# Congenital inguinal hernia, hydrocoele and undescended testis

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## Abstract

Congenital inguinal hernias (CIH), hydrocoeles and undescended testes (UDT) are common groin conditions in neonates, infants and children that are encountered by general practitioners, paediatricians, general surgeons and paediatric surgeons. CIH, hydrocoeles and UDT share a common embryological origin. Clinical differentiation between the three conditions can be challenging particularly as they may exist in isolation or combination in the same patient. Accurate clinical distinction is imperative as the management and outcome is different for each condition. Surgery and outcomes for these conditions is discussed.

**Keywords** Children; congenital inguinal hernia; hydrocoele; undescended testis

## Congenital inguinal hernia

### Definition

A congenital inguinal hernia (CIH) is an indirect hernia related to failure of closure of the patent processus vaginalis (PPV) at the deep inguinal ring. Intra-abdominal contents pass within a PPV, through the deep inguinal ring, inguinal canal, superficial inguinal ring and potentially into the scrotum (male) or via the canal of Nuck to the labium (female).

### Incidence and age at presentation

The incidence of congenital inguinal hernia depends on age. The incidence is highest in premature infants. The incidence may be as high as 60% in infants born at 500–750 g. Nearly one-third of infants with a birth weight less than 1000 g will develop an IH. Term infants have an IH incidence of 3–5%.

The overall incidence of childhood inguinal hernia is 0.8–4.4%. Inguinal hernia repair is considered the most frequently performed paediatric surgical operation.

### Sex and laterality

Congenital inguinal hernias are between four and ten times more common in boys than girls. In boys, CIH occur on the right in 60–70%, left 20–25% and bilaterally in 5–15%. Laterality is equal in girls.

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### Family history and geography

A higher familial incidence has been reported, although, unlike umbilical hernias, incidence does not seem to vary with ethnicity or geographical region.

### Aetiology

Inguinal hernia is known to be associated with certain conditions. These include connective tissue disorders (cutis laxa, Ehlers–Danlos syndrome, prune belly syndrome), ascitic conditions (ventriculo-peritoneal shunts, peritoneal dialysis, chylous ascites, biliary atresia), other conditions causing increased intra-abdominal pressure (post closure of gastroschisis and exomphalos, cystic fibrosis) and in association with other developmental sequelae (undescended testis).

### Embryology and pathology

Congenital inguinal hernias, hydrocoeles and undescended testes are linked to the descent of the gonads and subsequent closure of the processus vaginalis. Much of the knowledge regarding the detailed mechanisms of testicular descent and the role of the processus vaginalis has been elucidated by the research team of Professor John Hutson in Melbourne, Australia and reading their findings is recommended for a detailed understanding of the embryology of the testes and groin.

Essentially, the gonads are derived from coeliac epithelium and primordial germ cells, and develop on the urogenital ridge on the posterior abdominal wall. Until the 6th week of gestation, male and female gonads are indistinguishable. During the 7th week of development the testis starts to differentiate. The gubernaculum arises around this time, originating at the testis and inserting into the anterior abdominal wall at the site of the future inguinal canal. As the fetal abdomen enlarges, from the 8th to the 15th week, the testis is held at the level of the internal ring, whilst the mesonephros (which will become the kidney) ascends to its eventual retroperitoneal position. At around 12 weeks a fold of peritoneum starts to protrude towards the internal ring. This finger-like diverticulum is the processus vaginalis, on which the testis slides through the inguinal canal. The processus vaginalis lengthens through the inguinal canal from the 3rd to 7th month of development, and the gubernaculum shortens, drawing the testis downwards. Between 36 and 40 weeks, the testis reaches the scrotum and the processus vaginalis gradually obliterates, closing the peritoneal opening at the internal ring. Just the very distal portion of the processus vaginalis remains, sitting around the testis as the tunica vaginalis.

Failure of obliteration of the processus vaginalis at the level of the internal ring (a patent processus vaginalis) is observed in congenital inguinal hernia and hydrocoele (Figure 1). Closure occurs earlier on the left than the right and this may be related to the higher incidence of right-sided hydrocoeles, hernias and undescended testis.

At birth, up to 95% of male infants can be observed to have a patent processus vaginalis. Obliteration of the PPV occurs in the postnatal period, so that at 1 year the incidence of PPV is 40% and 20% at 2 years. The relationship between obliteration or closure of the PPV and development of CIH is not yet fully understood.

 

### Presentation and clinical features

The classic clinical presentation of a congenital inguinal hernia is an intermittent bulge in the groin, scrotum or labia. This is most visible when the child is crying, coughing or performing other manoeuvres that increase intra-abdominal pressure (e.g. laughing). Older children may complain of vague ache in the inguinal region. On examination, there may be an appreciable bulge in the groin superiomedially to the pubic tubercle, but often the hernia is reduced at rest. Provocative manoeuvres (such as standing them up, coughing, making the child laugh or jump) are required to elicit it. The 'silk glove sign' has traditionally been used as supporting evidence of an inguinal hernia: on placing a single finger over the cord and gently rolling it over the pubic tubercle there is a palpable thickening and the sensation of rubbing two pieces of silk together. This has a sensitivity of 93% and a specificity of 97%. Increasingly, parents are able to provide clinicians with photographic evidence of the hernia bulge through the use of handheld digital devices. Examination should include the scrotum to confirm testicular position, as an undescended testis may present as a groin mass.

A hernia may become incarcerated (irreducible) which results in bowel obstruction or strangulation (loss of blood supply) of the hernial contents. An incarcerated hernia presents with a hard, tender groin swelling which cannot be reduced with gentle pressure. Symptoms of obstruction such as vomiting and abdominal distension may be present. Severe pain, prolonged

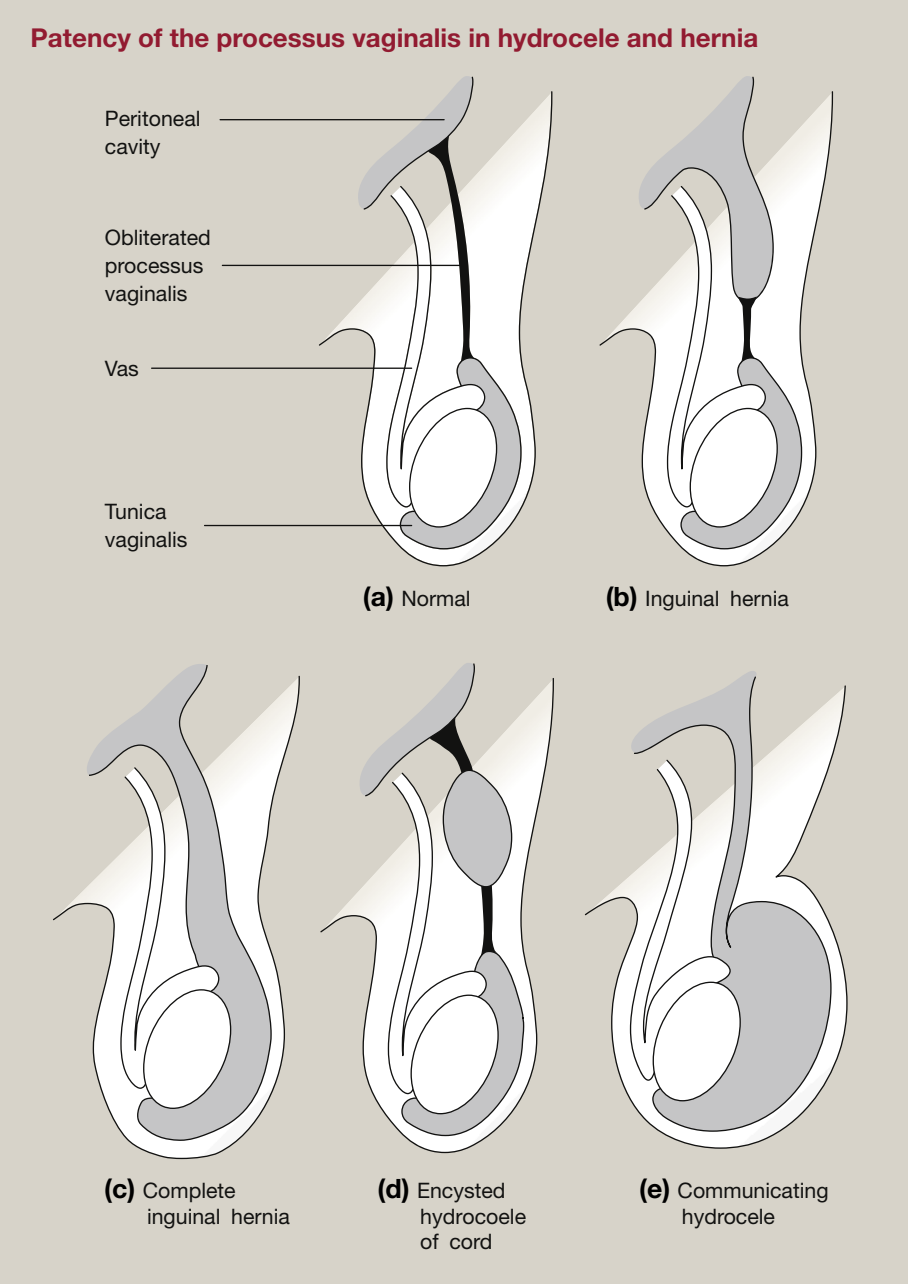


**Figure 1**