# A case of unilateral hydrocele in a dog secondary to inapparent inguinal hernia

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## Abstract

A 6-year, male intact Coonhound, was presented for unilateral scrotal enlargement of roughly 3 months' duration. His left side scrotum was markedly enlarged and edematous and both testes palpated normal. Rapid slide agglutination test (for brucellosis) and SNAP 4DX (IDEXX Laboratories, Inc., Westbrook, ME) test (for tick-borne disease) were negative. Initial scrotal ultrasonography revealed accumulation of anechoic fluid with hyperechoic flecks and swirling surrounding the left testis. On further ultrasonographic examination, omentum appeared extending through the left inguinal ring and into the scrotum. A case of scrotal hernia with secondary hydrocele was diagnosed. Hydrocele was resolved surgically and the dog returned to full athletic function.

**Keywords:** Dog, scrotal enlargement, hydrocele, brucellosis, hernia

## Background

Scrotal enlargement in any species could be indicative of multiple pathologies, including primary orchitis, epididymitis, testicular or scrotal neoplasia, testicular torsion, hernia, or hydrocele.[1] A thorough scrotal and testicular examination is required to reach a diagnosis. With a breeding male, not only are there concerns regarding the health of the animal, but future reproductive capability may also be a priority for the owner. It is important to take a multi-modal approach in working up cases of scrotal enlargement to maximize the chances of an accurate diagnosis and successful outcome.

## Case presentation

A 6-year, 34 kg (75 lb) intact male Treeing-Walker Coonhound, was presented for a unilateral scrotal enlargement. Swelling was first noticed ~ 3 months prior to presentation. Patient also had a history of aspermia (lack of sperm in the ejaculate) of unknown etiology that was diagnosed 15 months prior to presentation. On general physical examination, the dog appeared bright, alert, and responsive. Rectal temperature was 102.1°F (38.9°C; reference range 100 - 102.6°F or 37.8 - 39°C), heart rate was 120 beats/minute (reference range 60 - 160), and respiratory rate was 30 breaths/minute (reference range 10 - 30). Dermal irritation and hyperemia were noted along the dorsum and ventrum, and fleas presence were confirmed during physical examination. Marked scrotal asymmetry was observed (Figure 1). Both testes were fully descended into the scrotum. On palpation, the left side of the scrotum felt edematous; left testis

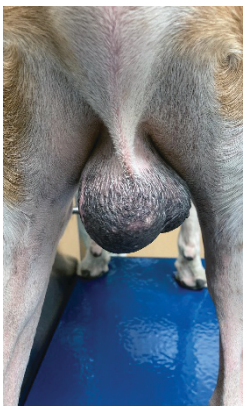

**Figure 1**. Scrotum on presentation, note marked asymmetry and left side enlargement

felt normal and was easily isolated within the fluid-filled scrotum. Right testis and right part of the scrotum palpated normal. Dog did not appear uncomfortable, did not react to palpation, and no additional signs of inflammation were noted on either side of the scrotum. Prepuce and penis appeared normal. Prostate felt normal on digital transrectal examination. Blood was submitted for a *Brucella canis* rapid slide agglutination test (RSAT), a complete blood count (CBC), and a chemistry panel. Given the dog's signalment and environment, a SNAP 4Dx (IDEXX Laboratories, Inc.) test and a direct blood smear were performed to rule out tick-borne disease and blood parasites. The SNAP 4DX (IDEXX Laboratories, Inc.) was negative for heartworm, *Ehrlichia*, Lyme disease, and *Anaplasma;* however, microfilaria were observed on the blood smear, so a Modified Knotts test was performed. Microfilaria were from a benign parasite *(Acanthocheilonema reconditum)*

rather than from *Dirofilaria imitis.* Dog tested negative for brucellosis, and the 4DX panel was also negative. Red blood cell density was mildly decreased (5.96 x $10^6$/µl; reference range 6.02 - 8.64x$10^6$/µl). This is most likely a normal variation or may reflect a mild anemia. All other values were within the reference interval. Abnormalities on the chemistry panel included hypoalbuminemia (2.47 g/dl; reference range 3.00 - 4.30 g/dl), a decreased albumin/globulin ratio at 0.60 (reference interval 0.70 - 1.90), hypocholesterolemia at 116 mg/dl (reference interval 132 - 335 mg/dl), and a low anion gap (11.1; reference range 14 - 24). A free-catch urine sample was obtained and submitted for urinalysis and a urine protein/creatinine ratio. Urinalysis revealed a urine protein level of 283.2 mg/dl with a specific gravity of 1.031. Urine protein: creatinine ratio was 1.2 (normal value is ≤ 0.5 in dogs) and the sediment had 1 - 5 white blood cells per high-power field (HPF) with 0 - 3 squamous epithelial cells per HPF. A cursory ultrasonography of the scrotum was performed that revealed a large amount of anechoic fluid with some swirling material (sediment) evident within the left side of the scrotum. Right side of the scrotum had no fluid accumulation, and the parenchyma of both testes imaged normally. Aspiration of the scrotal fluid was considered at this time, but upon discussion with the owner, it was decided to perform complete abdominal imaging (radiographs and a more detailed ultrasonographic examination under sedation) and aspiration of the scrotal fluid on a subsequent day.

## Differential diagnosis

Differential diagnosis for unilateral scrotal enlargement include orchitis, epididymitis, testicular or scrotal neoplasia, testicular torsion, hernia, and hydrocele.[1] In this case, given the minimum database results and the preliminary imaging, hydrocele (the accumulation of serous fluid in a body cavity; in this case, the scrotum) was the most likely diagnosis. However, further imaging and fluid analysis were indicated to investigate an underlying cause for the hydrocele and a treatment plan.

## Treatment

Dog returned 4 days later for further diagnostics. He remained bright, alert, and responsive with all physical examination parameters were within normal limits. Patient was sedated with dexmedetomidine and butorphanol to facilitate diagnostics that included abdominal radiographs, abdominal ultrasonography, and aseptic aspiration of the scrotal fluid. Three-view abdominal radiographs were obtained. Radiographs revealed an enlarged prostate that suggested benign prostatic hyperplasia (BPH), and the enlarged scrotum that was grossly notable. Otherwise, radiographs were unremarkable. Abdominal ultrasonography also concluded that prostatic changes were consistent with BPH. No free abdominal fluid was noted; however, there was fluid within the left side of the scrotum (Figures 2 and 3) extending up to the level of the inguinal ring. Presumed omental fat was noted to be extending through the left inguinal ring and into the scrotum. Some echogenic particles were suspended within the scrotal fluid. Right testis and scrotum appeared normal via ultrasonographic examination. Compared to right testis, left testis and pampiniform plexus had decreased vascularity in color Doppler ultrasonography. Abdominal ultrasonography revealed no signs of a testicular mass, testicular torsion, or orchitis. It was concluded that omental fat was extending through the left inguinal ring, suggestive of a left-sided scrotal hernia with secondary fluid accumulation, or hydrocele; this was nonreducible. Fine needle aspiration (FNA) of the fluid was performed that revealed mild suppurative inflammation with evidence of chronicity (Figure 4). Given these collective findings, the dog was diagnosed with a left-sided scrotal inguinal hernia with secondary hydrocele. At that time, there did not appear to be small intestinal herniation, though it was communicated to the owner that this could still occur. Decision was made for the dog to undergo surgical correction of the hernia 3 weeks later.

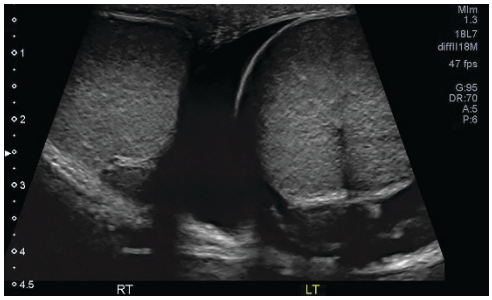


**Figure 2**. Ultrasonogram depicting fluid surrounding left testis (LT) compared to normal right testis

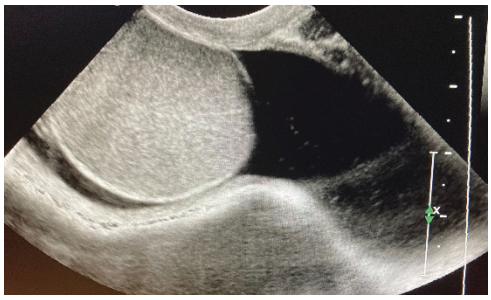

**Figure 3**. Ultrasonogram depicting the flocculent nature of the fluid surrounding left testis

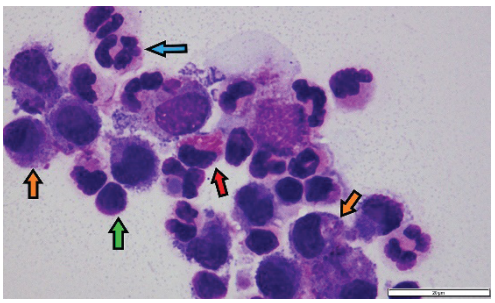

**Figure 4**. Fine needle aspirate from scrotal swelling (x 100 Objective). Primary neutrophilic (blue arrow) inflammation with a mild lymphocytic (green arrow) and eosinophilic (red arrow) component. Note evidence of macrophagic cleanup (orange arrow).

Patient underwent a caudal abdominal laparotomy with exposure of the left inguinal ring. Greater omentum was determined to be herniated through the left inguinal ring within the vaginal process that extended into the scrotal cavity (Figures 5 and 6). These findings were consistent with a diagnosis of a left-sided indirect inguinal hernia with an associated scrotal hernia. Herniated contents were reduced back into abdominal cavity through the left inguinal ring. Left inguinal ring defect was noted to be ~ 4.5 cm in length. After reduction of the herniated contents, the hernial sac was incised, revealing a large volume of serosanguinous fluid, presumably from the scrotum that was suctioned. Hernial sac was partially amputated using electrosurgery, taking care to avoid the ductus deferens and pampiniform plexus. Remainder of the hernial sac was then reduced into abdomen and the inguinal defect was repaired using non-absorbable suture material (Prolene) in a combination of horizontal mattress and simple interrupted suture patterns placed along the cranial aspect of the defect. Approximately 1cm of the caudal-most aspect of the inguinal ring was left open to allow passage of the external pudendal vessels, ductus deferens, pampiniform plexus, and genitofemoral vessels and nerve. Unilateral castration was considered but ultimately deemed unnecessary as the ductus deferens and pampiniform plexus were preserved. Postsurgically, there was a marked difference in gross appearance of the scrotum. There were no complications and the dog recovered from anesthesia uneventfully. Bilateral castration was discussed/recommended to the owner due to the risk of recurrence and the likelihood of this condition being a hereditary defect.

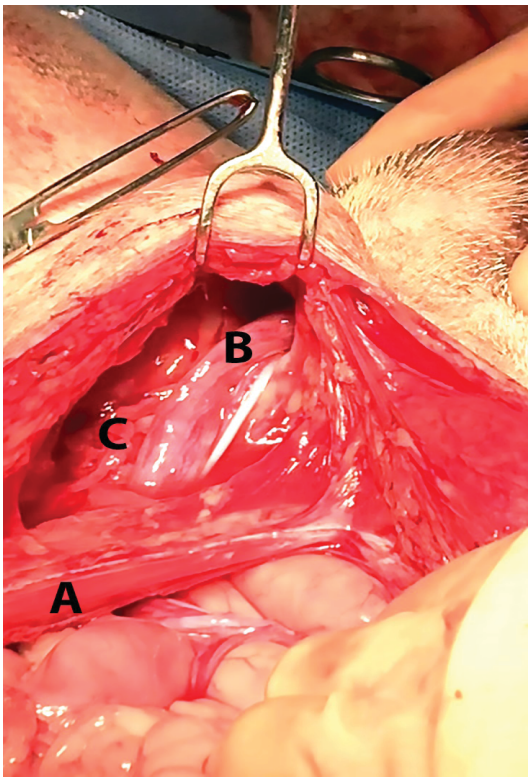


**Figure 5**. Herniated contents before reduction. Body wall (A) delineates abdominal cavity from the spermatic cord (B) and herniated omentum (C) passing through the inguinal canal into scrotum.

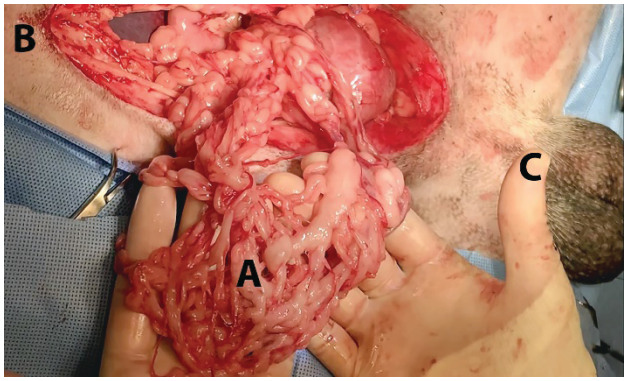


**Figure 6**: Omentum (A) herniation through the inguinal canal and extending into the scrotal cavity; cranial (B) and caudal (C).

Ten days later, the dog returned on an emergency basis for evaluation of serosanguineous drainage from the surgical site. Dog had removed the e-collar and owner has observed the dog licking the surgical site since the previous day. After examination, a surgical site seroma was diagnosed and all sutures were noted to be intact. Dog was prescribed carprofen, trazodone, codeine sulfate, and silver sulfadiazine cream to be applied topically to the wound. He returned 12 days later with the presenting complaint of severe nonspecific pain, lethargy, a decreased appetite, and a reluctance to rise or ambulate. Surgical site was unremarkable and complete healing was noted. After extensive diagnostics including a neurologic examination and spinal radiographs, the dog was diagnosed with discospondylitis at L7 - S1. Urine and blood samples were submitted for culture. RAST was repeated and was negative similar to initial test (conducted 6 weeks before) results. Urine culture revealed *Enterococcus faecium* whereas blood culture was negative for any growth. Dog was prescribed chloramphenicol. A repeat urine culture was performed 1 month later and that was negative for any growth.

## Outcome

After herniorrhaphy surgery and medical treatment for discospondylitis, dog returned to full athletic function. No further reproductive examinations were performed.

## Discussion

Given the presence of scrotal enlargement and discospondylitis in this case, brucellosis should be the primary differential diagnosis. However, this dog had 2 RSAT and a negative blood culture. Brucella RSAT can have false positive results but is very efficient in identifying dogs that are negative, making it a valuable screening test for brucellosis in dogs. There was no evidence of discospondylitis in the initial radiographs; it was only observed on the radiographs that were taken when the dog was presented on emergency 6 weeks later. Given the pathophysiology of discospondylitis, it is highly unlikely that it would have been the result of the surgical repair of the hernia. Since the specific inciting cause of the hernia itself could not be determined, it is impossible to know whether the subsequent discospondylitis was related to the hernia's pathogenesis, but the timeline of presentation make this an unlikely scenario. A 1983 case study[2] described a similar situation, in which a male intact dog presented

with unilateral scrotal enlargement, and later with weight loss and spinal pain. Brucellosis was diagnosed as determined by both RSAT and mercaptoethanol tube agglutination test titers and discospondylitis was observed on radiographs. However, this dog exhibited pain on palpation of the enlarged scrotum and was diagnosed with both orchitis and epididymitis with lesions consistent with *Brucella canis* on histopathological evaluation of the testes and epididymides after castration. Similarities and differences between these cases highlighted the importance of digital palpation and ultrasonography of an enlarged scrotum to differentiate between orchitis and hydrocele. With orchitis, whether or not the underlying cause is *Brucella canis*, one would expect the affected testis/es to exhibit evidence of inflammation, characterized by warmth on palpation and varying degrees of pain in response to digital palpation of the scrotum. Ultrasonogram of normal testis should have a uniform texture with similar echogenicity as the spleen throughout the testicular parenchyma.[3] In cases of orchitis, the testicular parenchyma will have irregular areas of varying echogenicity, and as observed in this case, a hydrocele will have substantial amount of anechoic fluid with or without echogenic particles within the fluid surrounding the testis/es.

There are 2 reported subcategories of inguinal hernias: direct and indirect. In indirect inguinal hernia in males, abdominal viscera pass through vaginal process cavity and into scrotum, resulting in scrotal hernia as observed in this case. Direct inguinal hernias, however, involve the passage of abdominal viscera through the inguinal ring adjacent to the vaginal process.[4] Dog in this case was nonpainful on palpation of the scrotum during every examination. Possible explanations for this include a lack of bowel incarceration in the hernia, inflammation that was not yet severe enough to cause overt pain, or the dog may have been remarkably stoic. Although scrotal aspiration is rarely performed in any species due to the risk of inoculating bacteria into the area, it was deemed necessary in this case to further evaluate the cause of fluid accumulation. In this case, scrotal hydrocele was presumably either as the result of obstruction (pressure caused by the herniated omentum) to venous outflow within the spermatic cord or reactive/inflammatory in nature from the herniated contents. Although the dog was used frequently for competitive hunting, there were no known injuries that could have explained the inciting cause of the hernia.

## Learning points

- Imaging is an invaluable tool when diagnosing the cause of scrotal enlargement in any species. Although scrotal fluid aspiration is rarely performed due to associated risks, in some cases it becomes necessary to characterize the type of fluid that has accumulated.
- Scrotal pathology does not always necessitate castration or hemicastration. If 1 or both testis/es is/are determined to be free of innate pathology, dog may be left at least partially intact and a breeding future can be preserved.
- It is paramount to rule out infectious causes of scrotal enlargement, especially brucellosis, as evidenced in this case. Treating dogs for brucellosis is generally not recommended. Due to high incidence of relapse and the uncertainty of antibiotic therapy resulting in a true cure, the risk of further transmission to humans and other animals remains high.[5]

## Conflict of interest

No conflict of interest to declare.

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