Inguinal Hernia and Hydrocele

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Incidence

Hernias and hydroceles are among the most common pediatric surgical problems. The incidence of indirect inguinal hernia in the term neonate is 3.5-5%. Premature infants have a higher incidence of approximately 9-11%. Inguinal hernias are more common in boys (male: female ratio is 5:1 to 10:1). Sixty percent of inguinal hernias occur on the right side, while about 30% occur on the left. Ten percent occur as bilateral hernias. Bilateral hernias are more common in premature infants (45-55%) and females. Indirect inguinal hernias and hydroceles are known to have familial tendencies, but true heredity factors have not been clarified.

Etiology

The processes vaginalis is an elongated diverticulum of the peritoneum which accompanies the testicle upon its descent into the scrotum. It pierces the anterior abdominal wall at the deep (internal) inguinal ring which is located just lateral to the deep inferior epigastric blood vessels. In most individuals, the processes obliterates during the ninth month of intrauterine life or soon after birth. If that channel remains open, intraperitoneal fluid will slowly accumulate in the structure forming a communicating hydrocele (also known as hernia/hydrocele) If the processes is wide enough, intestines, ovaries, or omentum can herniate into the inguinal canal forming an indirect hernia. Should the processes vaginalis obliterates near its origin but remain patent distally fluid may accumulate forming a noncommunicating hydrocele. If the processes obliterates proximally and distally but remains patent in its mid portion then it is known as hydrocele of the cord.

Direct inguinal hernias are occasionally identified in children. The abdominal wall defect is in the floor of the inguinal canal within the confines of Hasselbach’s triangle. Anatomically, Hasselbach’s triangle is that area bordered superolaterally by the inferior epigastric vessels, inferiorly by the inguinal ligament, medially by the rectus abdominus muscle. Direct inguinal hernias are believed to occur secondary to structural weakness. Femoral hernias occur inferior to the inguinal ligament within the femoral canal, just medial to the femoral vessels and are extremely rare in children.

Clinical Presentation

A bulge (swelling) in the groin which at times may extend into the scrotum is by far the most frequent sign. The bulge may appear and then disappear with some regularity especially during straining, crying, or coughing. Although sharp pain is
usually not associated with herniation, discomfort that occurs in some babies is
easily overlooked. Occasionally constipation, “colicky-baby” syndrome, and even
regurgitation are present.

In the very young, the initial presentation may be an episode of incarceration. In
this scenario, the baby is more symptomatic, the bulge is firm and tender to touch,
the groin and scrotum may be erythematous, and vomiting or poor feeding are
frequent. A history of recurring groin swelling which the parents or the pediatrician
can reduce is a strong indication that a hernia is present.

**Diagnosis**

The physical examination in many is so characteristic that only observation is
necessary to make the diagnosis. The examiner palpates the cord to ascertain if bowel
or other structures are present. Diagnostic confirmation is made when the contents
of the hernia are reduced into the peritoneal cavity. Hydroceles, even the communici-
ting variety, are difficult to reduce though many reduce spontaneously when the
child is recumbent over several hours. Many physicians resort to transillumination
to distinguish a hydrocele from a hernia containing bowel. However, this may be
misleading, particularly in infants, since a hernia with gas-filled bowel loops may
transilluminate quite well. If the child presents with a reduced hernia, secondary
changes can be found that suggest presence of a hernia. Palpation of the cord may
dict the “silk glove” sign (rubbing together of the opposing peritoneal membranes
of the empty sac). The cord may feel thickened in comparison to the contralateral
side. Increases in intra-abdominal pressure (i.e., coughing, crying, exhaling against
an occlusion such as thumb in mouth, blowing bubbles, etc) may help demonstrate
the hernia.

In the face of a suggestive history but no concrete findings, repeated examina-
tion in 2-3 weeks is recommended. The parents should continue observation, be
taught how to reduce the hernia and, at times, even resort to photographing the
hernia so that a definite diagnosis can be established.

Complete history and physical examination may reveal other unrecognized con-
ditions. The genitalia and the testicles must be carefully examined. At times, a retractile
testis presents as an inguinal bulge and appears to be a hernia. Undescended testes
are commonly (85%) associated with indirect hernia, and the two conditions are
repaired at the same time. Occasionally, the differential diagnosis includes inguinal
or femoral adenopathy. If an adenitis has progressed to an abscess, the findings may
be difficult to distinguish from an advanced stage of incarcerated inguinal hernia. In
this scenario, immediate surgical exploration is undertaken for both diagnosis and
treatment.

When incarceration is suspected, plain abdominal films are helpful and demon-
strate an obstructive/ileus bowel gas pattern and intestinal gas in the groin and scro-
tum. Plain films are also useful to distinguish between an acute hydrocele, for which
an operation can be delayed, and incarceration which requires immediate attention.
When in doubt—operate! Untreated incarceration leads to bowel necrosis and/or
testicular ischemia.
Treatment
The reason for repairing an inguinal hernia is to prevent incarceration. Since the incidence of incarceration is inversely related to age, the younger the patient—the sooner the repair. Premature babies should have their hernias repaired just prior to discharge from the hospital. Asymptomatic school age children can be repaired when school is in recess. The timing of repair is less clear with hydroceles. In most centers, hydroceles are not repaired until the baby is 12-18 months or older. Approximately 90-95% of all hydroceles resolve spontaneously in the first few months of life. If a hydrocele becomes very large and tense, earlier repair can be considered. If a hydrocele cannot be differentiated from a hernia, operation is indicated.

The operation is an outpatient procedure performed under general anesthesia. Infants less than 60 weeks postconception and children with associated conditions (i.e., cystic fibrosis, hemophilia, etc.) Need admission for 24 hours of observation. The recommended steps of inguinal hernia repair are listed in Table 12.1.

Postoperative care is straightforward. Since intradermal absorbable sutures are used for wound closure, most of these patients can start routine bathing within 24-48 hours. No restriction on diet or activities is given. Tylenol for analgesia is all that is required. In the older children, ibuprofen or codeine may be necessary. Patients with long-standing hernias, large hydroceles or formation of fibrous adhesive tissue around the cord may experience induration in the operative area that eventually subsides. These children deserve extended follow-up as occasionally the testicle on the affected side may be drawn out of the scrotum and requires secondary orchidopexy.

Outcomes
Recurrent herniation is rare and is seen in less than 1% of cases. More often, residual or posttraumatic hydroceles may be noted. If they do not resolve after several months, aspiration of their contents may expedite resolution.

Special Considerations

Contralateral Exploration (CLE)
The issue regarding the merits and objections to routine CLE in pediatric inguinal hernia is still not resolved among pediatric surgeons. Since the incidence of bilateral involvement in the first year or two of life is high (20-40%), most surgeons at pediatric centers perform CLE. Some surgeons extend CLE to mid-childhood (6 years old). The author's experience and many studies support exploration in all preschool children. In certain instances (i.e., strong family history, complicating circumstances like hemophilia or cystic fibrosis), exploration is offered to even older children. Resistance to this practice has been voiced by some European surgeons who report unacceptable complication rates. Either way, the family must understand the pros and cons and be an integral part of the decision making.

Operation for Incarcerated Hernias
If clinically the patient presents with peritonitis and the picture of sepsis, stran-gulation must be suspected. Antibiotics and massive preoperative resuscitation (rapid) is done. Initially, standard inguinal exposure is carried out, although the abdomen is prepped widely. The sac that is commonly edematous is freed from the cord structures.
Table 12.1. Guidelines for inguinal hernia repair

1. The surgical prep includes the lower 1/2 of the abdomen, genitalia, and upper thighs.
2. The incision is relatively short and is positioned in an inguinal skin crease at the level of the internal inguinal ring.
3. The aponeurosis of the external oblique is exposed and followed inferiorly until definite identification of the inguinal ligament is made.
4. The inguinal ligament is followed medially towards the pubic tubercle and the external inguinal ring is clearly identified.
5. The external oblique is divided along its fibers so as to transect the external ring, thus exposing the contents of the inguinal canal. (In small children this step may be omitted and the hernia repaired without opening the ring.)
6. Near the pubic tubercle, the cord and hernia sac are elevated with atraumatic forceps and encircled. Care is taken not to pierce the inguinal floor and produce a direct hernia.
7. A curved Kelly clamp is passed under the cord and sac upon which they now rest.
8. Careful separation of any cremasteric fibers allows identification of the sac that is gently grasped and elevated. With the sac pulled up and medially, the vas and vessels are exposed and gently teased off the sac. The vessels come off easily. The vas is quite intimate with the sac and is always an extraperitoneal structure.
9. Once freed, the cord structures are encircled with a narrow Penrose drain in older children (or an Allis clamp in the very young) to protect these structures.
10. If the sac is empty, it can be divided between clamps and each section freed separately. The proximal sac is held at some tension and with gentle pull of the cord structures the areolar tissue between the two is identified and cleared either bluntly with forceps or sharply with scissors. As one reaches the internal ring, the lip of the internal oblique muscles is retracted so that high ligation of the sac can be done.
11. The neck of the sac is suture ligated with either an absorbable or nonabsorbable suture. The floor of the canal is inspected. On rare occasions, additional sutures are required to narrow the internal ring.
12. The distal sac is opened. If a hydrocele of the testis is present it is opened.
13. Once hemostasis is assured, the external ring, if opened, is reconstructed and the external oblique is gently approximated. At this point, 0.25% marcain is instilled into the wound and subcutaneous tissue for postoperative pain control. Make sure that the testicle is repositioned in the scrotum properly.
14. The skin and Scarpa’s fascia are closed.

The sac is opened and the bowel inspected. If viability is established (immediately or after a period of observation), the bowel is returned to the peritoneal cavity. Widening of the internal ring may be required at times. If strangulation is the case, a Laroque type (RLQ) incision is made and the peritoneum entered. It is wise to isolate the bowel entering and exiting the hernia such that the intestinal spillage is minimized. Formal resection requires direct anastomosis in most instances unless the patient is most unstable. The hernia ring can be closed either from the inguinal or the peritoneal side. Antibiotics are administered for 48 hours or until the ileus resolves.
**Femoral Hernias**

Femoral hernias occur inferior to the inguinal ligament, along the femoral canal, medial to the femoral vessels. Femoral hernias are extremely rare in childhood but are more common in females. The diagnosis is most difficult in the very young and in those with excessive adipose tissue. In the lean and cooperative patient, a bulge is noted below the inguinal crease. Unfortunately, most are diagnosed after a routine inguinal exploration in which only a small indirect hernia or no hernia was found. In these cases, the femoral canal must be explored. This is accomplished by incising the transversalis fascia in the Hasselbach's triangle close to the Poupart ligament. The hernia will be identifiable medial to the femoral vein. The Cooper's ligament repair is the treatment of choice. If the diagnosis is made preoperatively, a subinguinal (femoral canal) approach can be used in which the space medial to the vessels is eliminated after reduction of the hernia and its contents.

**Selected Readings**