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Urethral obstruction due to seminal vesiculitis in a sheep – case report

[*Obstrução uretral por vesiculite seminal em ovino – relato de caso*]

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ABSTRACT

We report a case of urethral obstruction due to seminal vesiculitis in a Dorper sheep, with symptoms of anuria, rectal prolapse, orchitis/epididymitis, and uroperitoneum and biochemical tests indicating severe azotemia. The animal died due to advanced azotemia, and necropsy revealed kidneys with cortical and medullary necrosis, pyelonephritis of renal calyces, hydronephrosis, ruptured and necrotic bladder, and vesicular, bulbourethral, and ampoule accessory sex glands. There was prostate hyperplasia that revealed a large amount of pus in the cross section, which was also observed bilaterally in the epididymis and right testis. Morphotintorial and biochemical analyses of bacteria obtained from microbiological culture revealed *Corynebacterium* sp. and *Escherichia coli*. Infection, hyperplasia, and abscessation of accessory sex glands caused urethral compression, resulting in an obstructive condition, similar to urolithiasis, in addition to bacteremia. Hyperplastic seminal vesiculitis, although rare, must be included among the differential diagnoses of obstructive processes in the urinary tract of sheep.

Keywords: *Corynebacterium* sp., *Escherichia coli*, epididymitis, accessory sex glands, pyelonephritis

RESUMO

Relata-se um caso de obstrução uretral decorrente de vesiculite seminal em carneiro da raça Dorper, com quadro de anúria, prolapso retal, orquite/epididimite e uroperitôneo, com exames bioquímicos indicativos de severa azotemia. Devido ao quadro avançado de azotemia, o animal faleceu e, na necropsia, foi observado:: rins com necrose de cortical e medular, pielonefrite dos cálices renais e hidronefrose, bexiga rompida e necrosada, assim como glândulas sexuais acessórias vesiculares, bulbouretrais e ampola. Havia hiperplasia de próstata que, ao corte transversal, revelou grande quantidade de pus, que também foi observado bilateralmente no epidídimo e no testículo direito. As análises morfotintoriais e bioquímicas das bactérias obtidas a partir do cultivo microbiológico foram compatíveis com Corynebacterium sp. *e Escherichia coli. A infecção, a hiperplasia e a abscedação das glândulas sexuais acessória, causaram compressão uretral, levando a um quadro obstrutivo, semelhante à urolitíase, somado à bacteremia. A vesiculite seminal hiperplásica, apesar de rara, deve ser incluída entre os diagnósticos diferenciais dos processos obstrutivos do trato urinário de carneiros.*

Palavras-chave: Corynebacterium sp., *Escherichia coli*, *epididimite, glândulas sexuais acessórias, urolitíase*

INTRODUCTION

Ovine used for breeding generally show dysuria, stranguria, or anuria after total or partial urethral obstruction associated with metabolic changes, which result in urolith formation. However, these changes may also be caused by infectious processes through the formation of fibrin clots and/or blood clots (cystitis) (Sculy, 2021) or hyperplasia of organs adjacent to the urethra, such as accessory sex glands (ampullae,

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vesicular, bulbourethral, and prostrate), which are located along the dorsal region of the pelvic urethra (Stewart and Shipley, 2021). During total obstruction of the urethra, the ram exhibits signs of abdominal pain and, if left untreated, develops a ruptured bladder, followed by hydronephrosis, azotemia, and death (Stewart and Shipley, 2021).

Cases of vesiculitis in rams are rare, with reports primarily involving *Brucella ovis* and *Actinobacillus seminis*, but also *Escherichia coli*, *Chlamydophila abortus*, *Histophilus somni*, and *Trueperella pyogenes*, with varying, and still undetermined, infection routes that may be ascending (prepuce or urethra), descending (ductus deferens or epididymis), or hematogenous (Gouletsou and Fthenakis, 2015; Stewart and Shipley, 2021).

This report describes the clinical and pathological findings in a case of urethral obstruction due to seminal vesiculitis in a ram, which forms an important differential diagnosis of obstructive urolithiasis.

CASUISTRY

An 11-month-old Dorper breed ram weighing 47 kg used for reproduction was presented to the Large Animal Clinic, Veterinary Hospital of the Federal Rural University of Pernambuco, Recife/PE (LAC/HOVET/UFRPE). The ram had been purchased 70 days earlier and raised for 40 days in a property in Petrolina/PE, with a history of obstructive urolithiasis due to residue from potassium phosphite sprayed onto grapevines and pasture. It was then kept in the municipality of Serrita, in the Sertão Pernambucano mesoregion, during the past 30 days, where the ram reportedly urinated and defecated less frequently and developed anuria and constipation with mucus-covered feces during the past 3 days. Upon anamnesis, it was reported that the ram received treatment on site at the property. During the first 2 days of anuria, it received (Zalix, furosemide 250mg/kg, MSD Saúde Animal, Brazil) associated with (Antitóxico SM, acetyl-DL-methionine 6 g, choline chloride 4g, vitamin B-2 0.02g, vitamin B-6 0.20g, nicotinamide 0.50g, and dextrose 20g, 5mL/day, Química Santa Marina, Brazil) intramuscularly, and on the third day, because of persistent anuria, the urethral process was removed, with subsequent oral administration of canary grass to dissolve any uroliths due to the history of urolithiasis cases at the property where the animal was previously located.

The procedures were unsuccessful, and the ram was referred to the LAC/HOVET/UFRPE. A clinical examination done on the fourth day after the development of anuria showed that the ram was prostrated, with an extended neck and in the lateral sternal decubitus position (Fig. 1A), and when placed standing, it was intolerant to movement. Other findings included a rectal temperature of 39°C, polypnea breathing (116 mpm), tachypnea (90 bpm), congested mucosae, skin turgor of >12 s, ruminal hypomotility with mild distension of the dorsal region of the left flank, mildly ventrally distended abdomen that was sensitive to palpation, moderately enlarged precrural lymph nodes, prolapsed rectal mucosa (Fig. 1B), and enlarged scrotum with the presence of fluid and flaccid testicles, especially the right testicle. Despite these findings, the owner reported that the ram appeared to be in less pain compared to the previous day.

An abdominal ultrasound (Mindray DP-50vet, Mindray, São Paulo, Brazil) done using a convex 7-MHz transducer revealed a large amount of free fluid within the abdominal cavity. The urinary bladder was thickened and irregular and moderately filled with hypoechoic content (Fig. 1C). A transrectal ultrasound examination was not performed because of the unavailability of a linear transducer. During paracentesis, a dark red aqueous liquid was collected (Fig. 1D).

For pain control and muscle relaxation (Banamine, *Flunixin meglumine* 2.2mg/kg, MSD Saúde Animal, Brazil), (Apromazin 0.2%, Acepromazine, 0.1 mg/kg, Syntec, Brazil) and (Compaz, Diazepam 0.1mg/kg, Cristália, Brazil) were administered. Due to a presentation that was characteristic for obstruction, a number four silicone catheter (1.5 mm × 40 cm) was inserted without difficulty via the glans, followed by hydropropulsion with 0.9% NaCl. As the urinary flow could not be reestablished using the catheter and the ruptured bladder was identified, the ram was referred for surgery, specifically for exploratory laparotomy and suture of the urinary bladder; however, the animal died before the procedure.

Figure 1. Clinical examination findings. (A) Dorper breed ram in lateral sternal recumbency, with prostration, abdominal distension, and enlarged scrotum. (B) Partial prolapse of the rectal mucosa. (C) Abdominal ultrasound done using a 7-MHz convex transducer showing free fluid in the abdomen following bladder rupture. (D) Dark-red-colored fluid collected via abdominal paracentesis.

A laboratory examination performed after the death of the animal revealed urea and creatinine levels of 428.5 and 8.2mg/dL, respectively, in the fluid collected via paracentesis, indicating the presence of urine within the abdominal cavity. Hematology showed a hematocrit of 42%, indicative of dehydration, a total red blood cell count of 14.98×10^6/mL, and a mean corpuscular volume of 28.04 fl. The total leukocyte count was normal (8700/ml); however, there was absolute and relative lymphopenia and neutrophilia with a regenerative left shift with a lymphocyte level of 1740/mL (20%), segmented neutrophil count of 6264/ml (72%), and 696/ml bands (8%). Serum biochemistry, which was performed using commercial kits (Labtest Diagnóstica) and a semiautomatic biochemistry analyzer (Labquest), revealed elevated levels of urea (417.1mg/dL), creatinine (33.8 mg/dL), and AST (438.6U/L). The levels of total plasma protein (7.4g/dL), gamma-glutamyl transferase (30.3U/L), and albumin (2.7g/dL) were within normal limits for the species. Fibrinogen levels were 400mg/dL (Madureira *et al*., 2013).

Necropsy revealed diffuse serofibrinous peritonitis, and the abdominal cavity was filled with a brownish liquid with a uremic smell. No uroliths were observed within the abdominal cavity or in any organ. A ruptured bladder with a dark necrotic and hemorrhagic mucosa and multifocal hyperemic areas was observed; these areas were also observed in the vesicular, ampullae, and bulbourethral accessory sex glands (Fig. 2A). The prostate was hypertrophied, and at transection, there was a large amount of purulent secretion in the prostate (Fig. 2B) and epididymis (Fig. 2C). The right testicle was degenerated and had purulent content in its interior (Fig. 2D). Subcutaneous edema was detected in the inguinal ring region and scrotum. The right kidney was enlarged compared to the left kidney, and on sagittal transection it revealed multifocal necrotic lesions in the cortical and medullary regions, pyelonephritis, and hydronephrosis (Fig. 2E). The lungs were congested and had diffuse emphysematous areas, and the liver showed pale areas.

Histopathologic evaluation revealed necropurulent content in the prostatic adenomeres (Fig. 3A and B), as well as in the epididymis, which showed sloughing of necrotic lumen cells, degenerated neutrophils within a

mass of spermatozoids, and several foci of luminal dystrophic calcification (Fig. 3C and D). The kidneys showed corpuscular and renal tubule necrosis, interstitial congestion, and acute interstitial nephritis, as well as an extensive area of necrosis, pyelonephritis, and tubular dilation containing neutrophils in the renal papillae (Fig. 3E and F). The lungs showed emphysema, congestion, and the presence of hemosiderophages in the interstitium.

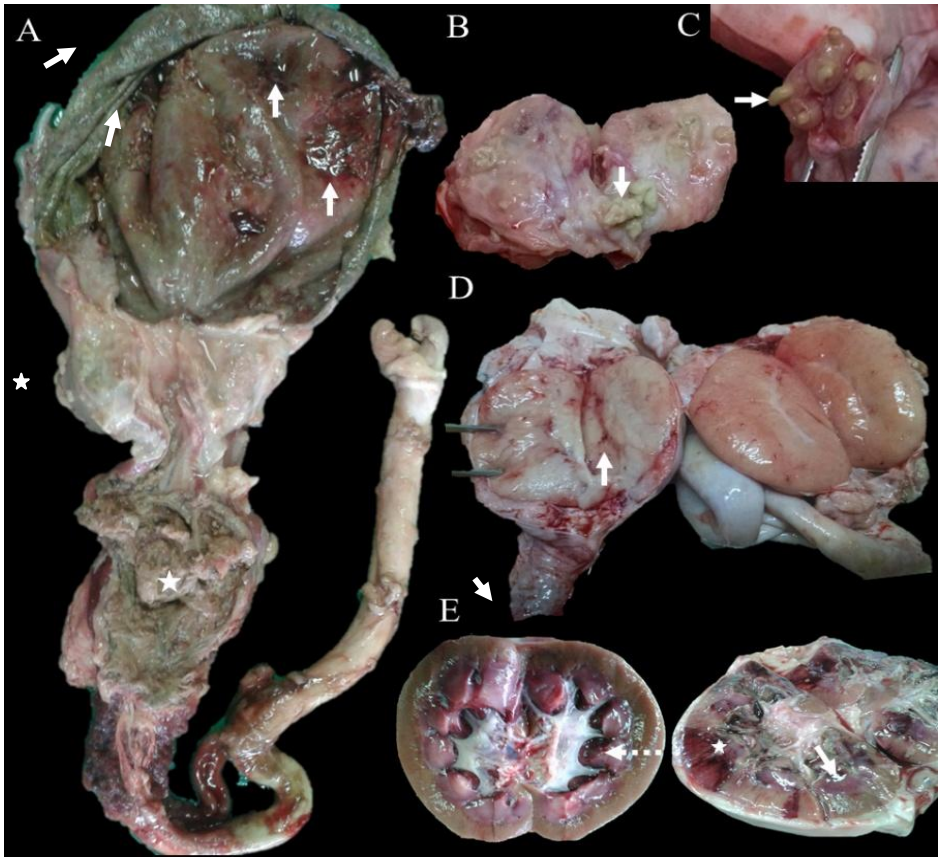

Figure 2. Anatomic and pathologic lesions found on organs of the urogenital system. (A) Hyperemic, thickened bladder mucosa with necrotic and hemorrhagic areas (arrows), prostate with acute necropurulent inflammatory process (star) and (B) purulent content (arrow). (C) Purulent discharge from the epididymal duct (arrow), (D) necrosis of the testicular parenchyma (arrow) and contralateral testicle with discrete petechial hemorrhage. (E) Kidneys with dilation of renal pelvis (dotted arrow), area of infarct (star), and necrosis (arrow).

The purulent content collected from the prostate and epididymis was processed at the Laboratory of Infectious and Contagious Diseases at UFRPE, where it was seeded onto 5% ovine blood agar and eosin methylene blue agar Levine (Himedia) under aerobiosis and onto chocolate agar under anaerobiosis. The cultures under aerobiosis were placed in an incubation oven at 37°C for 72 h, whereas those under anaerobiosis were incubated for 1 week. After 72 h of culture under aerobic incubation, the bacterial colonies were subjected to morphological and biochemical analyses for identification using lysine decarboxylation; mannitol degradation; fermentation of sugars such as glucose, lactose, and sucrose; indole production; motility, urease, catalase, and methyl red tests; Voges–Proskauer test; and hemolysis (Carter, 1988; Procop *et al*., 2018). Morphotinctorial and biochemical analyses of the bacteria obtained from microbiological cultures revealed the presence of *Corynebacterium* sp. and *E. coli*. The cultures under anaerobiosis were negative for *Brucella* sp.

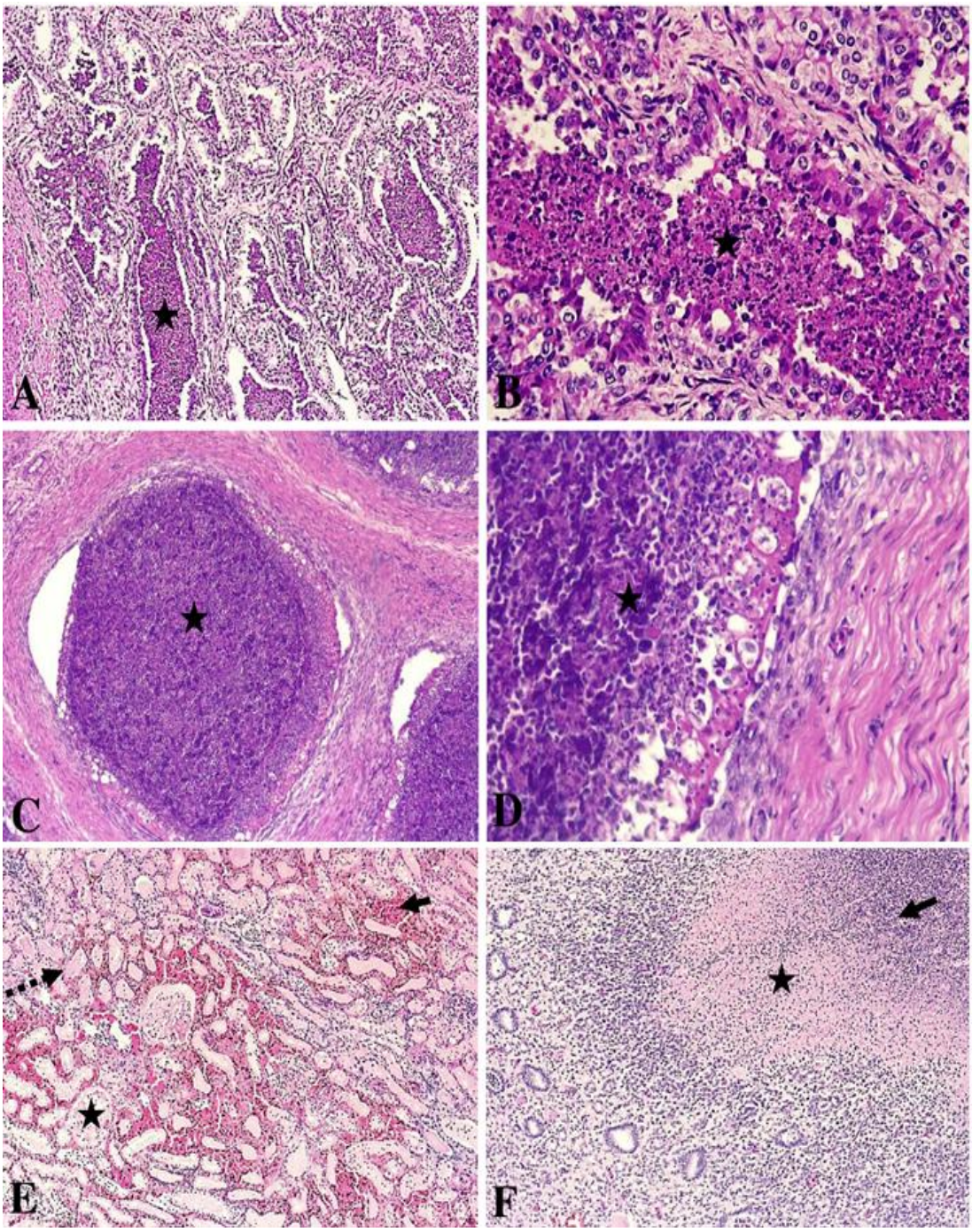

Figure 3. Histopathologic lesions in the genital and urinary systems. (A) Prostatic adenomeres containing purulent material in their lumen (star) and (B) eosinophilic luminal content consisting of sloughing, necrotic cells, dead neutrophils, and foci of intraluminal dystrophic calcification. (C) Epididymis (low magnification) with epididymal duct containing purulent material in its lumen (star) and (D) eosinophilic luminal content containing sloughing, necrotic cells, dead neutrophils, and foci of intraluminal dystrophic calcification. (E and F) Kidneys with necrosis of corpuscles (star) and renal tubules (dotted arrow), congestion (arrow) in the cortical, medullary, and papillary regions, and area of necrosis (star) surrounded by intense acute inflammatory infiltrate (arrow).

Urethral obstruction in ovine should be treated promptly because the time since obstruction is a relevant factor for treatment success, especially in cases of total obstruction where the death rate is even higher due to the possibility of bladder rupture and hydronephrosis (Guimarães *et al*., 2012). In the present case, veterinary assistance was delayed, and procedures that worsened the animal's condition were implemented, such as the use of diuretics, administration of liquids, and the lack of antibacterial treatment, which resulted in irreversible azotemia when the animal was presented at the veterinary clinic.

Urolithiasis was the first suggested diagnosis because it is the most common urinary tract disease in rams and matched the history (original property with a history of urolithiasis cases, and the animals being fed with grains and raised in a warm region), characteristics (young breeder with a high zootechnical value), and clinical signs (anuria, azotemia, fluid in the abdominal cavity, and scrotal edema) (Guimarães *et al*., 2012; Sculy, 2021) of the ram. However, this case also demonstrates another, previously unreported possible cause for urethral obstruction that should be included in the differential diagnosis of urolithiasis, which is related to infectious processes of the reproductive tract, with subsequent hyperplasia of the accessory sex glands located along the pelvic urethra which ducts open and eliminate their secretions into the urethral lumen.

Despite the similarities of symptoms, some of the signs observed in urolithiasis were not reported or observed in the present case, such as the presence of crystals in preputial fur, necrosis of gland and urethral process, presence of uroliths in the urethral process despite amputation, crystals within the bladder on ultrasound despite the already ruptured bladder on initial examination (Guimarães *et al*., 2012; Sculy, 2021). The unavailability of a linear probe for a transrectal ultrasound examination impeded the identification of the infectious process in the accessory sex glands, which were responsible for the obstruction. However, a wider ultrasound examination, even with a sector probe, could reveal significant changes in the testicle or epididymis when an infectious process is present (Stewart and Shipley, 2021) and in the kidneys, which may indicate the level of injury in the parenchyma from hydronephrosis and/or from the infectious process (Sculy, 2021). Ultrasound of the entire urogenital tract is recommended for investigating the processes that lead to urethral obstruction and their prognosis.

Clinical examination findings, later associated with laboratory data, indicated a poor prognosis, similar to that of obstructive urolithiasis cases. Which were confirmed by high hematocrit, urea, creatinine, and AST levels resulting from bladder rupture, and the subsequent sequestering of fluid in the abdomen, with urine absorption by the peritoneum. As well as absolute and relative lymphopenia and neutrophilia with a left regenerative shift related to the infectious process and resulting from the acute inflammatory process (uroperitoneum), with migration of defense cells to the inflammatory foci and/or severe, apparently chronic, lesions observed in the testicle, epididymides, and accessory sex glands, leading to a decrease in total leukocyte count (Guimarães *et al*., 2012; Sculy, 2021).

Based on the lesions observed on histology, it is not possible to identify the initial infection site in the reproductive tract or the portal of entry for the bacteria; however, *E. coli* and *Corynebacterium* sp. may enter the body through ascending, descending, or hematogenous routes (Gouletsou and Fthenakis, 2015; Stewart and Shipley, 2021). Although these bacteria are not the primary agents responsible for orchitis or epididymitis in ovine (Stewart and Shipley, 2021), together they have been reported to cause orchitis/epididymitis and vesiculitis with oligospermia and elevated numbers of neutrophils and gram-negative bacilli in the Poll Dorset ovine, with *C. pyogenes* isolated from testicular abscesses and *E. coli* isolated from the epididymis and accessory sex glands (Burgess and McDonald, 1981). Individually, *E. coli* has been responsible for epididymitis (Manson *et al*., 1982), and C. *pseudotuberculosis* has been responsible for orchitis, epididymitis, and testicular degeneration (Stewart and Shipley, 2021). However, none of these studies reported urethral obstruction. Regarding urogenital tract infections, *E. coli* and *C. renale* are among the major agents causing stranguria, characterized by frequent and painful urination, excreted slowly in small amounts, similar to the initial presentation of this ram according to the owner. Considering the degree of injury observed on histology

(Burges and McDonald, 1981) of the reproductive tract in the present case, the urinary tract infections might have been secondary to urinary retention and presence of bacteria, because under normal circumstances, bacteria are eliminated with normal urine flow (Sculy, 2021).

As the species of *Corynebacterium* could not be identified, it is necessary to consider the presence of *C. pyogenes* (Burges and McDonald, 1981), *C. renale*, the principal agent responsible for enzootic posthitis and infections of the urinary tract, and especially *C. pseudotuberculosis* (Stewart and Shipley, 2021) as possibilities because there were cases of caseous lymphadenitis at the original property, and the ram showed enlarged prescapular and right precrural lymph nodes, which may have also been a reaction to a local infectious process.

Infectious processes of the urogenital tract may result in urethral obstruction, with symptoms similar to those of obstructive urolithiasis. Therefore, it is important to identify certain signs for a correct diagnosis, such as the presence or absence of crystals (in the prepuce and bladder) and points of obstruction with necrosis of the penile urethra, as well as to conduct a careful ultrasound examination, especially a rectal ultrasound that provides images of the bladder and accessory sex glands.

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