Case Report

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An unusual case of ectrodactyly in a free-living European hedgehog (*Erinaceus europaeus*, Linnaeus 1758)

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ABSTRACT

This report aimed to present a case of ectrodactyly in a free-living adult female *Erinaceus europaeus*. At radiography and post-mortem dissection, the right hind limb developed 2 digits and aplasia of 3 digits. No other abnormality was found in this case. Various teratogens may be responsible for occurring skeletal anomalies. To the best of our knowledge, the present study is the first report of ectrodactyly in this species.

Clinical case

The European hedgehog (*Erinaceus europaeus*, Linnaeus 1758) is a highly adaptable and resilient small mammal native to the European continent. While it currently does not face the threat of extinction, declines in its populations have been observed in certain regions due to habitat loss, road traffic accidents, and other human-related factors (Garcês *et al*. 2020). Understanding and addressing the potential diseases that could affect the survival of the species are important for the conservation of wildlife. Teratogenic alterations warrant special attention, as one of the etiological factors could be the exposure of progenitors to toxic substances/pollution, such as heavy metals (García-Muñoz *et al*., 2023), which potentially serving as early indicators of environmental distress. Ectrodactyly (split-hand or lobster claw deformity) is the term used to describe an unusual congenital para-axial deficiency in one or more elements of the distal limb of a developing embryo (Harasen, 2010; Carvallo *et al*., 2011).

A free-living adult female *Erinaceus europaeus* was admitted to a Wildlife Rehabilitation Center in Northern Portugal after being found in a suburban area during the day debilitated and with uncoordinated movements. On examination, the hedgehog weighed 384g, had good body condition (3/5), and had pale mucous membranes. The left hind limb (LHL) presented an exposed fracture of the tibia with the mummification of the bone and necrosis of skin, muscle and soft tissues on the hind leg. Physical examination of the limbs revealed a deformity of the right hind limb (RHL) that characterized by the aplasia of 3 digits (thumb, 3rd and 4th phalange) and 2 digital pads. There were no signs of scar or trauma. The LHL was normal, with 5 digits, 3 phalangeal pads and one metacarpal pad. The metacarpal pad of the RHL was smaller than the LHL's (Figure 1). The RHL was thinner compared to the LHL. The radiographic examination consisted of a dorsopalmar view of the member (Figure 2). The animal

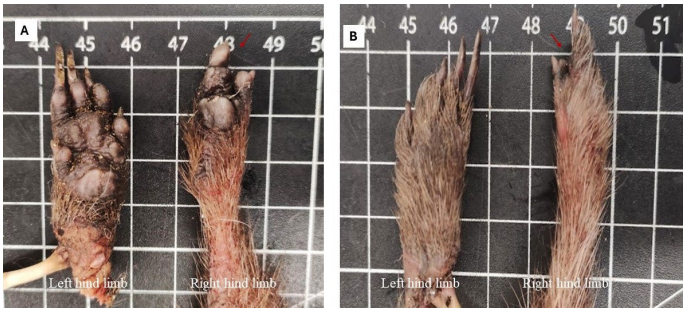

Fig. 1. Ventropalmar (A) and dorsopalmar (B) view of the right and left hind limb in an *Erinaceus europaeus* with ectrodactyly (arrow).

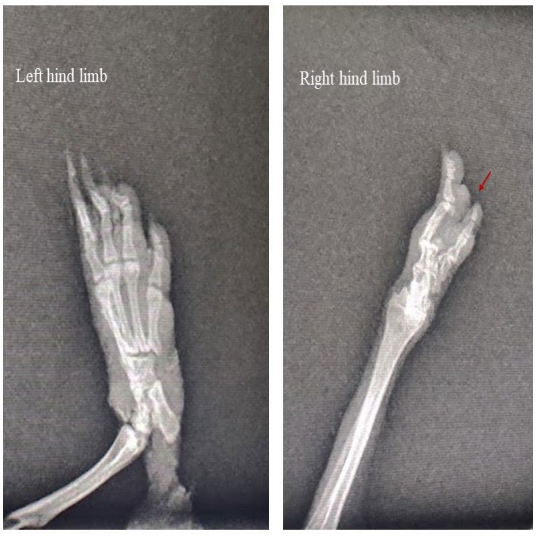

Fig. 2. Dorsopalmar radiographs of the right and left hind limb in an *Erinaceus europaeus* with ectrodactyly (arrow).

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was euthanised due to the severity of the injuries. During the post-mortem exam, both members were dissected. In addition to the changes observed macroscopically it was possible to observe RHL fusion of IV tarsal bone, III tarsal bone, II tarsal bone and central tarsal bone. All these bones seem to have a different shape from normal. The bones metatarsal and phalanges were shortened. The I-tarsal bone seemed absent or residual (Figure 3).

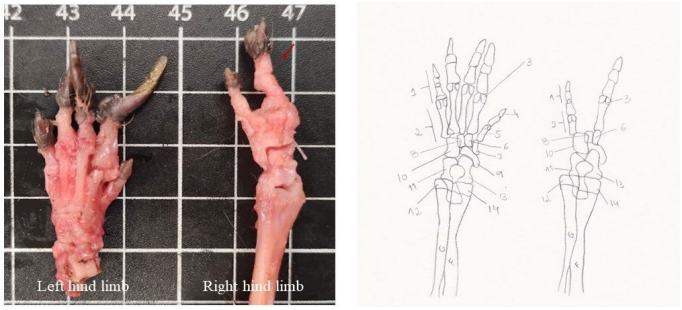

Fig. 3. Dorsopalmar view of the right and left hind limb in an *Erinaceus europaeus* with ectrodactyly (arrow), after soft tissue removal. G – fibula, F – tibia, 1 – phalanges of digits 2 to 5, 2 – metatarsal bones, 3 – proximal plantar sesamoid bones digits 2 and 3, 4 – IV tarsal bone, 5 – metatarsal bone, 6 – II tarsal bone, 7 – I tarsal bone, 8 – III tarsal bone, 9 – central tarsal bone, 10 – IV tarsal bone, 11 – calcaneus, 12 – distal epiphysis of fibula, 13 – talus, 14 - distal epiphysis of tibia.

Ectrodactyly in animals is rare (Harasen, 2010). This malformation has been reported in various mammalian species including, dogs, (Harasen, 2010; Carvallo *et al*., 2011; Di Pietro *et al*., 2021), tigers (Rahal *et al*., 2012), amphibians (Ouellet *et al*., 1997), reptiles (Martínez *et al*., 2017), horses (Azizi *et al*., 2017), cat (Schneck, 1974), sheep (Ramadan, 1993), primates (Cooper *et al*. 1990) and humans (Sharma *et al*., 2015). Despite the growing number of reports, the current knowledge about congenital limb deformity is still very poor (Azizi *et al*., 2017; Martínez *et al*., 2017). Moreover, in veterinary medicine, a complete and unequivocal description of many congenital defects is still lacking (Ramadan, 1993), compared to human literature. In wild animals, this knowledge is even more scarce. Both genetic and environmental factors may contribute to its occurrence. While genetic mutations have been implicated in some cases (cats and humans), environmental factors such as maternal disease, diet, pollutants (e.g. cadmium in the laboratory), and radiation exposure have also been proposed (Harasen, 2010). However, the precise aetiology of ectrodactyly in wild animals remains elusive due to limited research in this area.

To the author's knowledge, this is the first report of ectrodactyly in a wild animal and this species. Despite the limb malformation, no other anomalies were observed. This case study contributes to understanding ectrodactyly in wild animal populations, emphasising the need for continued research. By documenting the occurrence of ectrodactyly in a previously unreported species, this study underscores the importance of studying congenital limb deformities and other malformations to understand their prevalence, aetiology, and potential conservation impacts.

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