Rowe et al., and Grosfeld et al. who reported the most common side to be the right side, while bilateral pediatric IH was reported in 8-15% of cases (Grosfeld et al., 1991). Regarding the mode of surgery, in our patients, 65.3% underwent day-case surgery, 30.7% underwent elective surgery, and 4% underwent emergency surgery. In other similar studies, according to the contents of the sac and preoperative complications, the mode of surgery was emergency surgery in 11% of the patients due to acute presentations, such as strangulation or incarceration, while 89% of the patients underwent elective groin surgeries (Zamakhshary et al., 2008; Kaya et al., 2006).

In our study, the type of operation was a herniotomy in 98.7% of cases. The Central Hospital of Qurrayat city, Saudi Arabia, 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 (Salma et al., 2016). Regarding the congenital anomalies and associated conditions, our study found that 5.3% of children had an umbilical and para-umbilical hernia, there were no associated conditions in 56.7% of the patients, hydrocele reported in 10.7% of the patients, undescended testes were reported in 8.7% of the patients, and asthma was reported in 4.7% of the patients. In agreement with our findings, another study conducted in Qurrayat, SA, found that there were no associated conditions in 95.0% of the patients, undescended testis in 2.4%, and hydrocele in 1.8% (Salma et al., 2016). However, in different studies, the associated conditions were congenital problems, such as connective tissue disorders, increased intra-abdominal pressure, abdominal wall defects, or family history of congenital hernias. However, in this study, such patients were excluded, and the only associated conditions were congenital hydrocele and undescended testis (Chen et al., 2011; Sarpel et al., 2005; Katz, 2001).

5. CONCLUSION

In our study, pediatric IH was more common in males than females. Most of the patients were born at full term. The presentation was more frequent in children younger than a year of age, and in most cases, the right side was involved.

Authors' contributions

Mohammad M Alnoaiji: Primary author read and approved the final manuscript.

Asmaa Ghmaird, Tahani Alrashidi, Sarah Rayyani, Mastorah Aljuhani, Eid Alshahrani, RazanAljohani, Sarah Alsalem, Bayan Alatawi, Ebtesam Alatawi this work carried out in collaboration among all authors. All authors read and approved the final manuscript.

Conflict of interests

The authors declare no conflict of interest.

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Ethical approval and patient consent

The study was approved by ethics research committee at king Salman Armed forces hospital, Tabuk, Saudi Arabia (Ref. Number KSAFH-REC-2019-287).

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Abbreviations

IH: Inguinal Hernia

SA: Saudi Arabia

MRN: Medical Record Number

SPSS: Statistical Package for Social Sciences Software

VLBW: Very Low Birth Weight

LBW: Low Birth Weight

Data 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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