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CASE REPORT
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Testicular Teratoma in a Unilateral Right-Sided Abdominal Cryptorchid Horse

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ABSTRACT

***Background*:** Cryptorchidism is characterized by the incomplete descent of one or both testicles to the scrotum, being a hereditary alteration and frequently an unilateral condition. Besides the sexual and aggressive behaviour, the retained testicle is commonly located in abdominal cavity, being considered a risk factor for neoplasm development. The most common testicular neoplasm reported in mammalian species are Sertoli cell tumors, Leydig cell tumors, seminomas and teratomas. A presumptive diagnosis of testicular tumor can be achieved by ultrasonography, although the definitive diagnosis is obtained only by histopathology. In this report, we are presenting a case of testicular teratoma in an unilateral abdominal cryptorchid horse.

***Case*:** A 3 year-old stallion, American Quarter Horse, was attended and presented a right testicle retained inside the abdomen and a left testicle in the scrotum. Transrectal palpation was used to identify a round and firm structure, presumably the right testicle, lateral to the urinary bladder and located inside abdomen. Further, a transrectal ultrasound examination showed a complex, round mass with irregular edges containing both cystic and solid structures, hypoechoic fluid-filled cavities separated by linear hyperechoic septa. After a clinical examination, the animal was diagnosed with cryptorchidism and was submitted to orchiectomy and cryptorchidectomy by inguinal approach. Surgery was performed under general anesthesia and postoperative care included cold shower, anti-inflammatory and antibiotic therapy. Testicles were surgically removed and further sent for histopathological examination. The visual appearance of the right undescended testicle showed multiple round, cystic, and solid structures on outer surface, while the left descended testicle was apparently normal. The macroscopic evaluation showed that the affected testicle consisted of a firm solid mass with multiple fluid-filled cystic areas. Microscopically, the testicular architecture was replaced by cysts, fibrous tissue, adipose tissue, glandular structures, and foci of calcification. The histology revealed that the retained testicle had a testicular teratoma.

***Discussion*:** Reproductive disorders are common in horses and represent a significant part of the equine practitioner routine. Equine cryptorchidism is the most common non-lethal developmental defect of stallions. Surgery is the best treatment, since this alteration is hereditary. Teratomas have been reported more often in cryptorchid testicles, being usually just diagnosed as an incidental finding during surgical procedure. Under field conditions, usually the testicles are not sent for histopathological evaluation and this fact can contribute to underdiagnoses. Ultrasonography allows clinicians to determine testis location, morphological changes in the testes, as well as to elaborate a presumptive diagnose of testicular neoplasm. Histopathology is the best exam to achieve definitive diagnoses in the presence of testicular alterations. In our report, diagnosis of testicular neoplasia was not made before surgery and testicular mass was an incidental finding during pre-surgical examination. In the presence of testicular enlargement or presence of testicular mass, neoplasia should be included in the differential diagnosis. In conclusion, although rare, teratoma should be included in differential diagnoses of retained testicles, especially those with morphological alterations.

Keywords: andrology, neoplasm, cryptorchidism, stallion, testis.

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INTRODUCTION

In horses, testicular descent generally occurs 30 days prior to and up to 2 weeks after birth [4], when there is an incomplete descent of one or both testicles, the animal is considered a cryptorchid [15,18]. Cryptorchidism is a hereditary disorder with moderated to high heritability of 0.12 to 0.32 in horses [7] and frequently unilateral [6,18]. Cryptorchidism is common in companion animals, pigs, humans (2-12%) [1], cattle and sheep (1%) [1], stallions (2-8%) [6,13,14].

Besides the sexual/ aggressive behavior of cryptorchid animals, this condition is considered a risk factor for testicular tumors development when the undescended testes is inside the abdomen [13,14,17]. Testicular neoplasms are usually benign [14], have been seen in descended and undescended testes [5,12], are asymptomatic [3] and can and rarely cause abdominal pain [6]. The most common tumors reported in mammalian species are Sertoli cell tumors, Leydig cell tumors, seminomas and teratomas [14,15,17]. Teratoma is quite rare in horses [2,5], however, it is the most frequent testicular tumor reported in young stallions, between 1 and 5 years-old [14,15,17].

Ultrasonography is a useful tool for the diagnosis of abdominal cryptorchidism in horses [3,5]. A presumptive diagnosis of testicular tumor can be achieved by ultrasonography, however, a definitive diagnosis of testicular teratoma can only be obtained with histopathology [3].

The aim of this study is to report a case of testicular teratoma in an unilateral right-sided abdominal cryptorchid horse, with the description of ultrasonography evaluation, surgical approach, macroscopic and microscopic alterations in the testis.

CASE

A 3-year-old, 350 kg, American Quarter Horse was admitted to the Veterinary Hospital at the Universidade de Passo Fundo, Brazil, for elective surgical castration. The animal presented excessively unruly, masculine behavior, and had no history of a previous castration.

On visual inspection, the left testis was located inside the scrotum, however no right testicle was located. A protocol was followed in order to conduct a clinical diagnosis of cryptorchidism: visual assessment of the scrotum; palpation of the scrotum; palpation of the inguinal rings; transabdominal ultrasonography of the inguinal rings with a convex probe, transrectal palpation; and transrectal ultrasonography.

The right testicle was not found during visual inspection and palpation. Transabdominal ultrasonography confirmed the presence of a normal left testicle and the absence of the right testicle in the scrotum or within inguinal region. Transrectal palpation was used to identify a round and firm structure, presumably the right testicle, lateral to the urinary bladder and located inside the abdomen. Further, a transrectal ultrasound examination showed a complex, round mass with irregular edges containing both cystic and solid structures, hypoechoic fluid-filled cavities separated by linear hyperechoic septa.

Based on clinical examination and ultrasonography, the horse was diagnosed as cryptorchid.

Treatment was based on cryptorchidectomy and orquiectomy. For surgical removal of the testicles, the animal underwent general intravenous anesthesia. Before the surgery, a combination of procaine penicillin, benzathine penicillin, dihydrostreptomycin sulfate and piroxicam[1] (20.000 UI/kg IM) was administered. Xylazine[2] (1.1 mg/kg IV) was the premedication used, and induction was performed with a combination of diazepam[3] (0.04 mg/kg IV) and ketamine[2] (2.2 mg/kg IV). A constant rate infusion (0.05 mL/kg/min) of a combination of eterglicerilguaiacol[4] (50 mg/mL), lidocain without vasoconstrictor[5] (250 mg), ketamine[2] (2 mg/mL) and xylazine[2] (1 mg/mL) was maintained during surgery Before the testes were surgically removed, intratesticular anesthesia with lidocaine[5] was used. During the surgery, the patient received a single dosis of anti-tetanus serum[6] (5.000UI IM) and flunixin meglumine[1] (1.1 mg/kg IV).

The horse was placed in dorsal recumbence, and the area was aseptically prepared with 2% chlorhexidine detergent and 0.5% chlorhexidine alcohol solutions. The surgical technique for cryptorchidectomy by inguinal approach was conducted as described by Hendrickson [10], except for the use of a grasping forceps. The gubernaculum was not found, and the abdominal cavity was manually inspected until the right undescended testicle was found. The contralateral left testis was removed by orchiectomy as described by Hendrickson [10]. Testicles were referred to histopathological evaluation.

Postoperative care included flunixin meglumine[1] (1.1 mg/kg IV q24 h) for 5 days, association of procaine penicillin, benzathine penicillin, dihydrostreptomycin sulfate and piroxicam[1] (20.000 UI/kg IM q48 h) for 3 times, and cold showers for 20 min (2x a day) for 10 consecutive days.

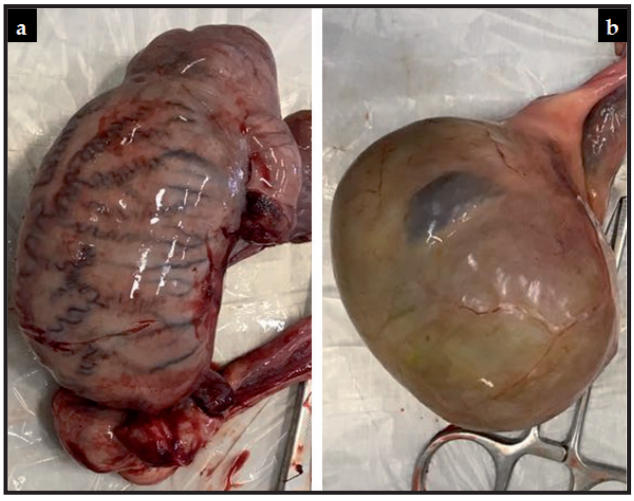

Figure 1. a- Descended left testis. b- Cryptorchid, undescended right testis.

The macroscopy of the testicles showed that the left testicle was apparently normal (Figure 1a) while the right testis was round, had cystic and solid structures detected on palpation (Figure 1b).

Left testis measured 13.0 x 6.0 x 5.3 cm. There was edema of the tail of the epididymis and no alterations in the testicular parenchyma on cut surface (Figure 2a). Right testis measured 8.0 x 6.5 x 6.3 cm, was firm, had multiple cysts with brownish fluid, with calcified areas alternating with firm white areas (Figure 2b).

Both testes were submitted for histopathological examination. No microscopic lesions were found in the left testis, which had preserved spermatogenesis. Parenchyma of the right testis was necrotic and had de-

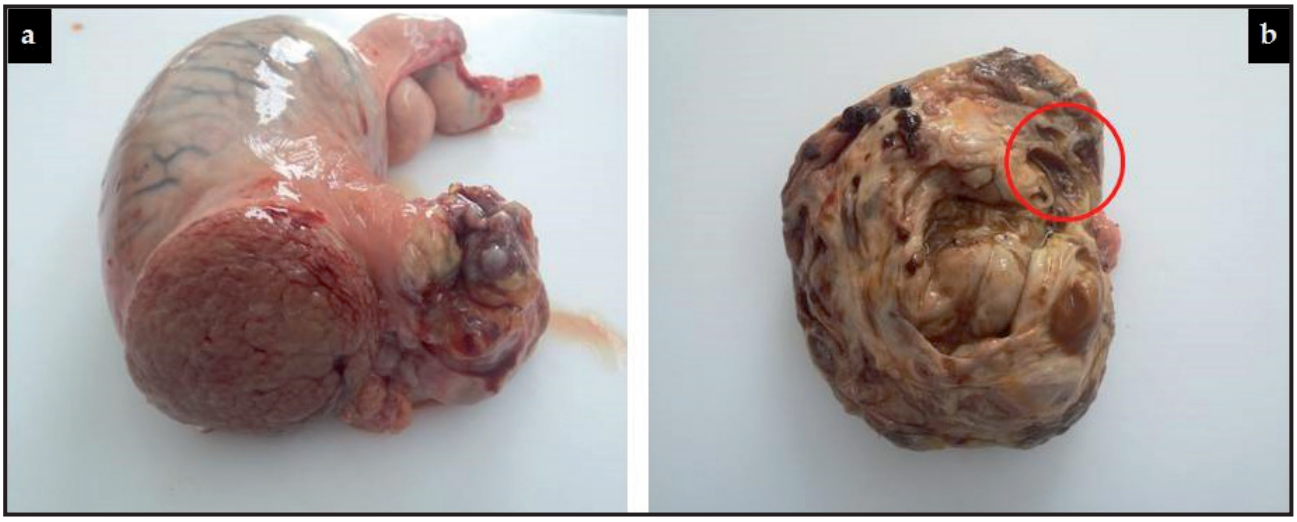

Figure 2. a- Descended left with no alterations in the testicular parenchyma on cut surface. b- Cryptorchid right testis. Testicular architecture is obliterated by the teratoma (red circle indicates cystic formations).

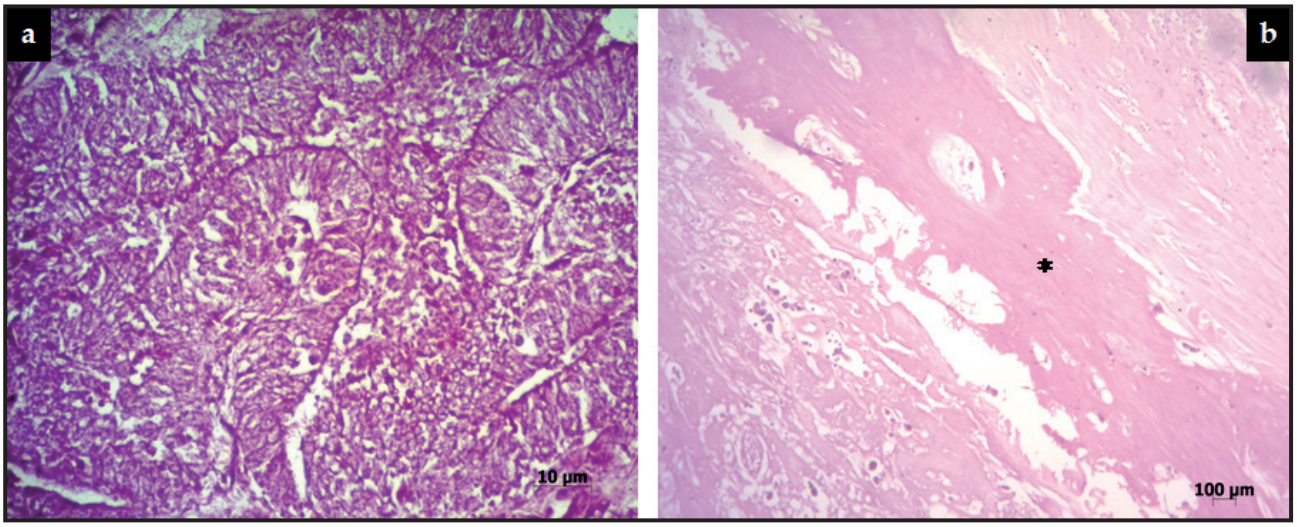

Figure 3. Microscopic findings in the retained testis. a- Degenerated glandular tissue [Obj.×400; Bar= 40 µm]. b- Presence of bone trabeculae (bone tissue) (asterisk). [Obj.×200; Bar= 100 µm].

generated glandular structures (Figure 3a), fibrous tissue, cystic areas alternated with bone trabeculae (Figure 3b), adipose tissue, areas of calcification, moderate multifocal hemorrhage, and mixed inflammatory infiltrate. A diagnosis of testicular teratoma was made by histopathology.

DISCUSSION

Reproductive disorders are common in horses and represent a significant part of the equine practitioner work load [8]. Equine cryptorchidism is the most common non-lethal developmental alteration in stallions and surgical removal of testes is the best treatment, since the hereditary aspect and the risk of neoplasm development.

Abdominal cryptorchid humans have higher risk of developing testicular neoplasms than inguinal cryptorchid patients. The relative position of the cryptorchid testis and the severity of environmental insults on the gonads, e.g. heat, likely play a role in the occurrence and prevalence of these neoplasms [6]. Precursor cancer cells are generally pluripotent germ cells, which are derived from primordial germ cells, that continue to proliferate or undergo improper differentiation [16]. The presence of an abnormal testis dramatically alters the function of somatic cells, providing the niche for spermatogonial steam cells self-renewal and differentiation. In humans, a possible explanation is that the ectopic testis itself is directly responsible for the infertility and germ cell tumorigenesis [13]. Although rare, teratomas have been reported more often in cryptorchid testicles inside abdominal cavity [12] and occurs sporadically in young stallions [3,6,8,12,14,15], similar to present case report.

In the present case, careful clinical examination of the stallion allowed to find the retained, undescended testes, located intra-abdominal. During physical examination, the testes are carefully palpated, and the size, symmetry and consistency of the gonad and surrounding structures are the parameters assessed. Inguinal and transrectal palpation are reliable tools to locate the testes [11]. If there is any abnormality during the physical examination, then the use of ultrasound should be considered. In our case, morphological changes were detected in one of the testis during transrectal ultrasound, but we were unable to accurately identify this structure as testis. Ultrasonography allows clinicians to determine testis location as well as morphological changes in the testicular parenchyma, such as enlargement of the gonad possibly caused by neoplasia [3,9]. As ultrasound imaging depicts the morphology of the examined tissues, veterinarians may be able to narrow down the diagnosis significantly [3]. If more information is needed, then a testicular biopsy should be performed and the sample submitted for histopathological evaluation to provide a definitive diagnosis. Histopathology analysis is more accurate than macroscopic inspection and clinical examination of the testis.

In the present study, a presumptive diagnosis of testicular tumor was made based on the ultrasound findings and macroscopic appearance of the surgically removed testis. Seminoma, Sertoli cell tumor, Leydig cell tumor, teratocarcinoma, and embryonal carcinoma are the testicular neoplasms that should be included in differential diagnoses of teratoma [5]. The definitive, final diagnosis, in our case was based on the microscopical findings in the surgically removed undescended testis.

Teratomas are formed by various different types of mature tissues originating from different germinal layers and which embryonic origin differs from the affected organ [5,12,14,17]. Tumor size varies greatly and many are cystic or polycystic [15], and usually grey to yellow [14,15]. Usually the retained testis is smaller than the scrotal testis. In our case, fibrous tissue, cysts, bone, adipose tissue, and mineralized areas were found by light microscopy. A variety of tissues can be identified in teratomas including skin, muscle, tooth, hair follicles, bone, and cartilage [2,12,14,15]. The actual prevalence of testicular teratoma in global equine population is difficult to estimate without large retrospective and prospective studies, because most stallions are castrated at an early age. Since testicular teratomas rarely cause clinical signs, the tumor is often detected during preoperative assessment, during surgery or at necropsy, as an incidental finding. Under field conditions, few veterinarians submit the retained undescended surgically removed testes for histopathology, unless when significant morphological alterations are noted. Possibly these factors contribute to the underdiagnoses and missdiagnoses of this neoplasm.

In our report, diagnosis of testicular neoplasia was not made before surgery and testicular mass was an incidental finding during the pre-surgical examination. Before testicular enlargement or presence of testicular mass, neoplasia should be included in the differential

diagnosis. Testicular teratomas are rarely reported in the veterinary literature and possibly underdiagnosed in cryptorquid stallions.

***Declaration of interest*.** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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