

Analysis of Pediatricians' Knowledge Regarding the Clinical Diagnosis of Testicular Position Abnormalities: A Cross-Sectional Study

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Abstract

Original Research Article

Background: This study assessed pediatricians' and trainees' knowledge and practices regarding undescended testes at a pediatric hospital, highlighting gaps in diagnosis, referral, and management that may impact treatment outcomes. **Methods:** A cross-sectional observational study was conducted using an anonymous questionnaire with objective questions. Of 164 distributed questionnaires, 99 were returned (response rate: 60.36%). Responses were analyzed by relative frequency and statistical significance ($p < 0.05$). **Results:** Ninety percent of pediatricians perform testicular examinations immediately after birth, and 77% include scrotal examinations in all pediatric consultations. For initial management of undescended testes, 66% request ultrasonography first, while only 12% refer directly to a specialist. Regarding surgical indications, only 44% recommend treatment between 6 and 12 months of age. Despite this, 67% report no difficulties in referring patients. There is notable inconsistency in characterizing testicular dystopias, with only 30% correctly identifying cryptorchidism. Although 60% recognize that there is no surgical indication for retractile testicles, only 55% are aware that they can develop into ascending testicles. **Conclusions:** While pediatricians are familiar with the optimal timing for surgical correction, they show difficulty identifying testicular dystopias and selecting appropriate management strategies. Further education and training are needed to align clinical practice with current recommendations.

Keywords: cryptorchidism, testis, pediatrics, clinical diagnosis, child health.

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INTRODUCTION

Testicular dystopias encompass cryptorchidism and ectopic testis. Cryptorchidism, a disruption in the normal process of testicular descent, presents an incidence that varies according to gestational age, affecting 1.0–4.6% of full-term newborns and 1.1–45% of preterm infants (Kolon *et al.*, 2014; Skott *et al.*, 2025). It requires early attention to prevent complications such as infertility, testicular atrophy, and an increased risk of neoplasms (Gates *et al.*, 2022; Kolon *et al.*, 2014; Skott *et al.*, 2025). Ectopic testis, a condition in which the testicle is located outside its normal embryological descent pathway, is rarer and its clinical consequences are less studied (Mau & Leonard, 2017). Retractable testis, although traditionally considered a normal variation, has been recognized in international medical literature as an

intermediate condition, potentially displaying anatomical changes and progressing to ascending testis or acquired cryptorchidism (Alchoikani & Ashour, 2021; Kolon *et al.*, 2014; Skott *et al.*, 2025).

Proper differentiation of these conditions is essential, with physical examination being the primary diagnostic tool as recommended by current guidelines (Kolon *et al.*, 2014; Skott *et al.*, 2025). The indiscriminate use of complementary exams, such as ultrasonography (US), and failures in specialist referral contribute to treatment delays and heightened risk of complications, including infertility and neoplasms (Echeverría Sepúlveda, Yankovic Barceló, & Lopez Egaña, 2022).

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This study aims to assess pediatricians' knowledge regarding the clinical diagnosis of testicular position abnormalities, including cryptorchidism, ectopic testis, and retractile testis. It seeks to identify gaps in clinical practice and propose institutional improvements in management, emphasizing early referral and adherence to protocols aligned with current guidelines.

METHODOLOGY

This cross-sectional observational study, conducted through an anonymous survey, was based on a literature review performed using the Web of Science and PubMed platforms. Priority was given to articles published within the last 15 years, including systematic reviews, randomized clinical trials, meta-analyses, and updated guidelines on the subject.

Data collection was carried out using an online questionnaire developed by researchers and validated by experts in pediatric surgery and urology. The instrument contained objective and short open-ended questions, structured in clear and direct language. Participants included physicians with active affiliations to a tertiary university pediatric hospital, including pediatricians and pediatric trainees, who completed the form within the specified timeframe. Physicians from other specialties, without pediatric training or institutional affiliation, were excluded.

The questionnaire was made available electronically over a two-month period. To increase outreach and engagement, reminders were sent through internal communication groups. The first page of the form contained the Informed Consent Form (ICF), along with information about the relevance of the study.

A total of 164 questionnaires were distributed: 66 to practicing pediatricians and 98 to physicians in pediatric training or specialization. The questions addressed clinical aspects related to the management of testicular dystopias and retractile testes. Responses were consolidated in electronic spreadsheets and analyzed using descriptive statistics, considering mean, standard deviation, and relative frequency. The level of statistical significance was set at $p < 0.05$.

This study was approved by the institutional Research Ethics Committee under protocol number 6.908.201.

RESULTS

Of the 164 questionnaires distributed, 99 were completed, resulting in a response rate of 60.36%. Among the respondents, 70% were trained pediatricians, while 30% were physicians in pediatric training. Most participants (58%) had up to 5 years of experience in pediatrics, whereas 33% had over 20 years of clinical practice. The remaining 9% had between 6 and 20 years of experience. Respondent demographics are illustrated in graphs 1 and 2.

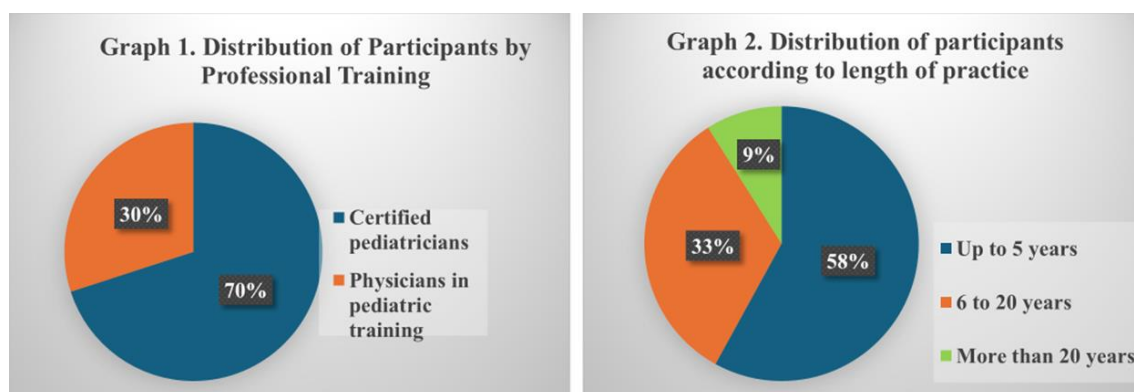


Figure 1: Graphs showing participant profiles

Analysis revealed that 90% of pediatricians perform the initial testicular assessment in the delivery room or neonatal unit, while 10% conduct it during the first outpatient visit. Seventy-seven percent reported performing scrotal physical examinations during all pediatric consultations.

Regarding the approach to an infant with suspected undescended testis, 66% of respondents indicated they would request ultrasonography (US), 26% preferred reassessment after six months, and only 12% would refer directly to a specialist. None of the participants reported requesting advanced imaging such as magnetic resonance imaging (MRI).

In terms of the ideal age for surgical intervention, 44% of participants recommended treatment between 6 and 12 months of age, while 24% advocated correction before 6 months. Only 6% considered treatment between 2 and 5 years of age to be appropriate. Despite this, 67% of respondents reported no difficulty in referring patients to a specialist, whereas 33% cited challenges such as high demand in the public health network and delays in performing complementary exams.

Clinical characterization of testicular position abnormalities and differentiation among cryptorchidism, ectopic testis, and retractile testis revealed

inconsistencies. When examining a patient whose testis remained in the inguinal canal throughout physical examination, 41% classified it as an ectopic testis, 30% as cryptorchid, 25% as retractile, and 4% as ascending.

Concerning spontaneous testicular descent, 89% of participants agreed that it can occur between the second and fourth month of life. Additionally, 72% considered scrotal asymmetry and family history as risk factors for cryptorchidism.

Most respondents (71%) believed that requesting a US exam is necessary for the initial assessment of testicular dystopia. Regarding the

association between cryptorchidism and hypospadias, 58% deemed karyotyping essential for all cases with this association, while 42% considered it necessary only in proximal hypospadias with non-palpable testes.

Finally, 55% of pediatricians agreed that retractile testes may progress to true cryptorchidism, while 60% stated that retractile testes should not be managed surgically.

Table 1 shows the questions from the survey that was administered to the pediatricians in the study and the data obtained from the 99 complete questionnaires.

Table 1: Distribution of Responses from Pediatricians

Question	Answer	Relative Frequency (%)
1) When should the pediatrician perform the initial testicular examination?	In the delivery room In the nursery During the first consultation After the first month of life	87 3 10 0
2) What is the recommended frequency of scrotal examination in pediatric follow-up?	Until school age In non-lactating infants At every consultation regardless of age	14 9 77
3) For infants with suspected undescended testicles, what is the appropriate next step?	Reassesses in 6 months Refer to pediatric urology Request ultrasound Request magnetic resonance imaging (MRI)	26 12 62 0
4) What is considered the ideal age range for orchidopexy to preserve fertility and support normal testicular growth?	0–6 months 6–12 months 1–2 years 2–5 years	24 44 25 6
5) Is referral to a specialist difficult in these cases?	No Yes	67 33
6) If the testicle remains in the inguinal canal throughout the examination, how is it classified?	Ascending testicle Cryptorchid Ectopic Retractile	4 30 41 25
7) Is the statement that spontaneous testicular descent occurs between 2–4 months of age:	False True	11 89
8) Is a family history of asymmetry among parents or siblings a risk factor for cryptorchidism?	False True	28 72
9) Is it necessary to perform ultrasound prior to specialist referral for suspected undescended testicle?	No Yes	29 71
10) It is considered that in newborns with cryptorchidism and hypospadias, karyotyping is necessary if:	The hypospadias is proximal, and the testicles are not palpable. All patients with this association	42 58
11) Retractable testicles can ascend and become true cryptorchidism. This statement is:	False True	45 55
12) Should retractile testicles be treated surgically?	No Yes	60 40

DISCUSSION

This study demonstrated that, despite established guidelines for managing patients with testicular position abnormalities, significant gaps remain

in early identification and timely referral. Prompt intervention is essential to ensure better clinical outcomes, including preservation of fertility potential and reduced risk of testicular malignancy (Gates *et al.*,

2022; Hadziselimovic & Herzog, 2001; Kolon *et al.*, 2014; Skott *et al.*, 2025).

The results revealed awareness among pediatricians regarding the importance of early testicular evaluation, with 90% performing the examination in the delivery room or neonatal unit and 77% including it routinely during pediatric visits. Some pediatricians do not attend births but perform the examination during the first contact, in accordance with established recommendations (Kolon *et al.*, 2014; Mearini *et al.*, 2021).

It is well recognized that the absence of testes in the scrotum during the neonatal period—particularly in preterm infants—is not an immediate indicator of surgical pathology. However, failure of spontaneous descent by six months of age requires referral in line with current clinical guidelines (Kolon *et al.*, 2014; Skott *et al.*, 2025). A substantial discrepancy was observed between initial attentiveness and subsequent actions when confronted with undescended testis. This divergence has also been reported in international literature, highlighting that delayed referral remains a global challenge in pediatric practice. Snodgrass (2011) and Jiang (2019) showed that referrals to pediatric urologists often occur around 43–44 months of age, significantly beyond the recommended window of 6 to 12 months (Jiang *et al.*, 2019; Snodgrass *et al.*, 2011). Such delays compromise the effectiveness of orchidopexy and increase the risk of complications, including the need for assisted reproductive technologies and higher incidence of testicular cancer (Schneuer *et al.*, 2018).

The predominance of ultrasound (US) requests (66% of respondents) as the initial approach, rather than direct referral to a specialist, contrasts with the guidelines issued by the American Urological Association and the European Society for Pediatric Urology, which recommend surgical correction ideally between 6 and 12 months, and no later than 18 months of age (Kolon *et al.*, 2014; Skott *et al.*, 2025). The indiscriminate use of imaging—with limited diagnostic efficacy for cryptorchidism—results in delayed diagnosis and appropriate treatment, contributing to increased risks such as infertility, use of reproductive technologies, and higher rates of testicular malignancy (Boyd *et al.*, 2024; Echeverría Sepúlveda, Yankovic Barceló, & Lopez Egaña, 2022; Gates *et al.*, 2022). Although most respondents claimed to have no difficulty referring patients to specialists, the practice of requesting US inherently delays surgery by at least three months and burdens imaging services with unnecessary examinations, as noted in other centers (Gates *et al.*, 2022; Stewart *et al.*, 2024). A Brazilian study showed that only 20.5% of pediatricians considered physical examination sufficient for diagnosis (Monte *et al.*, 2024).

Another relevant issue is the difficulty in distinguishing types of testicular positioning during physical examination. Male genital examination can cause discomfort for both patients and physicians (Gerber *et al.*, 2019), yet it is crucial for accurately characterizing retractile, undescended, ectopic, or impalpable testes and determining the appropriate management. The study data revealed inconsistencies in clinical classification. When presented with a testis located in the inguinal canal during examination, only 4% correctly identified it as ascending, while 41% classified it as ectopic and 29% as cryptorchid. This difficulty in differentiating cryptorchidism, retractile, and ectopic testes may impair clinical decision-making and support the observation that many professionals still express uncertainty during genital assessments (Jiang *et al.*, 2019; Kim *et al.*, 2022; Mau & Leonard, 2017). In numerous cases, the genital exam is either undocumented or documented imprecisely (Gerber *et al.*, 2019; Jiang *et al.*, 2019).

Regarding the ideal age for orchidopexy, although 44% of pediatricians recommended surgical correction between 6 and 12 months, a considerable proportion (31%) considered late intervention between 1 and 5 years appropriate—contradicting evidence that highlights increased clinical risks associated with delayed treatment (Jiang *et al.*, 2019; Schneuer *et al.*, 2018). International studies have linked these delays to reduced fertility and increased risk of testicular neoplasia, estimating that every 6-month delay raises cancer risk by 6% and the likelihood of requiring assisted reproduction by 5% (Gates *et al.*, 2022; Nassau *et al.*, 2020).

Another key finding relates to the understanding of retractile testes. While 55% of pediatricians acknowledged the potential progression to true cryptorchidism, 60% did not recommend surgical intervention. This reflects ongoing controversy in the literature, which, despite endorsing clinical monitoring, also reports that up to 30% may evolve into acquired forms requiring surgical correction (Kikkawa *et al.*, 2023).

Acquired cryptorchidism refers to testes that were initially descended but subsequently ascend out of the scrotum, with prevalence ranging from 0.6% to 7% between 18 and 36 months of age (Rodprasert *et al.*, 2024). There remains debate as to whether ascending testis is a congenital condition, wherein previously descended testes cannot maintain a stable scrotal position due to abnormalities of the gubernaculum or processus vaginalis, becoming more evident as the child grows (Alchoikani & Ashour, 2021; Kikkawa *et al.*, 2023). Although approximately 30% of retractile testes may progress to acquired cryptorchidism, there is no consensus regarding universal surgical treatment. This lack of consensus reinforces the need for specialist follow-up and individualized management. Current

literature supports regular clinical monitoring and complementary parameters, such as testicular size, as safer strategies for determining the optimal timing of intervention (Skott *et al.*, 2025).

The association between cryptorchidism and hypospadias also showed divergences in clinical opinion. While current guidelines (Echeverría Sepúlveda, Yankovic Barceló, & López Egaña, 2022; Kolon *et al.*, 2014; Skott *et al.*, 2025) recommend endocrine evaluation for bilateral non-palpable testes and multidisciplinary assessment—including genetic investigation—for cases of proximal hypospadias and impalpable testes, 58% of pediatricians recommended karyotyping for all associated cases. This suggests an overestimation of the risk for sexual differentiation disorders, potentially leading to excessive diagnostic procedures and unnecessary psychosocial burden.

Finally, the questionnaire response rate (60.36%) and low engagement among pediatric trainees (30%) highlight the need to strengthen medical education and enhance strategies for pediatric specialist training. This educational gap is particularly concerning given that the study was conducted at a university hospital. Deficient practical knowledge regarding genital semiology, test interpretation, and surgical indications may compromise the quality of pediatric care and exacerbate disparities in clinical outcomes. Raising awareness about proper genital evaluation, reinforcing early referral policies, and standardizing clinical protocols emerged as institutional needs—mirroring trends observed in several international centers (Basalelah *et al.*, 2018; Boyd *et al.*, 2024; Ellerkamp *et al.*, 2018; Mau & Leonard, 2017). These measures are essential to ensure adequate management of testicular dystopia and improved reproductive, oncological, and psychosocial outcomes in pediatric patients. Enhancing patient management through standardized protocols aligned with current guidelines would alleviate parental anxiety, reduce imaging costs, improve waiting times, and facilitate prompt surgical correction when indicated.

LIMITATIONS

This study presents several limitations. The response rate among pediatricians was moderate (60.36%), while the participation of pediatric trainees was considerably low (30%), potentially impacting the representativeness of the findings. As the study was conducted at a single tertiary hospital, results may not be generalizable to other institutions or regions. The use of anonymous questionnaires may lead to subjective responses, and the absence of direct clinical observation limit's objective evaluation of professional practice. These limitations underscore the need for multicenter studies employing complementary methodologies to validate and deepen the findings presented.

CONCLUSIONS

Although pediatricians demonstrate awareness of the ideal timing for surgical correction of testicular dystopias, challenges persist in clinical characterization and the adoption of practices that diverge from established guidelines—such as the overuse of diagnostic ultrasonography. Despite perceived ease of access to specialists, delays in referral remain. The findings highlight the necessity for ongoing training, standardization of clinical conduct, and closer alignment with current recommendations to ensure timely and appropriate care for boys with testicular position abnormalities.

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