









Case Report

First report of gastroschisis in black-eared opossum (*Didelphis aurita*)

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Abstract

Black-eared opossums (*Didelphis aurita*) are neotropical marsupials least concern with extinction in Brazil. Pathologies involving this species are rarely described, and gastroschisis has never been reported before. This study aims to report a case of gastroschisis in a black-eared opossum newborn and describe the main characteristics observed. A newborn black-eared opossum in the developmental stage in marsupial pouch was received lifeless by Núcleo de Estudos e Pesquisas em Animais Selvagens (NEPAS) of Universidade Estadual do Norte Fluminense Darcy Ribeiro (UENF). The animal was examined externally, and herniated intestinal loops were observed without the presence of the peritoneum covering them, indicating gastroschisis. This report aims to contribute to the literature on small marsupial medicine by describing the occurrence of this malformation in an individual of *D. aurita*.

Keywords: Marsupials, congenital anomaly, abdominal malformation, fetal development.

Introduction

Black-eared opossums are marsupials belonging to the Didelphidae family and Didelphimorphia order. Neotropical marsupials have a wide geographical distribution and occupy many ecological niches, making them fundamental to the balance of the ecosystem (15). According to the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, *D. aurita* is classified as of least concern.

Gastroschisis is a relatively rare congenital malformation defined by the failure of the rectus abdominis muscles to close during embryonic development, resulting in the evisceration of abdominal viscera such as intestinal loops (9, 14). Characterized by an irregularity lateral to the median sagittal plane of the abdominal wall, in the area adjacent to the umbilical scar. The viscera protrude from the cavity and are exposed, without compromising the umbilical cord, which

differentiates it from a common umbilical hernia where the viscera remain enveloped by the peritoneum (6, 14, 17).

The term gastroschisis literally means “opening or cleft of the stomach,” which is inappropriate because it is a pathology of the abdominal wall and not the stomach. In general, the defect occurs on the right side, lateral to the navel, and is more common in males (14).

Although clinically relevant, there are still no studies proving the exact origin of gastroschisis. Some theories and studies suggest that this anomaly may be caused by a failure in the regression of the right umbilical artery or the omphalomesenteric muscle. This hypothesis is reinforced by the frequent association of gastroschisis with intestinal atresia, a condition that often results from ischemic processes (4).

This condition is well documented in human medicine, and surgical correction is commonly used to treat it (4). The survival rate of newborns with gastroschisis has improved significantly in recent decades, but intestinal complications

still represent one of the main causes of high morbidity (8). In veterinary medicine, newborns with these conditions often do not survive.

Despite the clinical importance of these malformations in veterinary medicine, there is a clear lack of comprehensive reports on their treatment and management in wild animals, highlighting the need for further research to improve knowledge in this area. Based on this context, this report aims to describe the first recorded case of a congenital malformation characterized by gastroschisis in a newborn black-eared opossum (*Didelphis aurita*) living in the wild, contributing to the understanding and development of clinical practices for this condition in wild species.

Case description

A newborn black-eared opossum specimen (*Didelphis aurita*) was received in September 2024 pelo Núcleo de Estudos e Pesquisas em Animais Selvagens (NEPAS) of Universidade Estadual do Norte Fluminense Darcy Ribeiro (UENF) after his mother was hit by a car in the urban area of Campos dos Goytacazes, Rio de Janeiro. The mother died at the time of the accident and the surviving cubs were kept under human care. After the accident, one of the cubs died and was taken to NEPAS.

Upon arrival at NEPAS, biometric measurements were taken of the individual (Fig. 1). The animal was a newborn, with slightly darkened pink skin and fur just beginning to develop. Its eyes were still in formation, covered by a membrane, and its mouth, also not yet fully formed, showed

a small central opening while remaining closed at the sides - indicating it was a cub still undergoing development within its mother's pouch.

During macroscopic evaluation, an opening was noted in the abdominal region with part of the intestinal loops exteriorized from the cavity, without being surrounded by the peritoneum, thus compatible with gastroschisis. The opening measured 6.50 mm in the craniocaudal direction and 5.30 mm in the laterolateral direction, as illustrated in Figure 2. In addition, there was 11.64 mm of intestinal loop outside the cavity in the ventral view (Fig. 3) and lateral view (Fig. 4). Apart from gastroschisis, no other changes or traumatic injuries were observed in the animal, which was the only one in the litter with this congenital malformation.

Histopathological evaluation is not necessary for a definitive diagnosis. Differentiation between this condition and possible trauma caused by being run over was based on macroscopic examination. The absence of bleeding, along with the appearance of the muscle at the edge of the fissure, supported the exclusion of trauma as a cause.

Discussion

Congenital malformations found in animal neonates are rarely described in veterinary medicine, especially when related to wild animals. There are records of this condition through induction for experimental studies, such as in chicken embryos (7) and in rabbit fetuses (10).

Previously reported cases addressed the same condition in a mixed-breed dog (18), a Welsh Corgi Pembroke (2), a French Bulldog (5), and a female Yorkshire Terrier (16), born

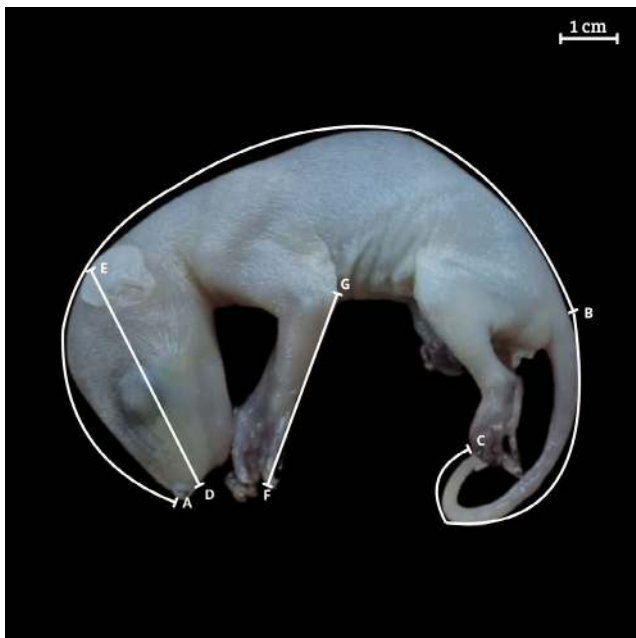


Figure 1. Biometrics performed. 60.65 mm from A to B; 100 mm from A to C; 27.15 mm from D to E; 23.50 mm from F to G.



Figure 2. Image of gastroschisis with measured opening parameters.



Figure 3. Image of Black-eared Opossum: ventral view of gastroschisis.



Figure 4. Image of Black-eared Opossum: side view of gastroschisis.

via cesarean section. In their respective litters, they were the only ones to present with abdominal wall malformation and exposure of part of the intestine. Both underwent surgical correction of the anomaly, which ensured their recovery. These reports indicate that the anomaly does not show a specific predisposition related to species or breed.

The black-eared opossum specimen in this study presented a spontaneous pathological change without the presence of other concomitant pathologies, as seen in other

reports (11, 13). Thus, existing theories about the pathogenesis of gastroschisis emphasize its complexity, which makes it important to describe teratologies in wild animals to report that there is a possibility of these changes in a free-living animal.

A teratogenic agent is any element capable of causing a congenital anomaly or increasing the occurrence of such anomalies in an individual. Environmental agents, such as infections and drugs, can simulate genetic conditions when they affect two or more children of apparently normal parents (3, 14).

A study evaluated the effects of carbon monoxide contamination in exposed rats when combined with zinc deficiency, observing a 60% increase in fetal mortality rates and malformations, such as gastroschisis (20). Study shows association between gastroschisis and other congenital defects, such as anencephaly or hydrocephalus. Additionally, limb shortening has been observed in some cases of gastroschisis (11).

In this study, histopathological evaluation was not performed, as it is not required for the definitive diagnosis of this anomaly. Microscopic analysis was used in studies of gastroschisis in bovine fetuses, but it did not reveal any histological changes, thus rendering histopathology unnecessary (1).

The use of ultrasonographic examination for the prenatal detection of the anomaly is a helpful method in preparing for postnatal correction. In addition, ultrasound allows for monitoring the development of fetuses with anomalies (21). However, in the case of free-ranging animals, ultrasonographic monitoring is not feasible, which complicates postnatal corrective measures.

Surgical correction of gastroschisis is the most effective alternative in both human medicine (12) and veterinary medicine (5). Although it is an effective treatment method, it presents difficulties because there may be a disproportion between the viscera and the abdominal cavity (19). In opossums, they are very small when newborn compared to dogs, which can make the surgical procedure difficult.

Thus, improving and creating new clinical and surgical techniques in a simple and quick way that aim to identify this impasse and solve it concisely before the animal dies, as already seen in other species such as dogs, and also as seen in human medicine (4). Additionally, these descriptions serve as an excellent research tool, enabling more in-depth studies on their etiology and consequently contributing to species conservation.

Conclusion

This report describes, for the first time, the spontaneous manifestation of gastroschisis in a black-eared opossum (*Didelphis aurita*) newborn, highlighting the importance of identifying and documenting congenital malformations in

wild animals. This report highlights the need to deepen knowledge about congenital pathologies present in wild species, as well as the development of specialized clinical and surgical strategies for these conditions.

Conflict of Interest

The authors declare no competing interests

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