

CRYPTORCHIDISM IN CHILDREN: TIMING OF ORCHIDOPEXY AND LONG-TERM RISKS OF INFERTILITY AND TESTICULAR CANCER

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Abstract. Cryptorchidism (undescended testis) is one of the most common congenital anomalies in boys and is associated with later infertility and testicular cancer. This review summarizes current recommendations on the timing of surgical correction, the evaluation of palpable and nonpalpable testes, and the reasons for delayed treatment, based on guidelines and published cohort studies. Consensus statements recommend orchidopexy between 6 and 18 months of age, and European guidance favors surgery before 12 months and by 18 months at the latest. Histological changes in the undescended testis, such as germ cell loss and interstitial fibrosis, progress with age and may become irreversible after the first year of life. Nevertheless, large reports indicate that 58–83% of boys worldwide undergo orchidopexy after 18 months, and in a series of 283 cases the mean age at surgery was 4.8 ± 5.6 years, with later surgery when the anomaly was first noticed by caregivers rather than by clinicians. Improved screening in primary care, avoidance of unnecessary imaging and counseling of patients about long-term risks are the priority measures.

Keywords: cryptorchidism, undescended testis, orchidopexy, infertility, testicular cancer, primary care, pediatric urology

1. INTRODUCTION

Cryptorchidism means that a testis stopped somewhere along its normal path of descent and did not reach the scrotum. On examination, palpation is used to determine the position of the undescended testis, which is most often located in the inguinal canal but may also be intra-abdominal or absent; bilateral cryptorchidism is observed in approximately 10% of patients (StatPearls, 2024).

The condition matters because undescended testis is associated with infertility and testicular cancer, and delayed treatment is a major risk factor for both (Caregiver recognition study, n.d.). International guidelines therefore recommend corrective surgery before 18 months of age, although the evidence informing them comes mainly from studies of fertility potential measured around the time of surgery rather than from adult outcomes such as paternity (Lancet Child Adolesc Health, 2018).

The aim of this review is to summarize current recommendations on the timing of orchidopexy, the management of nonpalpable testes, and the factors that delay treatment in clinical practice. The review is based on published guidelines, narrative reviews and cohort studies.

2. MAIN PART

2.1 Pathophysiology and long-term risks

Histopathological studies show that structural changes in the cryptorchid gonad, such as interstitial fibrosis and germ cell loss, progress with age and may become irreversible after the first year of life (Caregiver recognition study, n.d.). According to the AUA guideline, uncorrected undescended testes, particularly nonpalpable ones, are at increased risk of continued germ and Leydig cell loss, and the fertility index (the number of spermatogonia per tubule) decreases in cryptorchid testes after one year of age (AUA, 2025).

Testes of boys operated on at three years grew less than those of boys operated on at nine months (AUA, 2025). It has been estimated that each 6-month delay in orchidopexy may be associated with a 1% decrease in fertility, a 5% increase in the need for assisted reproductive techniques and a 6% higher risk of testicular malignancy later in life (StatPearls, 2024).

2.2 Recommended timing of surgery

The consensus recommendation of surgical correction between 6 and 18 months of age is supported by the current evidence on infertility and testicular cancer risks (Timing review, 2021). European guidance is stricter: orchidolysis and orchidopexy should be offered before 12 months of age and by 18 months at the latest (EAU/ESPU, 2025). In premature infants, corrected age is used to determine the optimal timing (StatPearls, 2024).

Hormonal therapy for unilateral undescended testis is of no benefit for future paternity, whereas in bilateral cases endocrine treatment may be considered to improve fertility potential; male neonates with bilateral nonpalpable testes should be evaluated for disorders of sex development (EAU/ESPU, 2025).

2.3 Evaluation of nonpalpable testes

In prepubertal boys with nonpalpable testes, examination under anesthesia is recommended to reassess palpability; if the testis remains nonpalpable, surgical exploration and, if indicated, abdominal orchidopexy should be performed, and the status of the testicular vessels should be identified at exploration (AUA, 2025). Diagnostic laparoscopy is used to locate an intra-abdominal testis (EAU/ESPU, 2025).

Awareness of the optimal timing of surgery is not consistently applied, which results in unnecessary and excessive use of ultrasound in many cases (StatPearls, 2024). In boys with a normal contralateral testis, orchiectomy may be considered if the testicular vessels and vas deferens are very short, the testis is dysmorphic or very hypoplastic, or the boy is postpubertal (AUA, 2025).

2.4 Delayed surgery in clinical practice

Despite the consensus of major guidelines, global data show a persistent gap between recommendations and practice: approximately 58–83% of patients with undescended testis worldwide undergo orchidopexy after 18 months of age (Caregiver recognition study, n.d.). In a retrospective analysis of 283 cases the mean age at orchidopexy was 4.8 ± 5.6 years, and caregiver-detected cases underwent surgery at a significantly older age (5.08 ± 4.98 years) than clinician-detected cases (Caregiver recognition study, n.d.).

An international administrative data study of boys born in 2003–2011 in England, Finland, Ontario, Scotland and Sweden examined compliance with the 2008 recommendation of orchidopexy at 6–12 months and socioeconomic inequities in the timing of surgery (International cohort study, n.d.). Race and insurance status have also been identified as factors associated with delayed surgery (StatPearls, 2024). Systemic improvements in early primary care screening and caregiver awareness are essential (Caregiver recognition study, n.d.).

3. CONCLUSION

Cryptorchidism is a common condition whose long-term consequences can be reduced by timely surgery. The available evidence supports orchidopexy between 6 and 18 months of age, preferably before 12 months, but in practice many boys are still operated on later.

Priority measures include systematic examination of the genitalia in infants by primary care providers, prompt referral, avoidance of unnecessary imaging, and counseling of boys with a history of cryptorchidism and their parents about the risks of infertility and testicular cancer (AUA, 2025).

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