Official Journal of Erciyes University Faculty of Medicine

DOI: 10.14744/cpr.2026.92673
J Clin Pract Res 2026;48(4):437–442

Does the Initial Source of Recognition—Clinician versus Caregiver—Affect the Age at Orchidopexy for Undescended Testis? A Retrospective Comparative Analysis of 283 Cases

Mevlüt Keleş,[1] Erdal Benli,[1] Abdullah Çırakoğlu,[1] Onur Yalçın,[2] Ahmet Anıl Acet[1]

[1]Department of Urology, Ordu University Faculty of Medicine, Ordu, Türkiye
[2]Department of Pediatric Surgery, Ordu University Faculty of Medicine, Ordu, Türkiye

Cite this article as:
Keleş M, Benli E, Çırakoğlu A, Yalçın O, Acet AA. Does the Initial Source of Recognition—Clinician versus Caregiver—Affect the Age at Orchidopexy for Undescended Testis? A Retrospective Comparative Analysis of 283 Cases. JClinPractRes2026;48(4):437–442.

Address for correspondence:
Mevlüt Keleş.
Department of Urology, Ordu University Faculty of Medicine, Ordu, Türkiye
Phone: +90 532 312 4079
E-mail:
drmevlutkeles@gmail.com

Submitted: 06.05.2026
Revised: 08.07.2026
Accepted: 23.07.2026
Available Online: 17.08.2026

Erciyes University Faculty of Medicine Publications - Available online at www.jcpres.com

ABSTRACT

Objective: To evaluate institutional adherence to international guidelines regarding the timing of treatment for undescended testis (UDT) and investigate the impact of the initial source of recognition on age at orchidopexy.

Materials and Methods: We conducted a retrospective analysis of 283 patients who underwent orchidopexy for UDT between 2012 and 2022. Chronological age, laterality, and the initial source of recognition (clinician vs. primary caregiver) were evaluated using IBM SPSS Statistics, version 28. Variables were compared using the chi-square test, independent-samples t-test, or Mann–Whitney U test, with statistical significance defined as $p<0.05$.

Results: The mean age at orchidopexy was 4.8±5.6 years, reflecting an overall trend toward delayed consultation. A subgroup analysis of 185 patients with documented recognition data showed that caregiver-detected cases underwent surgery at a significantly older age than clinician-detected cases (5.08±4.98 vs. 3.57±3.68 years; $p=0.020$). A sensitivity analysis excluding adult patients confirmed that this difference remained significant within the pediatric cohort ($p=0.016$). However, most procedures in both groups were performed well beyond the recommended 18-month guideline threshold.

Conclusion: Delayed orchidopexy remains a prevalent clinical challenge with potential long-term implications for testicular health. Although clinician-led detection significantly improves surgical timing compared with caregiver recognition, systemic improvements in early primary care screening and caregiver awareness are essential to ensure strict adherence to optimal surgical timelines.

Keywords: Cryptorchidism, infertility, orchidopexy, primary care, testicular cancer, undescended testicle.

INTRODUCTION

Cryptorchidism, or undescended testis (UDT), is the most common congenital malformation affecting the male reproductive system, occurring in up to 4.6% of full-term infants and up to 45% of preterm newborns.[1] Although UDT is typically congenital, acquired forms characterized by the secondary ascent of a previously descended testis—referred to as ascending testis—may also occur. In congenital cases, spontaneous descent into the scrotum may occur within the first 6 months of life; however, spontaneous resolution after this period is exceedingly rare.[2]

The clinical significance of UDT lies in its potential to cause serious long-term complications, including impaired fertility, testicular torsion, and malignant transformation. Histopathological studies indicate that delaying surgical intervention beyond the first year of life leads to progressive interstitial fibrosis and significant impairment of spermatogenesis, thereby directly contributing to an increased risk of subsequent male infertility.[3–5] Furthermore, delayed surgery is strongly associated with an increased risk of testicular germ cell tumors, with the risk increasing substantially when orchidopexy is deferred until after adolescence.[6] Recent epidemiological data suggest that every 6-month delay in testicular descent into the scrotum is associated with a 6% incremental increase in the risk of testicular malignancy.[7]

Adherence to evidence-based treatment guidelines is essential to mitigate these risks. The American Urological Association (AUA) and European Association of Urology (EAU) guidelines recommend that, if spontaneous descent does not occur by 6 months of age, surgical orchidopexy should ideally be performed within the following year and completed no later than 18 months of age to preserve reproductive potential and facilitate oncological surveillance.[8,9]

Despite these well-established clinical consensus statements, timely surgical intervention remains a global challenge. Delays often result from systemic gaps in early detection, screening protocols, and referral pathways. This study aimed to evaluate adherence to international guidelines for UDT management at our tertiary institution. Specifically, we investigated the chronological age at orchidopexy and evaluated whether the initial source of clinical recognition influenced the timing of definitive surgery.

KEY MESSAGES

- Timely detection of undescended testis (UDT) is vital because delayed treatment remains a major risk factor for future male infertility and testicular malignancy.
- Although clinician-detected cases are diagnosed earlier than caregiver-identified cases, both groups frequently miss the 18-month "gold-standard" window for orchidopexy.
- Addressing this delay requires a dual strategy: implementing more rigorous professional screening protocols during infancy and enhancing caregiver education to promote prompt recognition and specialist referral.

MATERIALS AND METHODS

Study Protocol and Design

This retrospective descriptive study was conducted in the urology and pediatric surgery clinics of our tertiary academic center. The study protocol adhered to the ethical principles of the Declaration of Helsinki and was approved by Ordu University Clinical Research Ethics Committee (Approval Number: 268, Date: 25.11.2022).

Patients and Data Collection

We reviewed the medical records of patients diagnosed with UDT who underwent orchidopexy in our urology and pediatric surgery departments between January 1, 2012, and October 15, 2022. A total of 283 patients met the eligibility criteria. The patient selection process and study flow are summarized in Figure 1.

Clinical data, including chronological age at orchidopexy and UDT laterality, were systematically extracted from institutional electronic health records. We also documented the initial source of recognition, categorized as clinician-identified (detected during routine medical examinations or well-baby visits) or caregiver-identified (recognized by parents or guardians), along with the dates of surgical intervention.

Inclusion and Exclusion Criteria

The study included only patients with palpable UDT located in the proximal groin, distal groin, or proximal scrotum who underwent definitive orchidopexy. We excluded patients with:

- Incomplete clinical notes or missing essential surgical records.
- Documented spontaneous descent before the scheduled surgery.
- Nonpalpable testes, including intra-abdominal or vanishing testes.
- Retractile testes.
- Additional complex congenital anomalies requiring concomitant major surgical procedures.

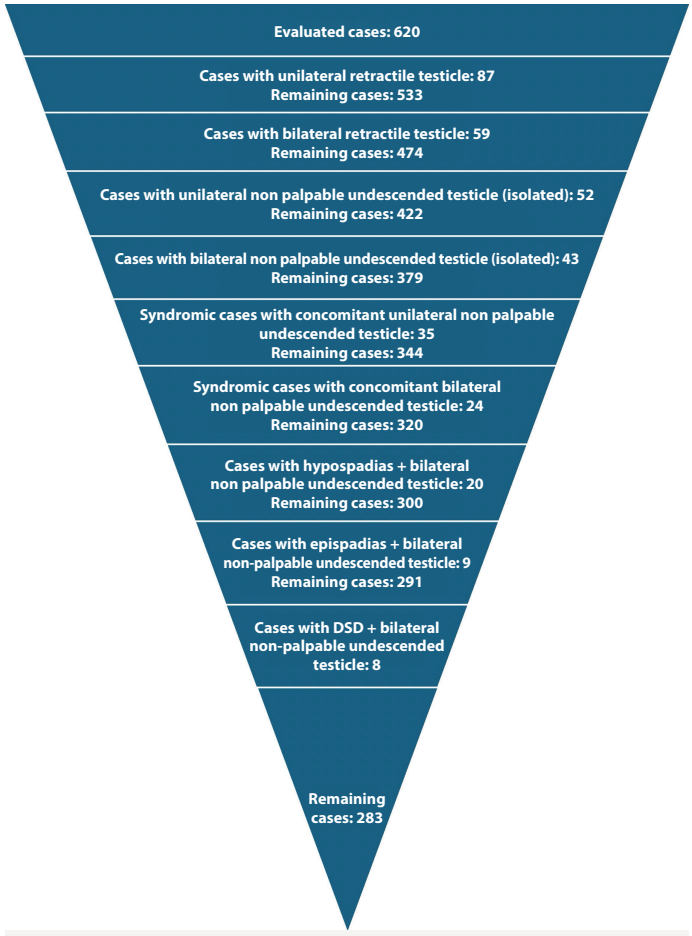

Figure 1. Flowchart of patient selection for the study.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 28.0 (IBM Corp., Armonk, NY, USA). The distributions of continuous variables were assessed using visual methods, including histograms and probability plots, and analytical tests, including the Kolmogorov–Smirnov and Shapiro–Wilk tests. Normally distributed data are expressed as mean±standard deviation (SD), whereas nonnormally distributed variables are reported as median (interquartile range [IQR]). Categorical variables are summarized as numbers and percentages.

For comparisons of continuous variables between groups, the independent-samples t-test was used for normally distributed data, whereas the Mann–Whitney U test was used for nonparametric data. Associations between categorical variables were evaluated using the chi-square test. Pairwise deletion was used to address missing retrospective data in subgroup analyses. A p value of <0.05 was considered statistically significant.

Table 1. Distribution of the initial source of recognition in the study population (N=283)

Recognition source	Count (n)	Percentage (%)
Caregiver-identified	92	32.5
Clinician-identified	93	32.9
Undocumented	98	34.6
Total	283	100.0

Table 2. Subgroup analysis comparing age at orchidopexy according to the source of recognition (n=185)*

Recognition source	n	Mean age at surgery (years)±SD	p
Clinician-identified	93	3.57±3.68	0.020
Caregiver-identified	92	5.08±4.98	

*: Excludes 98 patients with undocumented recognition sources. Statistical analysis was performed using the independent-samples t-test.

RESULTS

General Characteristics of the Study Population

A total of 283 male patients who underwent orchidopexy for UDT were included in the baseline analysis. Regarding laterality, UDT was left-sided in 31.4% (n=89) of patients, right-sided in 21.9% (n=62), and bilateral in 11.3% (n=32). In 35.3% (n=100) of cases, laterality was not documented in the historical records.

The baseline distribution of the initial source of recognition is summarized in Table 1. The condition was first identified by primary caregivers (parents) in 32.5% (n=92) of cases and by clinicians during medical assessments in 32.9% (n=93). In the remaining 34.6% (n=98) of patients, the initial source of recognition was not documented.

Surgical Timing and Clinical Correlates

The overall mean age at orchidopexy in the entire cohort was 4.80±5.66 years (range, 0–45 years; median, 3.0 years). The mean age at surgery did not differ significantly according to UDT laterality (left, right, or bilateral; p=0.390, one-way analysis of variance).

Comparative analyses based on the initial source of recognition were restricted to the 185 patients with complete data, whereas the remaining 98 patients with undocumented recognition sources were excluded from this subgroup analysis. As detailed in Table 2, a significant association was observed between the initial source of recognition and age at surgical intervention (p=0.020). The mean age at orchidopexy was significantly lower in the clinician-detected group than in the caregiver-detected group (3.57±3.68 years vs. 5.08±4.98 years, respectively; p=0.020).

Pediatric Sensitivity Analysis

Because our cohort included a small number of adult patients with late historical presentations, including patients up to 45 years of age, a sensitivity analysis was performed by restricting the cohort to pediatric patients aged <18 years (n=277) to confirm the validity of our findings. In this pediatric-only group, the mean age at orchidopexy was 3.24±2.85 years in the clinician-identified subgroup (n=91), compared with 4.62±3.41 years in the caregiver-identified subgroup (n=90). The difference remained statistically significant (t=−2.43, p=0.016; independent-samples t-test), confirming that clinician detection was consistently associated with earlier surgical correction.

Despite this statistically significant difference, the mean age in both groups substantially exceeded the ideal 18-month threshold recommended by international guidelines.

DISCUSSION

The primary clinical objective of undescended testis management is the timely surgical relocation of the gonad into the scrotum. In the existing literature, the rationale for early orchidopexy rests on two main principles: optimizing long-term fertility and reducing the risk of testicular malignancy or facilitating its surveillance. Histopathological evidence has clearly established that structural changes within the cryptorchid gonad, such as interstitial fibrosis and germ cell loss, progress with age and may become irreversible after the first year of life.[10]

Despite the consensus among major international guidelines, including those of the AUA and EAU, that surgical intervention should be completed between 6 and 18 months of age, global data consistently demonstrate a persistent gap between guideline recommendations and clinical practice. Large-scale reports indicate that approximately 58%–83% of patients with UDT worldwide undergo orchidopexy after 18 months of age, with median ages at surgery ranging widely from 23 to 64 months.[11–20] Even after the widespread dissemination of the 2014 AUA guidelines, recent multi-institutional studies have shown that systemic surgical delays remain largely unresolved.[21]

A key finding of our study was that the age at orchidopexy was significantly lower when the condition was first identified by a clinician during a routine medical assessment rather than by a primary caregiver (3.57 years vs. 5.08 years; p=0.020). This difference was further confirmed by our sensitivity analysis excluding adult outliers (p=0.016), emphasizing that physical examinations performed by trained healthcare professionals may expedite definitive surgical care. Caregivers often lack the anatomical knowledge required to distinguish a truly undescended testis from a retractile testis or normal physiological variation, which may result in delayed consultation until the child approaches school age or undergoes a routine preschool evaluation.

However, a particularly concerning finding in our dataset was that, even in the clinician-detected group, the mean age at surgery (3.57±3.68 years) remained substantially higher than the recommended 18-month threshold. This finding indicates that clinician recognition alone, in its current form, is insufficient. Gaps may exist not only in caregiver awareness but also in the frequency of routine penoscrotal examinations during infant well-baby visits, the timeliness of specialist referrals by primary care practitioners, and the misclassification of true UDT as a harmless retractile testis.

Multifaceted strategies are therefore urgently needed to address this clinical gap. These strategies should include reinforcing mandatory genital examinations during routine immunization visits, implementing electronic health record reminders for primary care providers, and distributing locally adapted educational brochures to caregivers. Furthermore, as prospective public health models suggest, future research should evaluate whether delays in caregiver recognition are driven solely by educational deficiencies or are compounded by systemic socioeconomic barriers, health insurance disparities, and geographic limitations in access to specialized tertiary care.[22,23]

Strengths and Limitations

The primary strength of this study is its multidisciplinary approach, which combined surgical data from both the urology and pediatric surgery clinics of an academic institution, thereby reducing potential bias associated with individual practitioners.

However, several limitations must be acknowledged. First, the retrospective design carries inherent risks of incomplete documentation. The substantial proportions of missing data regarding UDT laterality (35.3%) and the initial source of recognition (34.6%) represent major limitations and may have introduced selection or information bias. Second, our database did not allow us to reliably distinguish historical cases of ascending testis, or acquired cryptorchidism, from true congenital cases with delayed presentation, which may have artificially increased the calculated mean age at surgery. Finally, the lack of standardized electronic documentation regarding patients' socioeconomic status, insurance type, and distance from our center precluded the development of a multivariable model to account for potential confounding factors.

CONCLUSION

Undescended testis is a time-sensitive condition requiring surgical correction within a strict therapeutic window to protect future reproductive and oncological health. Significant delays in orchidopexy persist both globally and regionally. Our study demonstrates that, although clinician-led detection significantly reduces the age at surgery compared with caregiver recognition, the timing of surgery in both groups remains delayed relative to established international guidelines.

To achieve optimal surgical timing, targeted educational initiatives for primary care physicians and family practitioners are essential. Primary care providers should prioritize standardized penoscrotal examinations during all routine infant visits and maintain a low threshold for early surgical referral, recognizing that true congenital undescended testes are unlikely to descend spontaneously after the neonatal period.

Ethics Committee Approval: Ethics committee approval was obtained from Ordu University Clinical Research Ethics Committee (Approval Number: 268, Date: 25.11.2022).

Informed Consent: Informed consent was not required due to the retrospective nature of this study.

Conflict of Interest: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study received no financial support.

Use of AI for Writing Assistance: The authors acknowledge that Google Gemini, a generative artificial intelligence tool, was utilized during the preparation of this manuscript solely for the purposes of improving linguistic clarity, correcting grammatical errors, and refining the academic tone of the text.

Author Contributions: Concept – MK, EB, AÇ, OY, AAA; Design – MK, EB, AÇ, OY, AAA; Supervision – MK, EB, AÇ, OY, AAA; Resource –EB, OY; Materials – MK, AÇ; Data Collection and/or Processing - AAA; Analysis and/or Interpretation - MK, OY; Literature Review –EB, AÇ; Writing – AAA, MK; Critical Review – AAA, MK.

Acknowledgment: We would like to thank Dr. Yeliz Kaşko Arıcı for her valuable cooperations and collaborations, especially on the statistical analysis.

Peer-review: Externally peer-reviewed.

REFERENCES

1. Radmayr C. Management of undescended testes: European Association of Urology/European Society for Paediatric Urology guidelines. J Pediatr Urol 2017;13(5):550. [CrossRef]
2. Wenzler DL, Bloom DA, Park JM. What is the rate of spontaneous testicular descent in infants with cryptorchidism? J Urol 2004;171(2 Pt 1):849-51. [CrossRef]
3. Engeler DS, Hösli PO, John H, Bannwart F, Sulser T, Amin MB, et al. Early orchiopexy: prepubertal intratubular germ cell neoplasia and fertility outcome. Urology 2000;56(1):144-8. [CrossRef]
4. Hadziselimovic F, Herzog B. The importance of both an early orchidopexy and germ cell maturation for fertility. Lancet 2001;358(9288):1156-7. [CrossRef]
5. Park KH, Lee JH, Han JJ, Lee SD, Song SY. Histological evidences suggest recommending orchiopexy within the first year of life for children with unilateral inguinal cryptorchid testis. Int J Urol 2007;14(7):616-21. [CrossRef]
6. Pettersson A, Richiardi L, Nordenskjold A, Kaijser M, Akre O. Age at surgery for undescended testis and risk of testicular cancer. N Engl J Med 2007;356(18):1835-41. [CrossRef]
7. Schneuer FJ, Milne E, Jamieson SE, Pereira G, Hansen M, Barker A, et al. Association between male genital anomalies and adult male reproductive disorders: a population-based data linkage study spanning more than 40 years. Lancet Child Adolesc Health 2018;2(10):736-43. [CrossRef]
8. Kolon TF, Herndon CD, Baker LA, Baskin LS, Baxter CG, Cheng EY, et al.; American Urological Association. Evaluation and treatment of cryptorchidism: AUA guideline. J Urol 2014;192(2):337-45. [CrossRef]
9. Radmayr C, Dogan HS, Hoebeke P, Kocvara R, Nijman R, Silay S, et al. Management of undescended testes: European Association of Urology/European Society for Paediatric Urology Guidelines. J Pediatr Urol 2016;12(6):335-43. Erratum in: J Pediatr Urol 2017;13(2):239. [CrossRef]
10. Cooper ER. The Histology of the Retained Testis in the Human Subject at Different Ages, and its Comparison with the Scrotal Testis. J Anat 1929;64(Pt 1):5-27.
11. Savoie KB, Bachier-Rodriguez M, Schurtz E, Tolley EA, Giel D, Feliz A. Health Disparities in the Appropriate Management of Cryptorchidism. J Pediatr 2017;185:187-92.e1. [CrossRef]
12. Williamson SH, Davis-Dao CA, Huen KH, Ehwerhemuepha L, Chuang KW, Stephany HA, et al. Timely orchiopexy by 18 months of age: Are we meeting the standards defined by the 2014 AUA guidelines? J Pediatr Urol 2022;18(5):683.e1-7. [CrossRef]
13. Bajaj M, Upadhyay V. Age at referral for undescended testes: has anything changed in a decade? N Z Med J 2017;130(1457):45-9.
14. Zvizdic Z, Islamovic B, Milisic E, Jonuzi A, Vranic S. Changing Trends in the Referral and Timing of Treatment

for Congenital Cryptorchidism: A Single-Center Experience from Bosnia and Herzegovina. J Pediatr Surg 2020;55(9):1965-8. [CrossRef]

15. Zhao TX, Liu B, Wei YX, Wei Y, Tang XL, Shen LJ, et al. Clinical and socioeconomic factors associated with delayed orchidopexy in cryptorchid boys in China: a retrospective study of 2423 cases. Asian J Androl 2019;21(3):304-8. [CrossRef]
16. Bradshaw CJ, Corbet-Burcher G, Hitchcock R. Age at orchidopexy in the UK: has new evidence changed practice? J Pediatr Urol 2014;10(4):758-62. [CrossRef]
17. Point D, Morley C, Tourchi A, Reddy S, Sirisreetreerux P, Gearhart J, et al. Rural versus urban compliance in the management of cryptorchidism: is there a difference? Eur J Pediatr 2017;176(8):1067-73. [CrossRef]
18. Jiang DD, Acevedo AM, Bayne A, Austin JC, Seideman CA. Factors associated with delay in undescended testis referral. J Pediatr Urol 2019;15(4):380.e1-6. [CrossRef]
19. Alhazmi H, Junejo NN, Albeaiti M, Alshammari A, Aljallad H, Almathami A, et al. Timing of orchidopexy at a tertiary center in Saudi Arabia: reasons for late surgery. Ann Saudi Med 2018;38(4):284-7. [CrossRef]
20. Aggarwal H, Rehfuss A, Hollowell JG. Management of undescended testis may be improved with educational updates for referring providers. J Pediatr Urol 2014;10(4):707-11. [CrossRef]
21. Weiner H, Solomon JR, Thinnes R, Pinsky B, Ferreri C, Singleterry M, et al. How Effective Was the 2014 AUA Cryptorchidism Guideline? A Multi-institutional Evaluation. Urol Pract 2023;10(6):605-10. [CrossRef]
22. Ahn JJ, Garrison MM, Merguerian PA, Shnorhavorian M. Racial and ethnic disparities in the timing of orchiopexy for cryptorchidism. J Pediatr Urol 2022;18(5):696.e1-6. [CrossRef]
23. Brown JJ, Wacogne I, Fleckney S, Jones L, Ni Bhrolchain C. Achieving early surgery for undescended testes: quality improvement through a multifaceted approach to guideline implementation. Child Care Health Dev 2004;30(2):97-102. [CrossRef]