

Serrano B.¹, Martino, L.¹, Alomar J.¹, Abarca M.L.¹, Pérez, L.¹, Espada Y.², Domingo M.¹.

¹ Departament de Sanitat i d'Anatomia Animals, ² Departament de Medicina i Cirurgia Animals
Facultat de Veterinària Universitat Autònoma de Barcelona, Catalunya (Spain)

Introduction

Angiomatosis in dolphins was first described in 1999 in bottlenose dolphins, *Tursiops truncatus*, from the Gulf of Mexico as a proliferation of small thin-walled blood vessels of unknown aetiology and high prevalence affecting the lungs and lymph nodes (Turnbull and Cowan, 1999), and reported also in bottlenose dolphins (Venn-Watson et al., 2012, Seguel et al., 2020) and common dolphins (Díaz-Delgado et al., 2012). The cause remains unknown.

We describe a case of pulmonary angiomatosis in a Mediterranean striped dolphin, *Stenella coeruleoalba*.

Material and methods

An adult female striped dolphin, of 77 kg and 200 cm length, stranded alive in Port de la Selva (Girona). It showed weakness, an increased respiratory frequency, and died shortly thereafter. Post-mortem CT scan and a complete necropsy, with histopathologic and immunohistochemical examination, were performed.

Results

CT scan: large areas of hyperattenuating parenchyma (interstitial-alveolar pattern) at the dorso-medial aspect of both lungs, compatible with pneumonia or atelectasis (Figure 1).

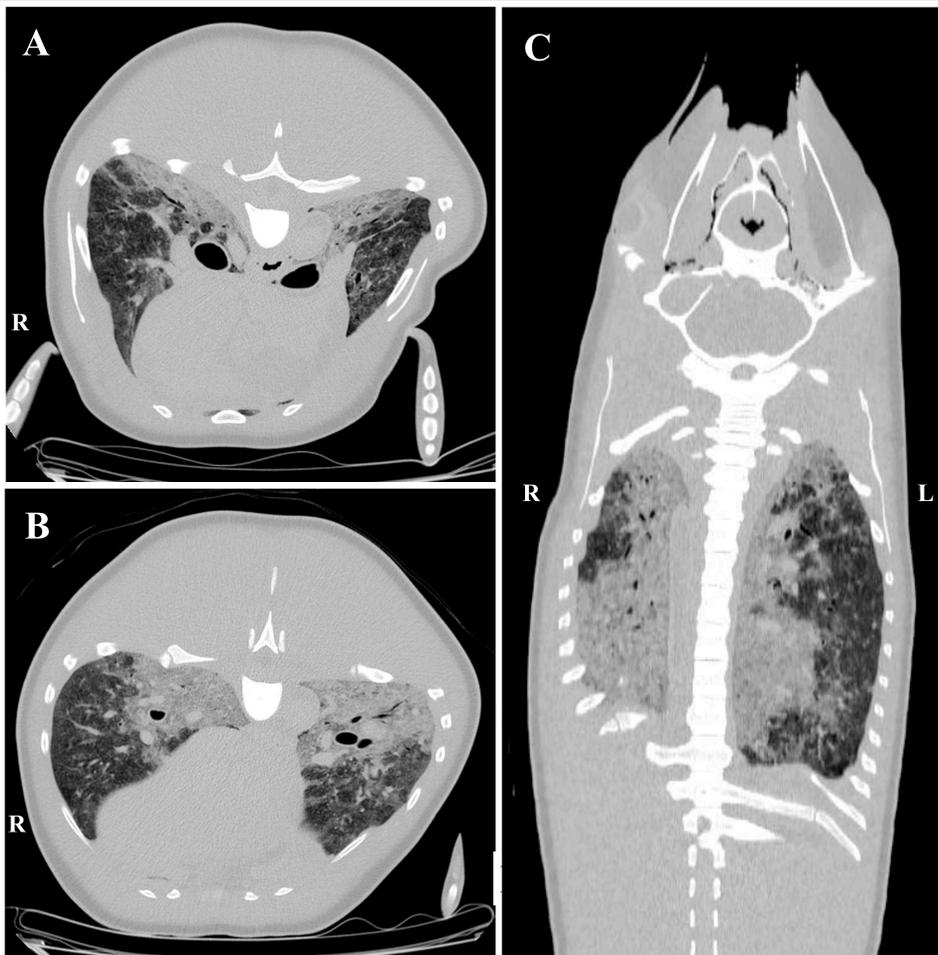


Figure 1. Transverse CT images (A,B), in lung window, striped dolphin, at the axillary and mid-thorax level with hyperattenuating parenchyma (interstitial-alveolar pattern). Dorsal CT reconstruction in lung window (C). R: right, L: left

At necropsy, the dolphin had a low body condition. The dorsomedial aspect of both lungs showed an extensive dark red, consolidated area (Figure 2). The cranioventral part had normal appearance. The dark red areas sank in formalin. No other significant lesions were observed



Figure 2. Lungs, striped dolphin. Dark-red areas extending bilaterally through the dorsal and medial aspect of the lungs, with atelectasis.

Histology: tortuous proliferation of thin-walled vessels with a thin smooth muscle layer, stained by Masson's trichrome and SMA-IHC (Figure 3). Vessels contained erythrocytes. No inflammatory changes were observed in vessels, alveolar spaces, airways, or pleura. Interstitial fibrosis was minimal, and haemangiomas were not seen in the lungs or other organs. Respiratory lymph nodes were normal. No other significant lesions were observed. Pulmonary parasite load was negligible.

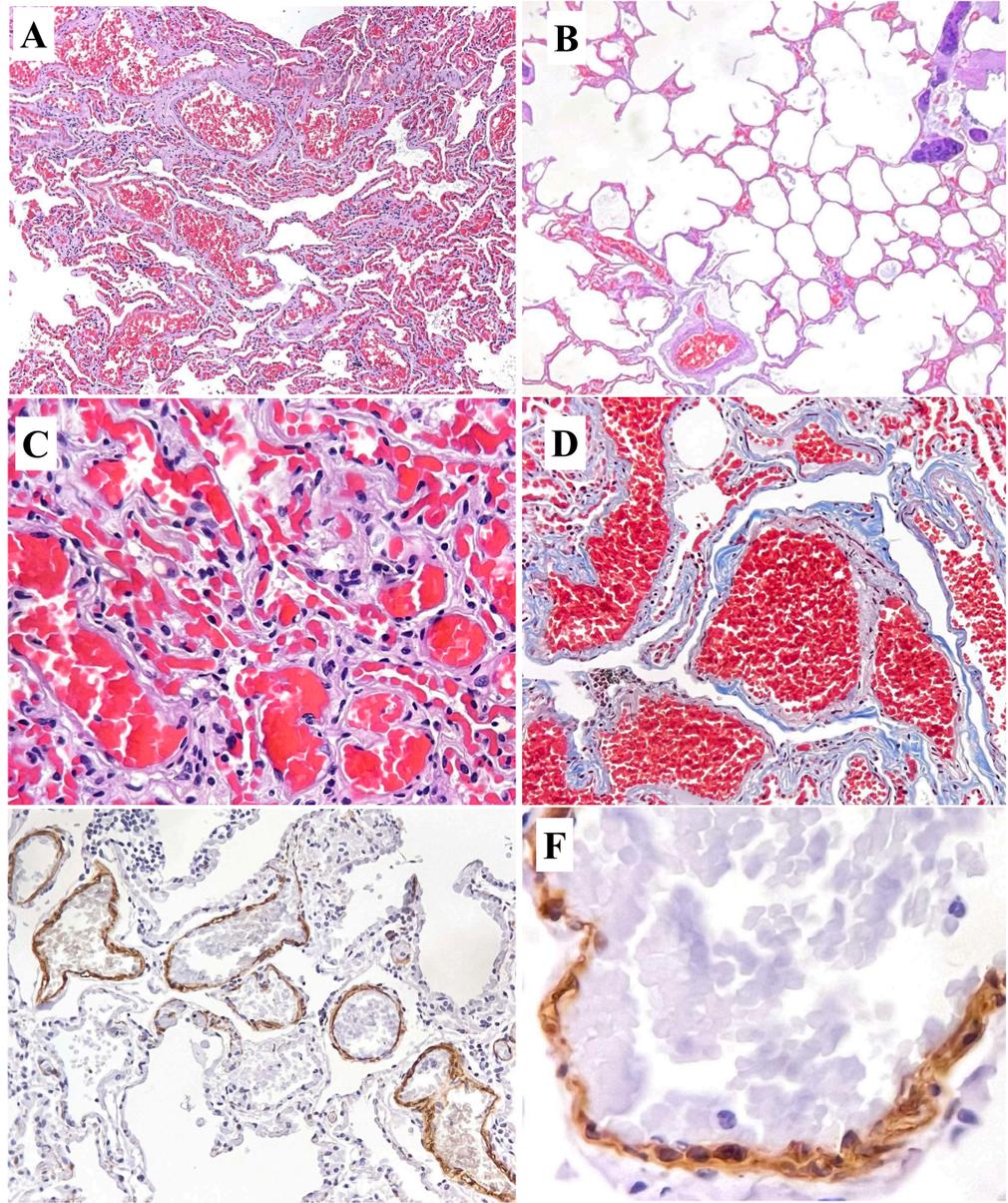


Figure 3. Lung tissue, striped dolphin. A. Affected zone. Tortuous thin-walled arteriolar vessels, and alveolar collapse. HE staining. B. Unaffected area. HE staining. C. Closer view of arterioles distended with erythrocytes. HE staining. D. Masson's trichrome. E and F. Anti-Smooth muscle actin IHC. Counterstained with Haematoxylin.

Bacteriology yielded abundant colonies of a GRAM- bacterium from a lung sample, but not from other organs. The bacterium was identified (API20NE) as belonging to the family *Pasteurellaceae*, and sequencing of the 16S ribosomal RNA gene identified it as *Phocoenobacter uteri*, a bacterium described by Foster et al., 2000, from a uterine sample in a harbour porpoise, and by Godoy-Vitorino et al. (2017) in a striped dolphin, as part of the microbiome.

A generic PCR for *Bartonella* spp. on lung tissue was negative. RT-PCR and IHC for CeMV were negative.

Conclusions

- To our knowledge, this is the first description of pulmonary angiomatosis in a Mediterranean cetacean.
- Proliferating vessels were identified as small to medium size arterioles, and alveolar spaces in affected areas showed extensive atelectasis.
- Pre-necropsy CT imaging showed that up to 1/3 of the whole lung tissue was affected. The extension of angiomatosis was sufficient to cause respiratory distress and loss of body condition, and to be considered the cause of stranding.
- The cause of the lesion could not be determined. The pathogenic role of *Phocoenobacter uteri* is unknown, but an association with angiomatosis seems improbable.

References

- Díaz-Delgado J, Arbelo M, Sacchini S, Quesada-Canales Ó, Andrada M, Rivero M, Fernández A (2012) Pulmonary angiomatosis and hemangioma in common dolphins (*Delphinus delphis*) stranded in Canary Islands. *J Vet Med Sci* 74:1063–1066
- Foster G, Ross HM, Malnick H, Willems A, Hutson RA, Reid RJ, Collins MD (2000) *Phocoenobacter uteri* gen. nov., sp. nov., a new member of the family Pasteurellaceae Pohl (1979) 1981 isolated from a harbour porpoise (*Phocoena phocoena*). *Int J Syst Evol Microbiol* 50:135–139
- Godoy-Vitorino F, Rodríguez-Hilario A, Alves AL, Gonçalves F, Cabrera-Colon B, Mesquita CS, Soares-Castro P, Ferreira M, Marçalo A, Vingada J, Eira C, Santos PM (2017) The microbiome of a striped dolphin (*Stenella coeruleoalba*) stranded in Portugal. *Res Microbiol* 168:85–93
- Seguel M, George RC, Maboni G, Sanchez S, Page-Karjian A, Wirth E, McFee W, Gottdenker NL (2020) Pathologic findings and causes of death in bottlenose dolphins *Tursiops truncatus* stranded along the Georgia coast, USA (2007–2013). *Dis Aquat Organ* 141:25–38
- Turnbull BS, Cowan DF (1999) Angiomatosis, a newly recognized disease in Atlantic bottlenose dolphins (*Tursiops truncatus*) from the Gulf of Mexico. *Vet Pathol* 36:28–34
- Venn-Watson S, Daniels R, Smith C (2012) Thirty year retrospective evaluation of pneumonia in a bottlenose dolphin *Tursiops truncatus* population. *Dis Aquat Organ* 99:237–242