

CLINICAL REPORT

Unexpected Relocation of a Cryptorchid Testis *due to* hCG Administration in an Adult Male Cat

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ABSTRACT

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This case report describes the successful diagnosis and surgical management of unilateral cryptorchidism in an adult male domestic shorthair cat with a non-palpable, ultrasonographically occult testis. Initial ultrasonography failed to localize the retained testis. Endocrine testing revealed a baseline testosterone of 91.10 ng/dL, which rose to 298.25 ng/dL four hours after human chorionic gonadotropin (hCG) stimulation, confirming viable testicular tissue. Non-contrast CT subsequently localized the testis to the right inguinal/subcutaneous region. Thirty-one days later, the cat underwent a targeted inguinal approach for removal of the retained testis and concurrent castration of the contralateral scrotal testis. Intraoperatively, the testis was found more caudal than where computed tomography (CT) indicated before. The histopathological analysis of cryptorchid testes reveals significant changes, such as atrophy, reduced diameter of the seminiferous tubules, and absence of spermatogonia. The case supports a stepwise diagnostic pathway (palpation, ultrasonography, hCG stimulation, and CT when needed) to combine functional and anatomic data for precise surgical planning. The CT should be used judiciously due to radiation and anesthesia concerns. Notably, the observed caudal shift of the retained testis between diagnostic hCG administration and surgery suggests that some degree of canalicular mobility may persist in adult cats, underscoring the importance of minimizing the time between imaging and surgical intervention when endocrine stimulation is used.

Introduction

Cryptorchidism (an undescended testicle) is a condition where one or both testes fail to move down into their proper location within the scrotum.^{1,2} Testicular descent, guided by the gubernaculum, occurs in three sequential phases (abdominal translocation, trans-inguinal passage, and inguinoscrotal migration).³ In dogs, testes typically traverse the inguinal canal ~3-4 days after birth, reach the scrotum by 14-35 days of age, and the inguinal canal closes around six months.⁴

In cats, descent usually occurs before birth, but testes may remain mobile within the canal until puberty. The inguinal canal normally closes by 7-8 months, and lack of palpable scrotal testes after this time is diagnostic for cryptorchidism.⁵ Because the testes originate near the kidneys, retained gonads may be intra-abdominal, inguinal, or pre-scrotal. Unilateral cryptorchidism is more common than bilateral, and while right-sided retention predominates in dogs, cats show no consistent laterality though some studies report a slight

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left-sided predominance.^{3,4} Reported prevalence is ~0.37-3.80% in cats and 0.8-12.9% in dogs; large feline surveys estimate ~1.10-1.80% depending on population studied.^{3,6} Persian and Ragdoll cats appear predisposed.⁷ In dogs, inheritance follows an autosomal recessive mode, whereas in cats evidence supports a likely polygenic predisposition.³ Thermal impairment of spermatogenesis means unilateral cryptorchids may remain fertile, though semen quality is frequently reduced, while bilateral cases are usually sterile.⁸ Retained testes, exposed to core body temperature (~5.00 °C above scrotal), show seminiferous tubule degeneration and hypoplasia. Leydig cells usually maintain testosterone secretion, therefore androgen-dependent behaviors persist. The clinical significance stems from increased risks of torsion and neoplasia (Sertoli cell tumor, seminoma, teratoma), with neoplasia risk estimated at 9-14 fold that of scrotal testes.⁹ Cryptorchidism may also co-occur with renal anomalies (e.g., unilateral agenesis, ectopia, dysplasia), reflecting shared embryological pathways.¹⁰ Diagnosis begins with inspection of external genitalia to evaluate testosterone-dependent penile spines, followed by careful inguinal palpation. Fat pads or lymph nodes may mimic a testis, while intra-abdominal testes are usually non-palpable.^{3,8} Abdominal ultrasonography is the first-line imaging modality, though small intra-abdominal testes may be missed or confused with adjacent structures.⁷ When required, hormonal stimulation with human chorionic gonadotropin (hCG) or GnRH (documenting a >2-fold rise in serum testosterone at ~1 h) confirms viable testicular tissue. Penile spines can serve as a practical surrogate when blood testing is unavailable.^{4,8} Advanced imaging with contrast-enhanced CT is valuable when ultrasonography is inconclusive or concurrent abdominal pathology is suspected. The CT can delineate vascular anatomy, localize retained testes, and detect complications such as torsion (e.g., a canine case with

cavitated masses and a torsion “whirl sign”). In cats, CT has revealed ectopic kidneys alongside intra-abdominal testes in bilateral cryptorchidism, guiding surgical planning.^{7,11,12} When a testis is non-palpable and ultrasonographically occult, clinicians may require two distinct data points to plan surgery: functional confirmation (*via* hCG stimulation) and precise anatomical localization (*via* CT). This case demonstrates that combining these diagnostics, especially when followed by a surgical delay, introduces a critical risk. We found that testicular location can shift over time even during adulthood, creating an intraoperative discrepancy. This displacement renders the preoperative imaging unreliable and necessitates an altered surgical approach. Therefore, to preserve anatomical accuracy, surgical intervention must be performed with minimal delay following this combined diagnostic protocol.

Case Description

A domestic shorthair (DSH) male cat, estimated to be over two years of age based on dentition and weighing 3.60 kg, was presented for evaluation of unilateral non-scrotal testis. Physical examination revealed the absence of the right testis from the scrotum. No testicular tissue was palpable on the abdomen or along the inguinal canal on clinical palpation. Vital parameters including heart rate, temperature, appetite, and physical activity were within normal limits. Abdominal and inguinal ultrasonography (SonoScape P40, Shenzhen, China, linear probe, 8-13 MHz) failed to visualize ectopic testicular tissue. Endocrine testing was performed on an ADVIA Centaur CP (TSTII; Siemens Healthcare Diagnostics, Tarrytown, USA) using an electrochemiluminescence assay. Baseline serum testosterone measured 91.10 ng/dl (normal range: 11.50-18.90 ng/dl) and estradiol 22.96 pg/ml (normal range: 3.3-5.3 pg/ml).^{19,20} As a diagnostic stimulation test, 100 IU hCG (Pooyesh Darou

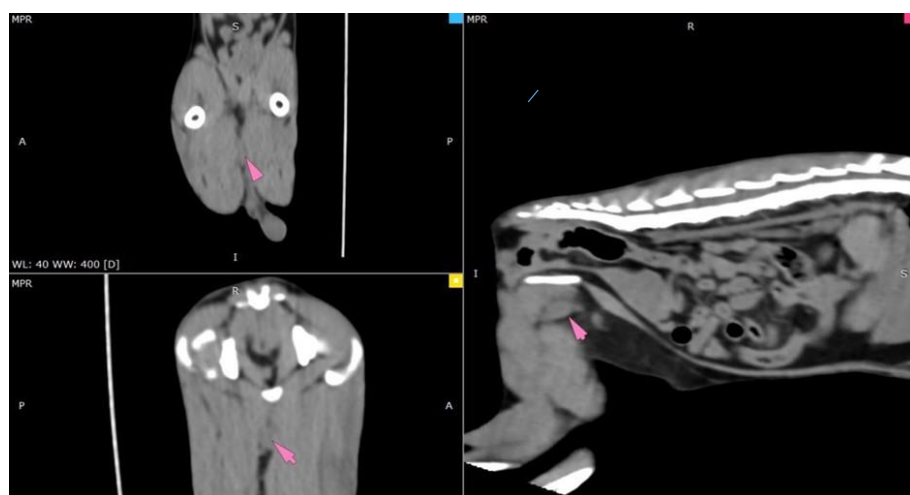


Figure 1. Computed tomography (CT): unilateral right-sided inguinal cryptorchidism. The CT scan was performed in three standard planes: sagittal, dorsal, and transverse. The image on the right represents the sagittal plane, the upper left image represents the dorsal plane, and the lower left image represents the transverse plane. The pink arrowhead indicates the undescended testis.

Biopharmaceuticals Co., Tehran, Iran) was administered intramuscularly; serum testosterone, reassessed 4 h post-injection (corresponding to the expected peak response in felids), elevated to 298.25 ng/dl, supporting retained functional testicular tissue

A plain (non-contrast) CT examination (Canon, formerly known as Toshiba, 2016, PUREVISION Solid State Technology, Kvp = 120, mA = R 50, Eff. mAs = 40) of the abdomen and pelvis was subsequently performed. Findings were as follows: The right testicle is located within the inguinal canal and situated in the subcutaneous region. The contralateral (left) testicle was unremarkable and within normal limits (Figure 1).

Treatment and Outcome

Thirty-one days after hCG administration, surgical exploration and castration were undertaken. Premedication consisted of acepromazine (Alfasan International BV, Woerden, The Netherlands) 0.05 mg/kg IM. After 30 minutes, an IV catheter was placed and general anesthesia was induced with ketamine (Alfasan International BV, Woerden, The Netherlands) 5.00 mg/kg IV plus diazepam (Caspian Tamin Co. Rasht, Iran) 0.3 mg/kg IV; the patient was intubated and anesthesia maintained with 1.00% isoflurane (Piramal Critical Care Inc, Bethlehem, USA). Through an inguinal approach followed by routine scrotal castration, both the retained and scrotal testes were removed. During surgery, the retained testis was found slightly more caudal closer to the scrotum than the location indicated by preoperative CT. This locational difference may have resulted from a shift occurring between the CT scan and the operation, potentially influenced by hCG stimulation post-administration. Gross measurements using a metal ruler confirmed a normally descended testis and a retained right inguinal testis (Figure 2). The epididymis was separated from the testis, and multiple incisions were made at the cauda epididymidis. The tissue was then placed in a specialized culture medium and incubated for 30 minutes, after which the sperm were examined under a microscope at 20× magnification. Tissue samples were collected from both normal and cryptorchid testes for histopathological examination. The samples were preserved in 10.00% neutral buffered formalin and subsequently processed for paraffin embedding. A 5-μm paraffin section was stained with hematoxylin and eosin. A microscopic analysis of the normal testes in cats demonstrated the various stages of spermatogenesis occurring within the seminiferous tubules, which were exhibited maturation of the germ cells from the peripheral to the center of the lumen (Figure 3A). In the cryptorchid testes, the testes exhibited disorganized germ cells, including Sertoli cells that were shed into the lumen of the seminiferous tubules, with severe hypo-

spermatogenesis features. Some tubules exhibit a complete absence of germ cells and have decreased in diameter and atrophied (Figure 3B).

Qualitative assessment of epididymal sperm revealed normal motility and morphology in the scrotal testis, whereas no sperm were recovered from the undescended testis in the culture medium. Preoperative CT scan was used to successfully localize the undescended testis 31 days prior to the surgical procedure. Its location was then directly assessed and documented during the operation. Comparison of these observations revealed a noticeable shift in the testis's location, suggesting a discrepancy between its location at the time of the diagnostic hCG test and at the time of surgery. Recovery was uneventful, with no postoperative complications reported during one-month follow-up.

Clinical Relevance

This case report describes a structured, multimodal approach to managing unilateral cryptorchidism in an adult cat, integrating diagnostic hCG stimulation with advanced imaging to optimize surgical planning, and highlights two key practical insights. Memon and Tibary reported that ultrasonography can achieve high detection rates (approximately 90.00-95.00%) for cryptorchid testes in small animals when performed by experienced operators.⁸ However, Felumlee *et al.* demonstrated that in



Figure 2. Gross specimens with scale: scrotal testis ≈2.30 cm (upper); retained inguinal testis ≈1.90 cm (lower).

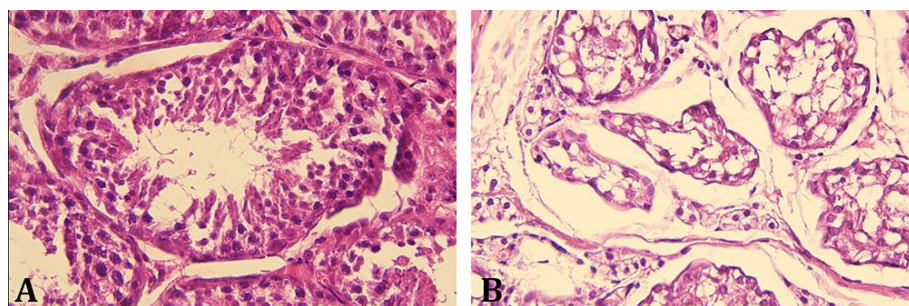


Figure 3. A. Normal and regular spermatogenesis demonstrates the maturation of germ cells progressing from the periphery towards the center of the lumen, alongside a typical histological structure of seminiferous tubules and inter-tubular spaces (H&E; 400×). B. Testicular biopsy performed on a cryptorchid cat reveals disorganization of germ cells and sloughing into the lumina, accompanied by significant hypo-spermatogenesis and decreased in seminiferous tubules diameter (H&E; 400×).

abdominal cryptorchidism, ultrasound sensitivity may decrease to 72.00%, whereas CT achieves 100% sensitivity in these cases. Accordingly, CT should be considered a reliable second-line modality when ultrasonography is inconclusive or non-diagnostic.¹³ A further critical point highlighted by this case is that combining hCG stimulation with imaging may result in location changes of the retained testis over time. The exact mechanism of androgen-mediated testicular displacement remains not fully understood; however, it is hypothesized that hCG-induced androgen surge may influence the testicular cord or cremaster muscle contractility.²¹ The 31-day interval between diagnostic evaluation and surgery in this report corresponded with a slight caudal displacement from the CT-identified location, emphasizing the necessity of minimizing the diagnostic-to-surgical interval to maintain localization accuracy. Epidemiological data from Yates *et al.* identified a 1.30% prevalence of cryptorchidism in a cohort study on 3,019 cats, and more recent studies by Karasu *et al.* and Cho *et al.* reported prevalence rates of 1.12% in cats compared to 3.21% in dogs. These findings confirm that cryptorchidism remains significantly less common in felines (0.37-3.80%) than in canines (0.80-12.90%), and the unilateral inguinal presentation observed here aligns with established species-specific patterns.^{3,6,11} Although ultrasonography is typically preferred as the initial diagnostic technique due to its non-invasive nature and availability, its limitations in this case were likely attributable to the small size of the feline testis and operator-dependent variability. In this case, CT examination subsequently enabled successful localization. This is consistent with previous reports which demonstrated CT's superior spatial resolution and deep tissue penetration in complex feline gonadal conditions, including testicular teratomas and testes associated with Müllerian duct remnants.^{12,14,15} The hCG stimulation test produced a marked increase in testosterone concentration (91.10-298.25 ng/dl), confirming functional Leydig cell activity. However, the literature indicates that while hCG has been investigated as a therapeutic agent to induce testicular descent in immature animals, controlled studies have shown that

testicular descent is largely independent of gonadotropic stimulation, and reported treatment successes are predominantly anecdotal.^{16,17} Thus, in adult cats, hCG should be regarded exclusively as a diagnostic tool. Furthermore, Bergh and Söder described hCG-induced vascular hyperemia and transient inflammatory-like changes in testicular tissue, which may increase mobility within the inguinal canal and plausibly explain the displacement observed at surgery.¹⁸ Although bilateral orchiectomy is widely recommended to mitigate the risks of neoplasia, torsion, and hereditary transmission,¹¹ some owners prefer unilateral removal to preserve fertility and endogenous hormone production. In this case, both testes were removed per standard protocol.

In conclusion, this case report highlights the clinical importance of considering the time interval between diagnostic procedures, including imaging and hCG administration, and surgical intervention in an adult cat with cryptorchidism. Administration of hCG, even in adult cats, may induce testicular movement within the inguinal canal, which can subsequently lead to inaccurate localization of the cryptorchid testis and an incorrect surgical incision site if a delay occurs between diagnosis and surgery. Therefore, if any interval exists between diagnosis and surgical management, re-evaluation of the location of the cryptorchid testis is strongly recommended immediately prior to surgery using careful palpation and/or diagnostic imaging to ensure accurate surgical planning and to minimize the risk of operative error.

Although this study provides valuable clinical insight, it is limited by its nature as a single case report. Future investigations involving a larger number of cases are necessary to validate the observations reported here, to better elucidate the effects of hCG administration on testicular localization in adult cats, and to establish more robust, evidence-based clinical guidelines for the diagnosis and surgical management of feline cryptorchidism.

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Conflict of Interest

None to declare.

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