Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 6 Issue 12 December 2024

Case Study

Benign Intratubular Seminoma in a Brown Booby (*Sula leucogaster*)

Aline Luize de Moraes Souza[1], Aline Felix[2], Hassan Jerdy[3]*, Ana Carolina Mendes[4], Cleidson Manoel Gomes da Silva[3] and Eulogio Carlos Queiroz de Carvalho[2]

[1]Universidade Vila Velha, Avenida Comissário José Dantas de Melo, Brazil

[2]Universidade Estadual do Norte Fluminense Darcy Ribeiro - UENF, Campos dos Goytacazes, Rio de Janeiro, Brazil

[3]Laboratório de Microscopia, Federal University of the South and Southeast of Pará, Rua Alberto Santos Dumont, Xinguara, PA, Brazil

[4]Universidade Federal do Piauí, Picos, Piauí State, Brazil

***Corresponding Author:** Hassan Jerdy, Laboratório de Microscopia, Federal University of the South and Southeast of Pará, Rua Alberto Santos Dumont, Xinguara, PA, Brazil.

DOI: 10.31080/ASVS.2024.06.0945

Received: October 28, 2024

Published: November 18, 2024

Abstract

The brown booby (*Sula leucogaster*) is a typically pantropical seabird with a distribution spanning much of the southern hemisphere. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be sufficiently rapid to approach the thresholds for vulnerable. Therefore, this case report aimed to report the case of a brown booby diagnosed with a benign intratubular seminoma. Upon necropsy examination, an increase in the left testicle volume was observed. The histopathological examination confirmed the diagnosis of benign seminoma. Seminomas are rare in birds, especially those exhibiting benign behavior. Microscopically, the testicle was composed of high-cellularity epithelial neoplasia. The seminoma was classified as spermatocytic, rarely reported in domestic and wild birds, and never described in seabirds. The neoplastic process led to extensive testicular destruction and caused functional impairment in one of the testicles, potentially resulting in reproductive capacity loss.

Keywords: Intratubular; Seminoma; *Sula leucogaster*

Introduction

The brown booby (Sula leucogaster) is a seabird belonging to the Sulidae family, which includes nine other species: blue-footed booby (Sula nebouxii), cape gannet (Morus capensis), Abbott's booby (Papasula abbotti), Nazca booby (Sula granti), northern gannet (Morus bassanus), australasian Gannet (Morus serrator), masked booby (Sula dactylatra), red-footed booby (Sula sula), and peruvian booby (Sula variegate) [1]. The brown booby has an extensive geographic range with a large population, which is currently estimated to be in a decreasing population trend due to human interference, pollution, and exotic animals affecting the native fauna [1]. However, it is believed that this decline is not occurring rapidly enough to approach vulnerability thresholds for the species [1]. The brown booby can be found in all pantropical oceans, with few exceptions. Breeding sites include the Caribbean, the Atlantic coasts of Brazil and Africa, the oceanic islands of

Madagascar, the Red Sea, northern Australia, many oceanic islands in the Western and Central Pacific, as well as the coasts of Mexico and Peru [1].

Seminoma is classified as a primary neoplasm of the testicles, originating from the germinal epithelium of the seminiferous tubules. It can present a diffuse histomorphological pattern characterized by a solid mass or be classified as intratubular, with aggregates of germ cells filling the lumen of the seminiferous tubules [2]. In view of the above, the present case report aimed to report the case of a brown booby diagnosed with benign intratubular seminoma.

Case Presentation

An adult, unknown age, male intact, 0.9 kg brown booby (scientific name) was found by the monitoring team of the company CTA Environmental Services. It was found in the region of Rio de Janeiro, between the cities of Duque de Caxias, Magé, and Guapimirim, (22°43'15.9"S 43°10'58.5"W) on December 11, 2016. The specimen was lethargic, with a good body score, died 9 hours after starting treatment, and upon gross necropsy examination, an increase in testicular volume was observed.

Searches were made from 1905 to 2024, Searches were conducted in CAB, SCOPUS, PUBMED and GOOGLE with the keywords: marine birds; seminoma for searching for seminoma in seabirds and seminoma; S. leucogaster; brown booby.

Samples from testicle were collected, fixed in 10% buffered formalin for a minimum of 48 hours, and then dissected and sent to the tissue processor (Leica ASP300S - Leica Microsystems CMS GmbH, Nussloch, Germany). The samples underwent processes of dehydration, clarification, and paraffin embedding. After the embedding process, serial sections of 5µm thickness were performed, and staining was carried out with hematoxylin and eosin (HE), periodic acid-Schiff (PAS) and immunohistochemistry with primary antibody placental alkaline phosphatase (PLAP). For microscopic analysis and photomicrography, an optical microscope (Leica DM4B - Leica Microsystems CMS GmbH, Wetzlar, Germany) was used.

Post mortem examinations

Upon external examination, a cutaneous lesion of pododermatitis was observed in the left hind limb, with no fractures detected. Macroscopically, the only alteration was a moderate enlargement of the left testicle, measuring 1 cm in length and 0.6 cm in width (Figure 1a). Upon sectioning, a yellowish nodular lesion with a diameterof 0.5 cm was identified, exhibiting a texture similar to that of a normal testicle.

Microscopically, the nodular lesion in the left testicle consisted of an epithelial neoplasm with high cellularity, organized in tubules, exhibiting expansive behavior (compression of adjacent tubules). It was well demarcated by the tunica albuginea and testicular tissue. The neoplastic process consisted of germ cells with a polyhedral shape, arranged in a solid pattern that occluded the tubular lumen and was limited by the basement membrane (Figure 1b). The seminiferous tubules weresupported by a mild to moderate amount of fibrous tissue composed of well-differentiated fibrocytes and reactive fibroblasts, frequently associated with an inflammatory infiltrate consisting of a marked number of well-differentiated lymphocytes (Figure 1c). The neoplastic cells exhibited abundant amphophilic cytoplasm with well-defined borders, which was occasionally rarefied or vacuolated (Figure 1d). The nuclei were frequently vesicular with finely stippled chromatin, round to oval in shape, paracentral to eccentric, hyperchromatic, and contained 1-4 nucleoli varying from small round nucleoli to meganucleoli with angular projections. The pleomorphism and anisocariosis were pronounced, and the mitotic index was 5 mitoses in 10 high-power fields (400x). Additionally, occasional random picnosis with a "starry sky" appearance, multinucleation (binucleation and trinucleation), giantcells, and atypical mitoses were observed (Inset Figure 1b). The histopathological findings described were consistent with a well differentiated intratubular seminoma. Labeling with PAS and PLAP were negative. In searches through CAB, SCOPUS, PUBMED, there were negative results for the occurrence of seminoma in seabirds and seminoma in *S. leucogaster*, the same result as a previous search in Google with marine birds; seminoma; pdf and seminoma; S*ula leucogaster*; brown booby; pdf.

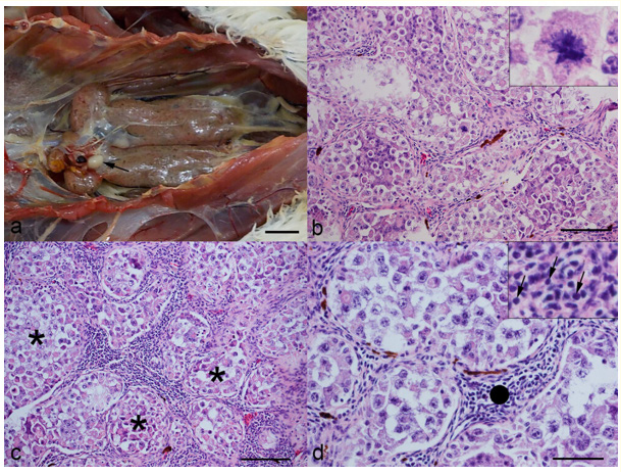

Figure 1: (a) Coelomic cavity. Moderate enlargement of the left testicle (arrow). Bar 2cm. (b) Testicle. Tubules enlarged and occluded by high cellularity with expansive behavior. Bar 100µm, 200x, HE. Inset: Anomalous tetrapolar mitosis, 1000x, HE. (c). Testicle. Well-delimited neoplastic seminiferous tubules (asterisks) supported by moderate amount of fibrous tissue associates with lymphocytic inflammatory infiltrate. Bar 100µm, 200x, HE. (d) Polyhedral neoplastic cells with abundant cytoplasm and well-defined borders, occasionally rarefied or vacuolated, associated with marked lymphocytic inflammatory infiltrate (black circle). Bar 50µm, 400x, HE. Inset: High power field with well differentiated lymphocytes (arrows), 800x, HE.

Discussion

Although PLAP and PAS markings were negative, there are no descriptions that confirm the accuracy in diagnosing seminomas with these markers in birds. In mammals there are reports of no PAS marking in seminomas[3]. Seminoma histological features have been described with very large, polyhedral, with sharp borders, vesicular nuclei and prominent nucleoli, "blastic" appearance, and scant basophilic or amphophilic cytoplasm. Mitotic figures are numerous and frequently bizarre, occasionally appearing as "spiremes" or mats of filamentous chromatin. Focal aggregates of lymphocytes are pre- sent in many tumors. In the diffuse form, tumor cells are not confined to the seminiferous tubules; instead they form broads heets. Necrosis of individual cells produces a "starry sky" effect within the neoplasm [2]. The description of this tumor is compatible with all thehistopathological findings described above, the presence of polyhedral neoplastic cells confined to the seminiferous tubules and lymphocytic inflammatory infiltrate are cytomorphological and histomorphological findings only present in seminoma.

Yolk sac carcinoma and gonadoblastoma have germ cells in the tumor cellularity, however foci of lymphocytic inflammatory infiltrate have never been described [4,5]. Among testicular tumors, the lymphocytic inflammatory infiltrate is typical in seminona and is also absent in interstitial tumor and sertoli cell tumor [2]. Teratoma is characterized by forming several tissues [6], it is completely incompatible with the description and documentary evidence of the tumor in this article. This report describes the macroscopy and microscopy of a seminoma in a brown booby. According to their biological behavior, seminomas in humans are classified as classic seminoma and spermatocytic seminoma. Spermatocytic seminoma, which occurs in older men, has a benign course. Classic seminoma affects younger men and is associated with aggressive clinical features. In classic seminomas, inflammatory lymphocytic infiltrates are commonly found, and the cytoplasm of neoplastic cells typically stainsstrongly positive for glycogen with (PAS) staining and (PLAP) with immunohistochemical staining. In contrast, these two stains are typically negative in spermatocytic seminomas, as reported in dogs [7,8]. Based on its biological behavior, the seminoma in this case was classified as spermatocytic. However, similar to dogs, it exhibited inflammatory lymphocytic infiltrates commonly seen in classic seminomas in humans.

Seminomas are rarely reported in domestic and wild birds and have never been described in seabirds. There are few reports of malignant seminoma in the right testicle of helmeted guineafowl (*Numida meleagris*) [9], the left testicle of rooster (*Gallus gallus*) [10], bilateral testicles of cockatiel (*Nymphicus hollandicus*) [11], pigeon (*Columba livia*) [12], bilateral testicles of duck (*Anas platyrhynchos*) [13], right testicle of black swan (*Cygnus atratus*) [14], bilateral testicles of trumpeter hornbill (*Bycanistes bucinator*) [15], and bilateral testicles of bald eagle (*Haliaeetus leucocephalus*) [16]. Among the cases reported in birds, both testicles were affected in half of the cases, representing 50% (4/8). There is a higher incidence in the right testicle, with 37.5% (3/8), and one occurrence

in the left testicle, with 12.5% (1/8). Regarding biological behavior, 87.5% (7/8) were malignant, and only 12.5% (1/8) were benign. In this report, the tumor occurred in the left testicle, unlike the majority of the reported cases, furthermore it was benign, which is rarely reported in birds.

Seminoma in birds has shown considerable metastatic potential. Among the reported cases with necropsy and histopathological analysis, metastasis was observed in 66.6% (6/9) of the cases. There were 2 cases with renal metastases [1,14,15]. cases with multiple metastases [1,9,17]. case with ventricular metastasis [16], and 2 cases with liver metastases [11,14]. In the present case, no metastatic foci were identified. Seminomas have historically been subdivided into intratubular and diffuseforms based on their histological appearance [2]. The histomorphological pattern in the present report was intratubular, as observed in previous studies on pigeon [12], guineafowl [9], and black swan [14]. The polyhedral cellular shape and lymphocytic inflammatory infiltrate are commonly found in birds [9,14,16]. Similar to this description, anomalous mitoses [12,15]. and "starry sky" appearance have been previously reported [17]. Testicular neoplasms can indicate genetic and environmental problems. Knowledge about the existence and causes of tumors can help conservation breeding to identify risk factors that weaken the health of that species and take measures to mitigate these risks [18].

Conclusion

This is the report of a benign intratubular seminoma classified as spermatocytic in the left testicle of a brown booby. There are few scientific reports of benign seminoma in wild birds. The neoplastic process led to extensive testicular compression with consequent functional impairment of one of the testicles, thereby potentially affecting its reproductive capacity. Seminoma in strictly marine birds and primary testicular tumors in Sulidae family birds have not been previously reported.It is expected that this report will contribute to the improvement of diagnoses and the conservation of this species. Therefore, among the differential diagnoses of testicular tumors, seminoma was diagnosed in Sulidae.

Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial or not- for-profit sectors. Biological samples were obtained through the Santos Basin Beach Monitoring Project required by the federal environmental agency in Brazil (IBAMA), as part of the environmental licensing of PETROBRAS' activities in Campos Basin area, together with other monitoring programs (further information can be obtained at http://www.comunicabaciadesantos.com.br). The co-author Aline Souza was supported by a scholarship from the International Cooperation Program CAPES/COFECUB at the University of Northern Rio de Janeiro financed by CAPES - Brazilian Federal Agency for Support and Evaluation of Graduate Education within the Ministry of Education of Brazil.

Bibliography

1. IUCN. Lista vermelha de espécies ameaçadas da IUCN. Versão 2021-1 (2023).

2. Agnew DW and Maclachlan JN. Tumors of the Genital Systems. In: Meuten, Donald J. "Tumors in Domestic Animals". *North Carolina: Fifth Edition* 16 (2017): 694-709.

3. Oliveira AR., *et al*. "Seminoma in a gray brocket deer (Mazama gouazoubira) with unilateral cryptorchidism". *Brazilian Journal of Veterinary Pathology* 15 (2022): 110-113.

4. Kagawa Y., *et al*. "Testicular yolk sac carcinoma in a calf". *Veterinary Pathology* 35 (1998): 220-222.

5. Reis-Filho JS., *et al*. "Bilateral gonadoblastomas in a dog with mixed gonadal dysgenesis". *Journal of Comparative Pathology* 130 (2004): 229-233.

6. Pegas GRA., *et al*. "Extragonadal malignant teratoma in a dog - Case report". *Arquivo Brasileiro de Medicina Veterinária e Zootecnia* 72.1 (2020): 115-118.

7. Grieco V., *et al*. "Classical and spermatocytic seminoma in the dog: Histochemical and immunohistochemical findings". *Journal of Comparative Pathology* 137 (2007): 41-46.

8. Maiolino P., *et al*. "Correlation of nuclear morphometric features with animal and human World Health Organization International Histological Classifications of canine spontaneous seminomas". *Veterinary Pathology* 41 (2004): 608-611.

9. Golbar HM., *et al*. "Malignant seminoma with multiple visceral metastases in a guinea fowl (Numida meleagris) kept in a zoo". *Avian Diseases* 53.1 (2009): 143-145.

10. Ledesma N., *et al*. "Diffuse unilateral seminoma in a fighting rooster (Gallus gallus)". *Brazilian Journal of Veterinary Pathology* 11.1 (2018): 32-36.

11. Saied A., *et al*. "Bilateral seminoma with hepatic metastasis in a cockatiel (Nymphicus hollandicus)". *Journal of Avian Medicine and Surgery* 25.2 (2011): 126-131.

12. Turk JR., *et al*. "Seminoma in a pigeon". *Avian Diseases* (1981): 752-755.

13. Ganorkar AG and Kurkure NV. "Bilateral seminoma in a duck (Anas platyrhynchos)". *Avian Pathology* 27.6 (1998): 644-645.

14. Goto N., *et al*. "A case of seminoma in black swan". *Nihon Juigaku Zasshi* 48.6 (1986): 1297-1299.

15. Wernick MB., *et al*. "Bilateral malignant seminomas in two unrelated, aged trumpeter hornbills (Bycanistes buccinator)". *Journal of Avian Medicine and Surgery* 29.2 (2015): 125-129.

16. Sullivan PJ and Fasina OO. "Bilateral Malignant Seminoma with Ventricular Metastasis in a Bald Eagle (Haliaeetus leucocephalus)". *Journal of Avian Medicine and Surgery* 32.3 (2018): 240-245.

17. Mutinelli F., *et al*. "Unilateral seminoma with multiple visceral metastases in a duck (Anas platyrhynchos)". *Avian Pathology* 35.4 (2006): 327.

18. Wobeser GA. "Essential of disease in wild animals". Blackwell Publishing, Oxford (2006).