Management of undescended testes

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The authors review the diagnosis, consequences and subsequent management of undescended testes. They recommend that infants with impalpable testes should be referred to the nearest centre providing paediatric urology cover, with a view to undergoing orchidopexy if necessary.

Undescended testes (UDT) or cryptorchidism is a common presentation in both primary care and paediatric urology clinics. It affects 2–4% of all males born in the UK (80% of these being unilateral), making it the most common male genital abnormality (Figure 1). It is more prevalent in cases of premature birth, with almost all of those weighing less than 1kg being affected.

If untreated, UDT carries several risks: reduced fertility, and increased risk of torsion, testicular atrophy and testicular malignancy. It is not uncommon for men to present with primary infertility with a previous history of UDT.

Many children seen in paediatric urology clinics are well beyond the age of 1 year, which is when corrective surgery is recommended, although many are found to have retractile testis and not true UDT.

TESTICULAR DESCENT

Testicular descent is a complicated, multistage process to allow the testis to move from an abdominal to a scrotal position. UDT can be found anywhere along the course of normal descent, from the inferior pole of the kidney to the inguinal canal (Figure 2). Testicular descent has been widely studied, but there are still many unknown factors. It is now generally accepted to occur in two stages, with many factors being involved at each hormonal and anatomical stage.

The first stage occurs at 8–15 weeks gestation when the male fetal gubernaculum (ligament controlling testicular descent) enlarges around the site of the developing inguinal ligament. This enlargement is not seen in females; it is driven by the production of hormones (insulin-like growth factor) produced by the Leydig cells of the testes. It has been shown in mouse models that blocking the gene coding for insulin growth factor-3

Figure 1. Scrotal scar after orchidopexy in an infant with undescended testis (© Dr P. Marazzi/Science Photo Library)

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leads to bilateral UDT. Hormonal treatment for UDT has been unsuccessful for the likely reason that this stage occurs during fetal development, so the window of treatment has passed at the time of presentation.

In the second stage, the testes and gubernaculum move from the inguinal region to the developing scrotum during weeks 25–35. This is achieved by the peritoneum passing through the gubernaculum to form the processus vaginalis. This is driven by the genitofemoral nerve. It is during these stages that testicular descent can be halted, with a multitude of varying causes being linked. Raised intra-abdominal pressure is also key to propelling the testes inferiorly, with absent testes seen in children with prune-belly syndrome.

AETIOLOGY OF UDT

The pathogenesis of UDT is unclear, but is likely to involve a combination of genetic, hormonal and environmental factors. The incidence is reported to be increasing in some countries, but decreasing in others. It has been suggested that there may be an environmental factor affecting hormones. Although likely to be multifactorial, few clear genetic or environmental factors have been attributed to UDT. Increased rates are seen in premature infants (100% under 1kg, more likely to be bilateral and more likely to resolve spontaneously), and in those with cerebral palsy or a strong family history.

EXAMINATION AND INVESTIGATION

The baby check and 6-week check should pick up UDT. Initial examination is of utmost importance. Ask the parent to remove the child’s nappy as if it were a routine nappy change. Minimising stress to the child is important. The parents should be told not to point at or touch the scrotum to demonstrate the abnormality. The clinician should assess the development of the scrotum, presence of pre-pubic fat pad and whether testes are visible in the relaxed state.

Stimulating a cremasteric reflex by stroking the inner thigh may reveal fullness in the scrotum that then disappears. Other urological developmental abnormalities should be excluded. Of particular concern is bilateral UDT with hypospadias, which may indicate a more fundamental disorder of sexual differentiation.

The infant should be supine while the doctor’s non-dominant hand milks down any retractile or high-lying testes from the lower abdomen/upper scrotum. The dominant hand holds the scrotum to palpate the returning testes. The contralateral testes should also be examined to check for normal volume and any additional abnormalities.

Retractile testes are defined as those that move out of the scrotum on a regular basis, but return to a scrotal position with or without manipulation.

Laparoscopy is the investigation of choice when the testes are impalpable. Imaging has a role only in the following circumstances:
- follow up relocated testes for volume and malignancy
- follow-up for malignancy in older patients who opted against surgery
- CT staging in confirmed testicular tumours.

TREATMENT

The vast majority of UDT (80%) are palpable in the inguinal canal. Where there is diagnostic uncertainty, an examination under anaesthetic may be indicated. This allows the surgeon to proceed to an open orchidopexy if the testis is found in the groin or to a laparoscopy if it remains impalpable (10–20%) (Figure 3).

Due to advancement in laparoscopic experience, this procedure is now being performed safely and successfully in children from 6 months old. Laparoscopy is the gold standard when the testes are impalpable because of the multitude of potential locations. If the testes are intra-abdominal (40% of cases), they would be beyond the reach of an inguinal approach. A one- or two-stage Fowler–Stephens procedure is then performed. If the internal spermatic vessels are long enough to reach the scrotum, a one-stage procedure is performed. If a short internal spermatic artery is found, a two-stage procedure is undertaken. The first stage is to divide the
testicular artery; the blood supply is then reliant on collaterals from the artery of the vas deferens. A second procedure is performed 6 months later to relocate the testes into the scrotum.

In half of cases the testis is absent; this is identified at laparoscopy with blind-ending vessels seen, so no further groin exploration is required. Finally, in 10% of cases the vessels supplying the testes are seen entering into the inguinal canal, allowing conversion to a simple inguinal approach to relocate the testes.

It is recommended that surgery for UDT should be carried out between 6 months and 1 year of age because of the associated fertility risks. Most babies in the UK are operated around the age of 1 year because of anaesthetic issues. It is also recognised that many previously UDT will descend spontaneously (1% will remain undescended), but if located outside the scrotum after 1 year are unlikely to do so without intervention.

**FERTILITY**

The driving factor for surgical correction is to improve spermatogenesis, which is compounded in cases of bilateral UDT. During the first year of life, neonatal germ cells develop into spermatogonia, which in later life will be responsible for sperm production. In particular, the dark spermatogonia are reduced in number and are changed in UDT, which is thought to lead to infertility. Despite having surgery by 6–12 months, impaired spermatogenesis is seen at rates of 33% in unilateral and 66% in bilateral cases, respectively. If boys with unilateral UDT are operated before puberty, near to normal fertility rates have been shown.

More studies are required to evaluate the effect on fertility post-orchidopexy, especially as we are now able to perform the operation at a younger age.

**RISK OF MALIGNANCY**

The lifetime risk of testicular cancer in the normal male population is 0.2–0.4%, accounting for around 1% of all male cancers. In UDT there is a five to ten times increased lifetime risk of developing testicular cancer compared with the regular population, though these rates are generally on a downward trend as figures are constantly reviewed. It is hypothesised that the same hormonal imbalance that leads to UDT may also cause the development of testicular malignancy. This may be why, even after surgical correction, the same malignancy rates are seen in later life.

If UDT presents at an older age past puberty, orchidectomy should be offered because of the increased risk of malignancy. Increased malignancy rates are also seen in cases of bilateral UDT, and when there is an affected twin or a high intra-abdominal testis. The risk of malignancy in the normal remaining testis in unilateral UDT is not increased over the general population.

**SURGICAL COMPLICATIONS**

It is important to remember that those who have undergone inguinal orchidopexy still have the same increased risk of testicular cancer compared with the general population. The relocation of the testes by 6 months of age does not alter the risk, but allows for self-examination and so earlier detection of any potential tumour. However, it has been shown to improve fertility.

Other complications include testicular atrophy, repeat procedures and damage to the vas deferens (at a rate of 1%). The two-stage Fowler–Stephens procedure...
carries an additional atrophy rate of 20%. The increased numbers performed and constant evolution of both equipment and technique make laparoscopy in infants a low-risk procedure in centres offering this service.

**SUMMARY**

UDT is a common condition in primary care. Difficulties are encountered in examining infants of this age, especially those with pre-pubic fat pads making a normal though retractile testis seem impalpable. There is also difficulty in following up this population, as the consequences of UDT conditions are not apparent until the second or third decade of life.

Imaging has a limited role in UDT. Infants presenting with impalpable testes at 6 months of age should be referred to the nearest centre providing paediatric urology cover so that they can undergo inguinal orchidopexy or laparoscopy, proceeding to single/two stage orchidopexy or excision of the remnant.

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**REFERENCES**