

Inguinal Hernia and Hydrocele

Inguinal hernia is a common condition of infancy and childhood, and repair is the most frequently performed general surgical operation in childhood.

Embryology

The occurrence of a congenital inguinal hernia and undescended testis is related to descent of the testis into the scrotum. The testes start developing in the abdomen and eventually drop into the scrotum. As the testes drop into the scrotum a membrane surrounding all the abdominal contents gets pulled into the scrotum with the testes. This is called the processus vaginalis. The testes usually reaches its final destination in the scrotum by the third trimester. In approximately 90% of children, the processus vaginalis seals shut and becomes a thin band of tissue without an opening. If all or any portion of the processus remains open it may cause either a congenital inguinal hernia or a hydrocele. The frequency that the processus vaginalis remains open is related to the gestational age of the infant and whether the testis drop into the scrotum or not. In girls, hernias are less common than in boys though inguinal hernia and, more rarely, a hydrocele may occur.

Incidence

Congenital inguinal hernias in children are by far most commonly indirect hernias. Hernias in children are rarely due to a weakness in the muscles or tissues in the groin as would be more often found in adults. Approximately 3% to 5% of term infants may be born with a clinically apparent inguinal hernia. Preterm infants have a considerably higher incidence (9% to 11%). In infants less than 28 weeks' gestation, the incidence is 35%. Clinical presentation of inguinal hernia occurs on the right side in 60% of patients and the left in 25%; 15% are on both sides. Inguinal hernia is much more common in boys than girls; however, presentation on both sides may be more likely in girls.

Physical Examination

The most common presentation of inguinal hernia in male infants is a bulge in the groin or the scrotal sac. The bulge is seen more easily during straining or crying but is sometimes difficult to identify. The bulge is caused by either intestine or fluid entering the hernia sac. In girls the ovary or fallopian tube may also enter the sac and cause the bulge. If infants are relaxed, the bulge may go away spontaneously and if not a doctor may be able to reduce the hernia. Reducing the hernia means that the intestine or fluid in the sac has been pushed back into the abdomen. Infants may be examined while lying on their backs or standing. In some instances, it may be difficult to show the presence of a hernia. If the physical examination is unconvincing,

it is safer to re-examine the patient another day or ask the parents to photograph the bulge.

It is important to determine the difference between a hernia, hydrocele and communicating hydrocele as the indication for surgery may differ. Patients with a very small opening in the processus vaginalis frequently present with a scrotal swelling that changes in size over the course of the day. This is likely to be a communicating hydrocele. This is similar to a hernia. The main difference is that the opening in the sac is only large enough for fluid to enter the sac and not intestine or ovary. Most surgeons will recommend repair of these the same as congenital inguinal hernia if they persist beyond 1 year of age.

Incarcerated Hernia

The most common complication of inguinal hernia is incarceration. This means that something has become stuck in the hernia sac and cannot be pushed back into the abdomen. This is also termed an irreducible hernia. The swelling is commonly caused by intestine or possibly the ovary in girls, having gotten caught in the hernia sac. Approximately 12% of all children (<12 years old) with hernia will develop incarceration. This event is far more common in the first year of life, when the incidence of incarceration may be 30% in a term baby. Preterm babies are more likely to have this happen. This problem will become apparent as sudden onset of a tender swelling in the scrotum or groin. Failure to reduce the tissue stuck in the hernia sac can cut off the blood supply to the incarcerated tissue and lead to a condition called strangulation. Because of the risk of incarceration (especially in the first few months of life), elective hernia repair should be scheduled shortly after the diagnosis of a hernia is made. While waiting for an early elective repair, parents of infants or children with a documented inguinal hernia should call their physician immediately if the hernia becomes irreducible or any discoloration to the skin occurs. In instances of incarceration, the physician will try to reduce the hernia and then schedule surgery electively. Infants may be admitted to the hospital in order to get the hernia repaired more quickly. Complications of incarceration include testicle shrinkage due to injury to the blood supply, loss of the testicle, intestinal blockage and dead bowel. The complication rate after emergency surgical repair of an incarcerated hernia may be greater than 10%, compared with a postoperative complication rate of 1.5% after elective surgery. The complication rate is higher because of all of the swelling that occurs if a hernia incarcerates. Postoperative complications may also include wound infection, recurrent hernia, and injury to the vas deferens and spermatic vessels.

Inguinal Hernia in the Premature Infant

Premature infants are at risk for developing an inguinal hernia. During hospitalization, premature infants with an inguinal hernia can be kept under close observation in the neonatal intensive care unit. If the hernia becomes incarcerated reduction of the hernia can allow the infant time to recover from the underlying neonatal illnesses that are due to prematurity such as problems with the lungs. As a general rule because of the high incarceration in premature infants, the hernia should ideally be repaired just before the infant's discharge from the neonatal intensive care unit. These infants require postoperative monitoring because anesthesia may cause post operative apnea (not breathing enough) or bradycardia (low heart rate). The risks of these problems resolve after ~24 hours. For premature infants who have the hernia diagnosed after discharge from the hospital, repair may be done on an outpatient basis when the child is approximately 50-60 weeks' gestation equivalent depending on the hospital and anesthesiologist. The decision to admit the baby or do outpatient surgery depends on criteria set

by the anesthesiologists at each individual hospital. Hernia repairs performed on infants prior to 50-60 weeks gestational age need admission to the hospital for post-operative monitoring for ~24 hours.

Treatment

In most instances, inguinal hernia repair in infants and children can be done as an outpatient surgery. Outpatient surgery for infants and children requires skilled pediatric anesthesiologists and nursing staff, appropriate-sized pediatric equipment, monitoring equipment, and the ability to admit to a pediatric inpatient facility if necessary. Outpatient surgery for inguinal hernia is safe, effective, and well tolerated.

The incision for hernia repair is made in a natural skin crease on the side where the hernia exists. Bleeding is usually not an issue during this operation. The spermatic vessels and vas deferens are then dissected away from the hernia sac. Great care is taken to avoid injury to these tissues. The sac is then tied closed with sutures and the part that extended into the scrotum is either removed or widely opened so that it will not collect fluid in the future. Prosthetic mesh or plugs that are commonly used in adult hernia repairs are not needed in childhood hernia repairs except occasionally in older teenagers.

The wound is closed with absorbable suture and various types of dressings may be used. Usually the dressing is waterproof to protect the wound from urine and stool in the diaper. Post operative pain control is usually accomplished with local injection of anesthetic during the operation or placement of a caudal anesthetic by the anesthesiologist. This is somewhat similar to the type of block pregnant women may get during labor though in the case of hernia repair it is a one time injection of anesthetic. Usually the child will then be sent home with pain medicine in syrup or pill form.