



REVIEW ON INGUINAL HERNIA IN CHILDREN

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Abstract

Inguinal hernia is frequently diagnosed by clinical exam. Imaging tests are recommended in the absence of definitive signs or associated symptoms that indicate complications. Ultrasonography (US) is the most common method used for examination of the various types of hernias. Inguinal hernias are the most prevalent type of hernia. US (grayscale or color Doppler ultrasonography) are suggested for examining inguinal hernias. CT is used to differentiate inguinal and femoral hernia based on the correlation between the hernia sac and pubic tubercle. Magnetic resonance imaging (MRI) is favored for diagnosing occult inguinal hernias when there are constraints associated with US and computed tomography (CT); or a lack of definitive diagnostic results. Inguinal hernia is an acquired or congenital condition wherein the abdominal cavity contents protrude into the inguinal canal. In men, the testes migrate from the abdomen into the scrotum through the inguinal canal. Thus, men (more than women) are more likely to develop an indirect inguinal hernia. An indirect hernia can occur congenitally. Indirect inguinal hernias present on the lateral side of the Hesselbach triangle and enter the inguinal canal through the deep or internal inguinal ring. Direct inguinal hernias constitute inguinal hernias that protrude through the Hesselbach triangle, remaining medial and caudal to the inguinal canal's origin at the internal inguinal ring. These hernias are common in older males and carry a lower risk of strangulation. The characteristic sign of a direct hernia on CT is a lateral fat crescent.

Keywords: Hernia Belt, Laparoscopic Repair, Male Infertility, Maneuver Incisional hernia, Encapsulated seroma, Giant pseudocyst.

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Introduction

Over 85,000 pediatric emergency general surgeries are performed in the United States each year, and about 40% of inpatient pediatric surgical operations are performed in adult hospitals. 1-3 Studies examining appendectomies have suggested that some outcomes may be better when treated by pediatric surgeons. 3 Other studies have shown that surgeon case volume, rather than specialty training, has more influence on outcomes. 3 A meta-analysis examining specialty type, surgeon volume, and hospital type in appendectomies and pyloromyotomies concluded

that these cases can be effectively managed by general surgeons with appropriate experience and volume. 4 Regardless of experience or practice location, at some point in their careers, acute care surgeons are likely to encounter pediatric patients requiring emergent surgical procedures. Since the inception of laparoscopy, improvements in technique [1].

Among the most prevalent pediatric surgical issues are inguinal hernias and hydroceles. The causes of both the hernia and the hydrocele are the same. For this reason, most cases of inguinal hernia in children are indirect hernias caused by a patent processus vaginalis. Fluid accumulation in a sac like that of the scrotum may be the consequence of patent processus vaginalis or an abnormality in the secretion and absorption processes of the tunica vaginalis. Yet, despite the prevalence of inguinal hernias and hydroceles in children, there has been a paucity of research on these conditions in Bangladesh. In this study our main goal is to evaluate clinico-epidemiological profile & associated risk factors in

pediatric inguinal hernia. The purpose of this research was to observe the frequency with which inguinal hernias and hydroceles occurred in children who were admitted to and treated at the Paediatric Surgery Department of Tertiary Hospital Dhaka between January 2020 and December 2021. Children of any age or gender who were diagnosed with inguinal hernia or hydrocele were included in the research [2].

The basic principle of treatment of inguinal hernia in infants and children has received insufficient consideration. The reason for much misinformation concerning hernia in the early age group is quite understandable because most of the writing has been on hernia in adults. In textbooks and systems of surgery the problem of hernia in children is often dismissed with a few sentences, or the principles governing treatment in adults are unconcernedly applied to children. The cause of indirect inguinal hernia during childhood is not muscular weakness but failure of the processus vaginalis to obliterate itself. (Direct hernia in this age group is so rare that it will not be considered.) Constipation, meatal stricture, coughing, crying, etc., are contributing causes responsible for the appearance of hernia only if the processus has not closed properly. Since the cause of hernia in children is an open sac, it seems logical to conclude that surgical treatment should consist of simple removal of that offending sac and nothing more [3]. Trends are changing in the management of infants and children with indirect inguinal hernias. Advances in neonatal intensive care have resulted in the survival of many small premature infants who have a high incidence of inguinal hernia. The rate of incarceration, strangulation, and gonadal infarction in these babies is twice that of the general pediatric age group. Respiratory immaturity, apnea, bradycardia, and associated neonatal conditions require special management at the time of hernia repair, usually performed just before discharge from the neonatal intensive care unit. New information concerning volume loss and depletion of germ cells beginning at 6 months of age in boys with undescended testes has stimulated the performance of orchiopexy when the patient is 1 year of age. More than 90% of boys with cryptorchid testes at the age of 1 year have an associated hernia that requires concomitant repair at the time of orchiopexy. The use of the peritoneal cavity for fluid absorptive purposes in hydrocephalus treated by ventriculoperitoneal shunts or of peritoneal dialysis for renal failure in metabolic diseases [4]. In India, due to the limited pediatric surgical services available, the majority of the patients with indirect inguinal hernia (IIH) are managed by general surgeons. Between January 1986 and June 1992, at a tertiary care level center, 392 children with inguinal hernia were seen from 0–12 years of age (4.5% of all pediatric surgical procedures). Sixty-five percent of these presented when below 5 years of age. The majority of these (376, 96%) were boys. There were 212 (54%) right sided, 150 (38.3%) left sided and 30 (7.7%) bilateral hernias.

Eighteen children (4.6%) presented with incarceration, and 6 of these required intestinal resections. The results following surgical repair were excellent. Contralateral exploration was reserved for babies under 6 months of age and girls (intersex disorders excluded). In a non-teaching hospital in Delhi inguinal hernias constituted 12.5% of all surgical procedures [5].

This study reports the age and gender characteristics of children with inguinal hernia repairs (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] Operation Codes 530-533). Methods we used a retrospective cohort study design based on 2 data sources from 2007 to 2011 (the Bureau of National Health Insurance, Department of Health, Taiwan, and a local teaching children's hospital database) and descriptive statistics to analyze the group's age and gender differences as independent variables.

Types of Inguinal Hernia

I. Indirect Inguinal Hernia

1. Most common type: Accounts for 90% of inguinal hernias in children.
2. Occurs through the internal ring: The hernia passes through the internal ring and into the inguinal canal.
3. Associated with a patent processus vaginalis (PPV): The hernia is often associated with a PPV, which is a remnant of the fetal processus vaginalis

II. Direct Inguinal Hernia

1. Less common: Accounts for 5-10% of inguinal hernias in children.
2. Occurs through a weakness in the abdominal wall: The hernia passes directly through a weakness in the abdominal wall, rather than through the internal ring.
3. Not associated with a PPV: Direct inguinal hernias are not associated with a PPV.

III. Sliding Hernia

1. A type of indirect inguinal hernia: A sliding hernia is a type of indirect inguinal hernia where the hernia sac contains a portion of the intestine and a portion of the bladder or other abdominal organs.
2. More common in older children: Sliding hernias are more common in older children and adolescents.

IV. Incarcerated Hernia

1. A hernia that becomes trapped: An incarcerated hernia is a hernia that becomes trapped and cannot be reduced back into the abdomen.
2. Requires urgent surgical intervention: Incarcerated hernias require urgent surgical intervention to prevent complications such as strangulation.

V. Strangulated Hernia

1. A hernia that has lost its blood supply: A strangulated hernia is a hernia that has lost its blood supply due to constriction of the hernia neck.
2. Requires emergency surgical intervention: Strangulated hernias require emergency surgical intervention to prevent tissue death and other complications [19].

Reasons of Hernia

Here are the reasons for inguinal hernia [20].

Genetic Reasons

1. Family history of hernias
2. Genetic conditions (e.g., Ehlers-Danlos syndrome)
3. Chromosomal abnormalities

Developmental Reasons

1. Patent processus vaginalis (PPV)
2. Abnormal fetal development
3. Premature birth
4. Low birth weight

Lifestyle Reasons

1. Heavy lifting or bending
2. Chronic coughing or straining
3. Obesity or excess weight
4. Physical inactivity
5. Poor diet
6. Smoking

Medical Conditions

1. Weakened abdominal muscles
2. Increased intra-abdominal pressure
3. Constipation
4. Pregnancy



Figure 1: Inguinal hernia repair

Epidemiology

Visual Evaluation Imaging studies typically are not necessary for men's diagnoses. It is common for women to need imaging to rule out other possible causes of groin discomfort, such as a recurrent hernia, complications following surgery, or a groin lump or hydrocele. Ultrasonography is the primary imaging method for detecting occult hernias; it can detect probable cases of groin hernias that are not visible during a clinical examination with a sensitivity ranging from 33% to 86% and a specificity ranging from 77% to 90%. In references 16 and 17. Despite negative ultrasound results, a groin hernia may still be suspected clinically, in which case an MRI with the Valsalva maneuver could be an option to explore. For hidden hernias, magnetic resonance imaging (MRI) has a sensitivity of 91%, a specificity of 92%, a positive predictive value of 95%, and a negative predictive value of 85%. MRI is more effective than ultrasound and CT scans for detecting inguinal hernias, especially hidden hernias.

Surgical Management

Several logistical considerations go into deciding which surgical approach is best for fixing an inguinal hernia,

including the ease of access to anesthesia, the surgeon's personal preference and level of training, the patient's financial situation, and the cost and availability of mesh. It is helpful for family physicians to learn about the most common surgical procedures so they may better monitor their patients after surgery and identify any problems, such as recurrence. There are various types of surgical procedures, including open anterior repair, open posterior repair, tension-free mesh repair, and laparoscopic repair. Despite the fact that no mesh techniques are no longer preferred in the US, they are nevertheless seen as appropriate elsewhere. Since mesh techniques have lower recurrence rates than non-mesh procedures, they are highly recommended. According to a 2009 European recommendation, an open anterior nonmesh approach is the preferred choice when mesh cannot be used. In terms of pain management following surgery, laparoscopic procedures are preferable to tension-free mesh repair.

Postoperative Care

Factors for recurrence of inguinal Hernia. Surgeons have traditionally, and according to professional opinion, advised patients to avoid strenuous exercise for four to six weeks following groin hernia repairs. Be that as it may, regardless of surgical technique, no data suggests that early physical activity raises the chance of recurrence. Physical exercise should be encouraged for the majority of patients for three to five days following hernia repair.

Complications

Acute complication Absolute

Possible complications include: headache following spinal anesthesia, inguinal cyst, minor surgical wound dehiscence, fever, orchialgia, bleeding, severe pain, scrotal edema, major edema, imprisoned hernia, orchitis, infection, bruises, hemorrhage, and seroma. Postoperative complications Potential difficulties that may arise after surgery Developing a seroma or hematoma With a prevalence of 2–25%, it is a frequent consequence following laparoscopic hernia surgery. They often appear following extensive indirect hernia repairs. For the most part, they go away on their own after around four to six weeks. Seromas can be prevented by fenestrating the transversalis fascia in a direct hernia, anchoring the direct sac to pubic bone, and preventing dissection of the hernial sac from the cord structures. After significant dissection or considerable bleeding, some surgeons may insert a drain. 2) Deterring urine flow After hernia repair, this problem occurs in 1.3% to 5.8% of cases. The presence of prostatism signs is a common trigger, particularly in older patients. Prior to surgery, these individuals should be catheterized, and the catheter should be removed the following morning. Pain in the Nervous System According to reports, the occurrence of this problem ranges from 0.56 to 4.66 percent, depending on the repair procedure used.

Causes

Congenital Causes

1. Patent Processus Vaginalis (PPV): Failure of the vaginal process to close during fetal development.
2. Abnormal Fetal Development: Abnormalities during fetal development, such as intestinal malrotation.
3. Genetic Conditions: Certain genetic conditions, such as Ehlers-Danlos syndrome.

Acquired Causes

1. Increased Intra-Abdominal Pressure: Straining, coughing, or heavy lifting.
2. Weakened Abdominal Wall: Weakness in the abdominal wall muscles or fascia.
3. Previous Hernia Repair: Previous hernia repair can increase the risk of recurrence.

Developmental Causes

1. Premature Birth: Premature birth can increase the risk of inguinal hernia.
2. Low Birth Weight: Low birth weight can increase the risk of inguinal hernia.
3. Developmental Delays: Developmental delays can increase the risk of inguinal hernia.

Symptoms

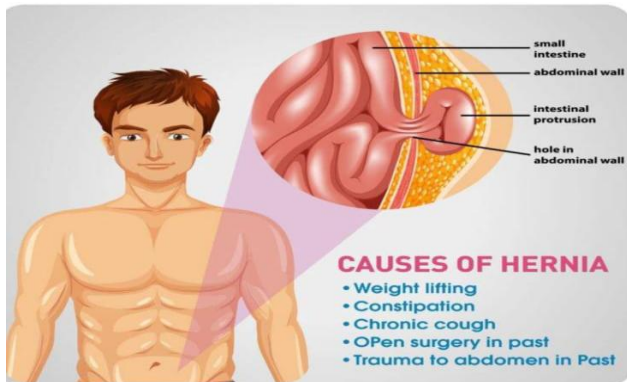


Figure 2: causes of hernia

Diagnosis

Here's an overview of the diagnosis of inguinal hernia in children:

Clinical Diagnosis

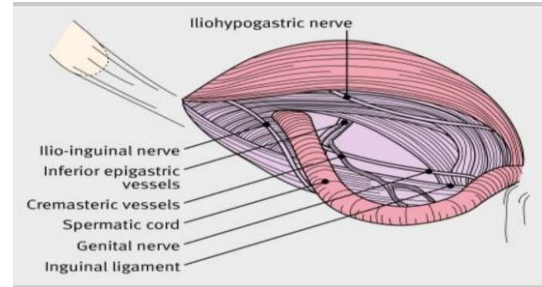
1. Physical Examination: A thorough physical examination is essential for diagnosing inguinal hernia in children.
2. Visible Bulge: A visible bulge or swelling in the groin area, which may be more prominent when the child coughs, strains, or stands.
3. Palpable Mass: A palpable mass or lump in the groin area, which may be tender to touch.
4. Transillumination: Shining a light through the bulge to check for intestinal contents.

Diagnostic Tests

1. Ultrasound: To confirm the diagnosis and rule out other conditions.

2. CT Scan: To evaluate the hernia and surrounding structures.

3. Herniography: An X-ray test that uses contrast material to visualize the hernia.
4. Laparoscopy: A minimally invasive surgical procedure to visualize the hernia and surrounding structures.



Treatment

Traditionally, the majority of children with IH are treated under general anesthesia either with mask, laryngeal mask or endotracheal intubation. However, in the cases of premature infants and high-risk infants requiring surgery, complications are common even for minor surgical procedures.

Anesthesia in the Preterm Infant with IH

Infants with gestational age ≤ 37 weeks undergoing IH repair under general anesthesia are susceptible to display respiratory and cardiovascular complications, most commonly apnea, with a rate of about 10% to 30%. The pathogenesis of apnea in preterm infants is multifactorial and involves a number of causes including airway obstruction, anemia, immature respiratory drive, hypothermia, diaphragmatic fatigue and anesthetic drugs. Steward suggested that the depressant effect of anesthetic drugs, and an increase of muscle fatigue, may contribute to a subsequent episode of apnea. The anesthetic risk of apnea in former premature infants it seems to relate with the corrected gestational age, with a peak at 41 weeks of post-conceptual age. Furthermore, Vaos reported that preterm infants undergoing IH repair within 1 week of diagnosis, experienced a significant greater risk of apnea compared to those undergoing operation later. However, there are not accurate data to correlate the minimum post-conceptual age and the chance of postoperative anesthetic complication. Warther-Larsen et al. [24].

Pain Management

Postoperative pain can be difficult to assess in children undergoing IH repair. A substantial number of analgesic strategies including preoperative or intraoperative ilioinguinal and iliohypogastric nerve blockade, wound infiltration with local anesthetic, preoperative caudal blockade, and postoperative analgesics such as opioids and acetaminophen have been used to minimize postoperative pain in children undergoing IH. Splinter reported comparable effects by using bupivacaine 0.25% injected either caudally or adjacent to the ilioinguinal and iliohypogastric nerves and into the subcutaneous tissue.

Impact of Anesthesia on Neurocognitive Development

It is generally accepted that anesthesia relieves pain, maintains stable vital signs and provides adequate conditions during surgical and diagnostic procedures in children. However, experimental studies in animals, have shown that exposure of the developing brain to anesthetic drugs can lead to neuronal apoptosis or neuro degeneration in vitro and measurable functional and neurobehavioural deficits in vivo. Unfortunately the available data, based mainly in retrospective studies, lack the precise information concerning the age, dose of anesthetics, duration of anesthesia, route of administration, and do not allow conclusions about the neurotoxic effect of general anesthesia nor extraction of reliable recommendations and guidelines are inconsistent.

Open Surgery versus Laparoscopy Repair

An open surgery with ligation of the inguinal hernia sac at the level of the internal ring and while safely handling the vas and testicular artery in boys and the ovary, fallopian tube in girls, is the standard approach for successful repair of IH repair in children. However, a non-ligation of the hernia sac after herniotomy in children has also been proposed. Since the initial reports of laparoscopic procedure in the beginning of 1990s, laparoscopy for IH repair in children has changed the standard dogma of open surgery repair.

Conclusion

Delaying HR in a premature infant in the NICU to just before discharge allows for repair closer to term without increasing the risk of incarceration. Because of low occurrence of metachronous inguinal hernia contralateral inguinal exploration is not justified. A former premature infant may undergo day surgery HR as day surgery if the PCA is >47 weeks without increased risk of postoperative apnea. However, a multicentered prospective study is required to establish the minimum PCA for former premature infants to undergo day surgery HR. According to the research, primary and recurrent inguinal hernias are more common in middle-aged men than in middle-aged women. Primary risk factors include right-sided incidence, which is more common; straining or moving heavy objects; and irregular bowel movements. Their family history was another key factor contributing to the occurrence of hernias in patients. A patient's diet, existing health conditions, and lifestyle choices can all influence the likelihood of an inguinal hernia recurrence. Inguinal hernia is a common surgical condition in children, requiring prompt diagnosis and treatment to prevent complications. Early detection and surgical intervention can significantly improve outcomes, reducing the risk of incarceration, strangulation, and testicular atrophy. Parents and caregivers play a crucial role in identifying symptoms and seeking medical attention. A multidisciplinary approach, involving pediatricians, surgeons, and anesthesiologists, is essential for optimal management of inguinal hernia in children.

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Conflict of Interest

No Conflict of interest

Informed Consent and Ethical Statement

Not Applicable.

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