BAHRİ DAĞDAŞ
Hayvancılık Araştırma Dergisi

OLGU SUNUMU

Hidden Testes, Hidden Problems: A Rare Intersection of Bilateral Cryptorchidism and Renal Anomalies in a Cat

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Yayın Bilgisi:
Geliş Tarihi: 04.12.2024
Kabul Tarihi: 06.01.2025

Anahtar kelimeler: Bilateral kriptorşidizm, kriptorşidizm, diagnostik görüntüleme, renal anomali, ürogenital gelişim

Keywords: Bilateral cryptorchidism, Cryptorchidism, Diagnostic imaging, Renal anomalies, Urogenital development

Abstract

Cryptorchidism is a common reproductive disorder in cats, characterized by the failure of testes to descend into the scrotum during embryonic development. This condition is often linked to genetic and embryological factors and frequently coexists with renal anomalies due to the shared developmental origins of the testes and kidneys. This report presents a rare case of bilateral cryptorchidism in a 6-year-old male cat, complicated by renal morphological abnormalities. Diagnostic imaging, including ultrasonography and contrast-enhanced computed tomography (CT), revealed ectopic kidneys and abdominally retained testes. Hormonal analysis confirmed reduced testosterone levels (<20 ng/dL), supporting the diagnosis. Surgical removal of the retained right testis was performed successfully, though the left testis could not be identified, likely due to involution or atrophy. This case underscores the importance of preoperative imaging and multidisciplinary evaluation in managing cryptorchidism cases, particularly when renal anomalies are involved, highlighting the embryological connections between these conditions.

Gizli Testisler, Gizli Sorunlar: Bir Kedide Nadir Görülen Bilateral Kriptorşidizm ve Böbrek Anomalileri

Özet

Kriptorşidizm, embriyonik gelişim sırasında testislerin skrotuma inememesiyle karakterize, kedilerde sık görülen bir üreme bozukluğudur. Testisler ve böbreklerin ortak embriyonik kökeni nedeniyle bu durum sıklıkla böbrek anomalileriyle birlikte görülür. Bu raporda, 6 yaşındaki bir erkek kedide nadir görülen bilateral kriptorşidizm ve böbrek anomalileri ele alınmıştır. Ultrasonografi ve kontrastlı bilgisayarlı tomografi (BT) gibi görüntüleme yöntemleri, abdominal yerleşimli testisleri ve ektopik böbrekleri tespit etmiştir. Hormonal analizde düşük testosteron seviyesi (<20 ng/dL) kriptorşidizm tanısını desteklemiştir. Cerrahi müdahaleyle sağ testis başarıyla çıkarılmış, ancak sol testis muhtemel involüsyon ve atrofi nedeniyle bulunamamıştır. Bu vaka, böbrek anomalilerinin kriptorşidizmle ilişkisini ve multidisipliner bir yaklaşımın önemini vurgulamaktadır. Detaylı görüntüleme teknikleri, tanı ve tedavi süreçlerinin başarısını artırmada kritik bir rol oynar.

1. Introduction

Cryptorchidism is a condition characterized by the failure of the testes to descend into the scrotal region during embryonic development, and it is one of the most frequently encountered reproductive disorders in cats (Ali et al., 2022; Karasu et al., 2022). This condition is associated with genetic factors, hormonal imbalances, and environmental influences. The process of testicular descent is a complex mechanism during the embryonic period, and disruptions in this process are often linked to developmental abnormalities in other organs of the urogenital system (Foster, 2022).

The kidneys and testes share a common embryonic origin within the urogenital system, establishing a significant anatomical and functional connection between the two structures (Romagnoli and Schlafer, 2006). During embryogenesis, different parts of the urogenital system develop from the same primordial tissue, meaning that abnormalities in one structure may have implications for others. For example, renal agenesis, ectopic kidneys, or renal dysplasia have been frequently reported in cats with cryptorchidism (Lohr et al., 2022). Such anomalies may interfere with the proper positioning of the testes or lead to their localization within the abdominal cavity.

It has been reported that the testes in cryptorchid cats are often located near the caudal pole of the kidneys (Amann and Veeramachaneni, 2007). This observation supports the theory that the testes move near the kidneys during embryonic development. Moreover, renal anomalies are typically ipsilateral to the cryptorchid testis, further emphasizing the developmental interdependence between the two structures (Millis and Hauptman, 1992). Therefore, in rare cases of bilateral cryptorchidism in cats, it becomes imperative to assess the kidneys' anatomical and functional characteristics thoroughly.

This case report presents a cat with bilateral cryptorchidism accompanied by renal anomalies. It highlights the clinical significance of recognizing the potential coexistence of these conditions. The report underscores the importance of veterinary practitioners considering renal anomalies when diagnosing and managing cryptorchidism in cats to ensure comprehensive care.

2. Case Description

The case involves a 6-year-old, otherwise healthy male domestic cat presented to the Izmir Animal Hospital for a routine examination. The cat had no prior history of surgical intervention.

2.1. Clinical Findings and Diagnosis

History and Physical Examination

The anamnesis provided by the owners revealed no prior history of orchiectomy. Upon physical examination, the testes were absent in the scrotum.

Imaging

Abdominal ultrasonography revealed that the right testis was located within the abdominal cavity, whereas the left testis could not be identified. These findings led to a diagnosis of bilateral cryptorchidism.

2.2. Surgical Intervention

Premedication and Anesthesia

The cat was fasted for 12 hours prior to the surgical procedure. Metedomidine was administered intramuscularly (IM) at 10 µg/kg and butorphanol was administered IM at a dose of 0.2 mg/kg. Propofol was administered intravenously at a dose of 4 mg/kg. The cat was intubated with a 3.5 mm endotracheal tube, ensuring an appropriate fit for the

airway. Anesthesia was maintained with isoflurane at a concentration of 1.5–2%, and vital parameters, including heart rate, respiratory rate, oxygen saturation, and body temperature, were continuously monitored throughout the procedure.

Surgical Plan and Operative Findings

A midline laparotomy incision was performed under sterile conditions, extending from the xiphoid to the cranial pubis, providing adequate access to the abdominal cavity. During the procedure, it was observed that both kidneys were ectopically positioned and displayed irregular shapes and sizes, consistent with congenital anomalies.

The right testis, preoperatively localized via ultrasonography, was carefully dissected to separate adhesions and surrounding tissues. The spermatic cord was ligated using absorbable sutures (2-0 polyglycolic acid) and transected, allowing for its successful removal (Figure 1).

Despite thorough intraoperative exploration and additional ultrasonographic evaluation, the left testis could not be identified, suggesting either agenesis or a deeply ectopic location.

The abdominal cavity was meticulously inspected for abnormalities, and the incision was closed in layers using standard surgical protocols. Postoperative care included effective pain management, infection prevention, and close monitoring to ensure a smooth recovery.

Figure 1: Postoperative image of the excised right testis removed from the abdominal cavity.

2.3. Diagnostic Evaluation

Hormonal Analysis

Blood samples were collected intraoperatively from the cephalic vein under sterile conditions and transported to a specialized diagnostic laboratory under a cold chain protocol to preserve sample integrity. Testosterone levels were measured using an enzyme-linked immunosorbent assay (ELISA) method tailored for feline samples. The laboratory ensured stringent quality control, including assay sensitivity, specificity validation, and triple replication of each sample. The analysis revealed testosterone levels of <20 ng/dL, supporting the diagnosis of cryptorchidism and confirming the absence of functional testicular tissue in the scrotum.

Imaging:

Postoperative contrast-enhanced CT confirmed the ectopic positioning of the kidneys and their morphological abnormalities, consistent with congenital defects (Figure 2).

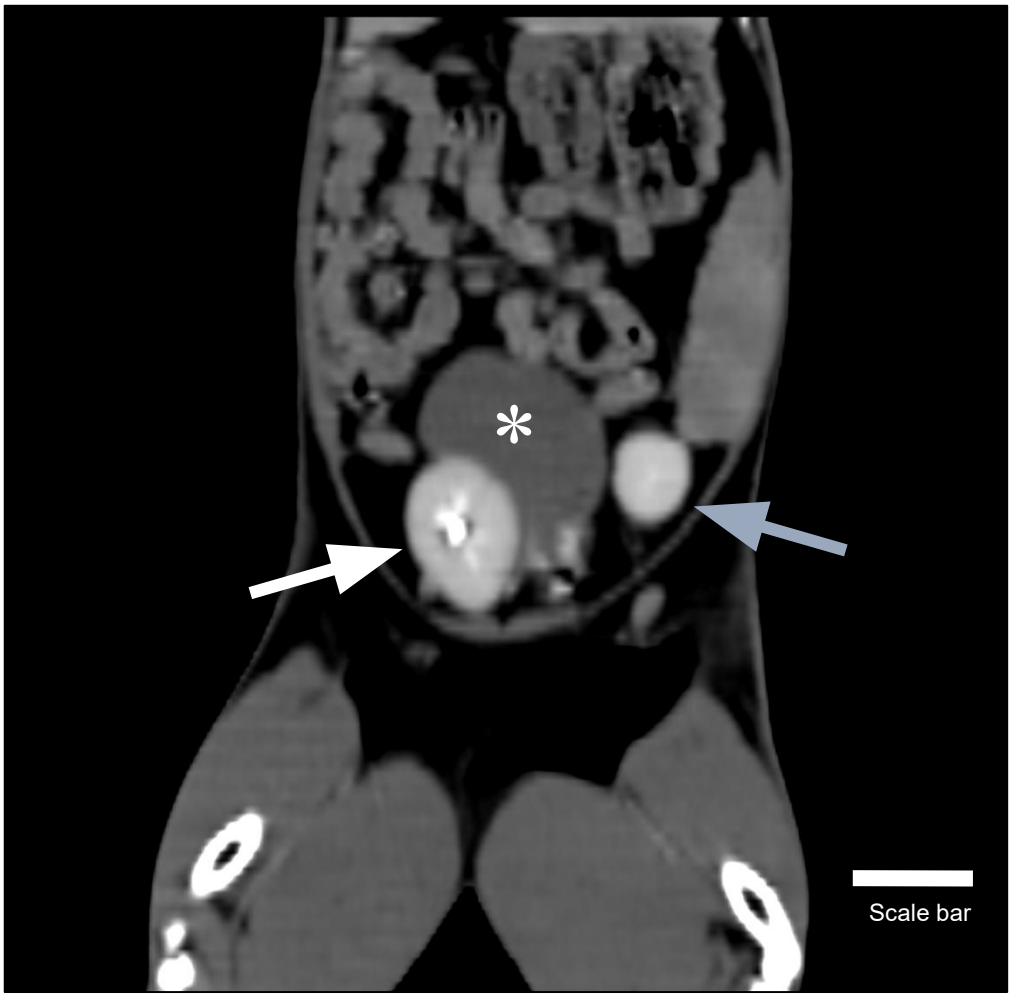

Figure 2. Contrast-enhanced computed tomography (CT) image showing the ectopic kidney (marked with a white arrow), the normal kidney (marked with a blue arrow), and the urinary bladder (marked with an asterisk *). The morphological abnormalities of the ectopic kidney are consistent with congenital defects. This imaging highlights the anatomical relationship between the kidneys and the cryptorchid testis in the abdominal cavity. (Scale bar = 30 mm)

3. Discussion

This case highlights the clinical and surgical challenges associated with the rare presentation of bilateral cryptorchidism in cats. Cryptorchidism arises from genetic and embryological factors and is often associated with developmental anomalies of the urogenital system (Foster, 2022). In cases where renal anomalies coexist, a multidisciplinary diagnostic and therapeutic approach is essential (Millis and Hauptman, 1992).

Renal anomalies often present ipsilateral to the cryptorchid testis, reflecting the shared embryonic origin of the kidneys and testes within the urogenital system (Amann and Veeramachaneni, 2007). Conditions such as renal ectopia or agenesis can disrupt the normal descent of the testes, resulting in their abnormal localization within the abdominal cavity (Lohr et al., 2022). These anomalies not only complicate the surgical removal of the cryptorchid testis but also emphasize the importance of preoperative imaging for accurate localization and planning.

In this case, the inability to locate the left testis during surgery suggests that it may have undergone atrophy or involution, a phenomenon reported in similar cases (Romagnoli and Schlafer, 2006). Such findings further emphasize the critical role of advanced imaging techniques, including ultrasonography and CT, in the comprehensive evaluation of cryptorchidism cases (Meyers-Wallen, 2012).

These observations underscore the need for veterinarians to carefully assess renal anomalies in cryptorchidism cases, as these conditions often coexist and have significant implications for clinical management. Advanced diagnostic tools, such as contrast-enhanced CT, are invaluable for elucidating the anatomical and functional abnormalities of the urogenital system.

4. Conclusion

This case report underscores the close relationship between cryptorchidism and renal anomalies in cats and their implications for clinical management. Veterinary practitioners must conduct a thorough evaluation of the kidneys' anatomical and functional characteristics in cryptorchid cats. Detailed preoperative imaging is essential to enhance the safety and success of surgical interventions.

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