Journal of Poultry Sciences and Avian Diseases

Journal homepage: www.jpsad.com

Successful Surgical Removal of a Perforating Ventricular Foreign Body from a Mallard Duck (Anas platyrhynchos): A Case Report

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Meamar, N., Asghari Baghkheirati, A., Abbasi, M., & Shahbazi, V. (2023). Successful Surgical Removal of a Perforating Ventricular Foreign Body from a Mallard Duck (Anas platyrhynchos): A Case Report. *Journal of Poultry Sciences and Avian Diseases, 1*(2), 37-41.
http://dx.doi.org/10.61838/kman.jpsad.1.2.5

A B S T R A C T

Swallowing foreign bodies is an important cause of emergency visits in pet birds. An adult female mallard duck with a history of anorexia, weakness, and depression was referred to the Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran. Radiographic examination showed the penetration of a needle in the ventriculus (gizzard). Since foreign bodies can lead to obstruction and injury that is life-threatening, the team's decision was surgical removal by ventriculotomy under general anesthesia. The patient was laid in dorsal recumbency on a heating pad, and the feathers around the incision site were removed. Then a skin incision was made in the middle of the abdomen. The ventriculus was explored, and the infiltrated foreign object was carefully removed. To the best of the authors' knowledge, this study reports the first successful foreign body removal surgery in a duck in Iran. During the 10-day follow-up period, no complications were observed, and the duck was healthy. Prompt intervention and surgical treatment might be necessary to remove penetrating gastrointestinal foreign bodies located in the gizzard of domestic ducks.

Keywords: *mallard duck, surgery, foreign body, gastrointestinal obstruction*

1 Introduction

Ingesting foreign bodies (FBs) has been observed in a broad range of avian species, ranging from pet birds and poultry to zoo birds and wild ones, and can be life-threatening in some cases (1-5). Several foreign objects, such as feathers, rubber, needles, pieces of jewelry, glasses, wood, plastics, stones, and metallic items, have been reported in the digestive tract of birds (5) . For instance, Hayati *et al.* (2011) and Raisi *et al.* (2019) reported ingesting needle and elastic band in a common mynah, respectively.

Article history:
Received 16 February 2023
Revised 01 April 2023
Accepted 06 April 2023
Published online 01 June 2023

Foreign objects in birds can lead to severe gastrointestinal tract disorders such as injury, inflammation, peritonitis, and blockage. These FBs are primarily found in the proventriculus, ventriculus, crop, and sometimes in the small intestine (1). Depression, anorexia, vomiting, diarrhea, and lethargy are the primary clinical symptoms of such disorders (1).

Birds have been kept for several reasons: food, entertainment, and religion. Because of their natural curiosity, they want to try things out in their mouths (1, 6). The domestic duck is one of the most popular species to keep as pets. Its popularity is rooted in industrial reasons and the importance of keeping it as a pet (7). Ducks are included in the Anatidae family, Anseriformes order (8). Some species of Anatids consume fish or aquatic arthropods, while adult ducks are generally herbivorous and feed on various water plants (9) .A duck's cutaneous mechanoreceptors on the bill and tongue gather food from muddy or flooded areas and identify the difference between edible and non-edible things. However, there is the possibility of swallowing a foreign object by chance.

The ventriculus, also known as the gizzard, is a dense muscular part of a bird's stomach that can be found just to the left of the midline at the caudal border of the sternum. The other part of the stomach is called the proventriculus, the glandular portion (10). This paper discusses a successful ventriculotomy to remove a penetrating foreign body (a needle) from a female adult mallard duck's ventriculus.

2 Case presentation

A 2-year-old female mallard duck (*Anas Platyrhynchos*) was committed to the avian hospital of the Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran, with a history of weakness, depression, and anorexia for three days, although water intake was normal. The duck was kept alone in an apartment, and there was no pet animal to stay in touch with. The bird was fed fresh vegetables, fruits, and commercial seeds. At the clinical examination, the patient was active, and the body weight was 1.1 kg. A 3.5 body condition score was also observed (on a scale from 1 to 5). The heart and respiratory rates were within the normal range for this species, and the cloacal temperature was 40.6°C. The owners claimed that their pet was played with a needle about five days ago, albeit they did not see any foreign objects ingestion.

Standard whole-body digital radiographs (Direct View Classic CR System; Kodak, Rochester, USA) were taken in ventrodorsal and left lateral projections. The radiographic images show a needle-shaped metal foreign body in the anatomical region of the ventriculus with a maximum length of around 2.7 cm, and the ventriculus wall was involved with the foreign body (Figure 1). As a result of the radiographic findings, surgical removal of the foreign body using a ventriculotomy was elected by our team.

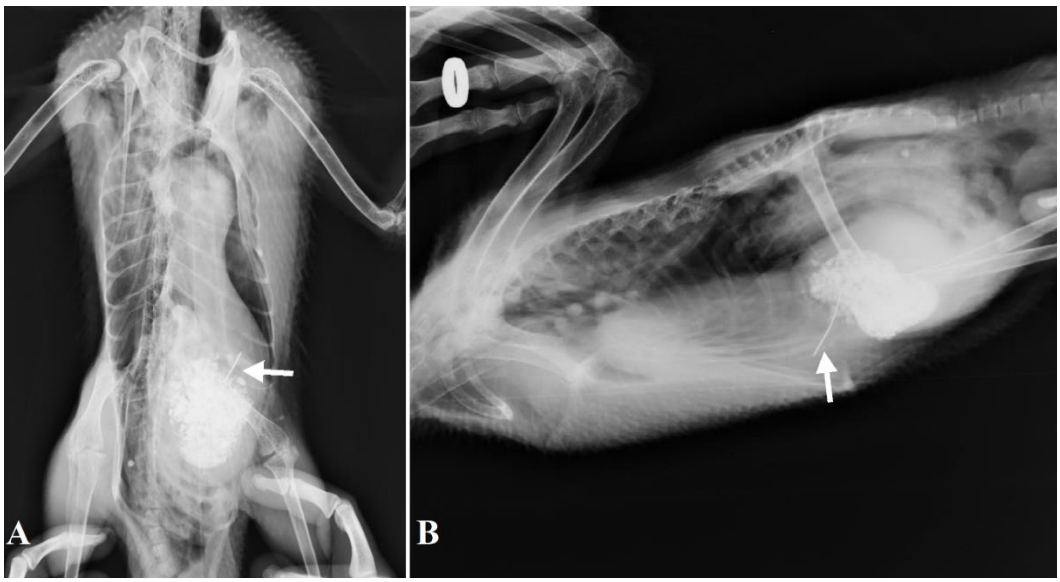

Figure 1. A 2.7 cm metallic needle was observed in the anatomical region of the gizzard in ventrodorsal (A) and lateral (B) radiographs. The arrow indicates the needle's location.

General anesthesia was induced with 5.00% isoflurane (Nicholas Piramal, London, UK) using an anesthetic mask connected to the anesthetic machine and maintained on 2.00% isoflurane with 1.00 liter per minute oxygen flow rate (Figure 2). The patient was laid in dorsal recumbency on a heating pad with a 40- to 50-degree head raising. The abdominal feathers were plucked. Then, the skin of the surgical site was scrubbed for aseptic operation by using povidone-iodine solution (10%) (Nano Chemistry Company of Yazd Desert Co., Iran) and alcohol (Ethanol 70%) (Foumanvash Co., Iran). Following the draping, an approximately 4-5 cm skin incision was performed, and the muscular abdominal wall was opened. The ventriculus was identified and moved to the incision site. At first, a stab incision was done and then extended with Metzenbaum scissors. After removing the needle, the incision site was sutured with an inverting pattern (Cushing-PGA 3-0). Then, the muscle layers and skin were closed with a simple continuous pattern (PGA 4-0). The surgery only took 40 minutes and the patient recovered in the postoperative hours.

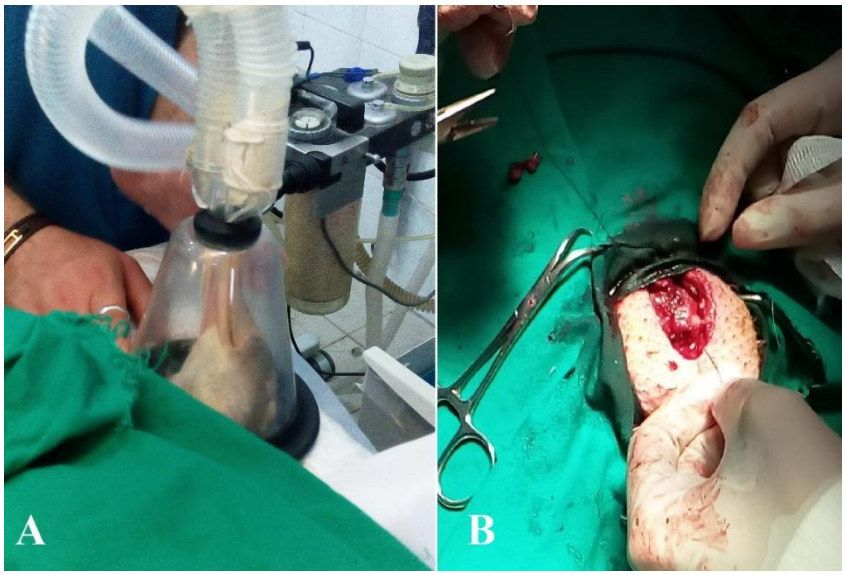

Figure 2. A) Inhalation anesthesia along with oxygen flow rate. B) closing the surgery site with the polyglycolic acid suture.

3 Discussion

This study was conducted to illustrate the successful surgical removal of a perforating ventricular foreign body from a mallard duck. Our study demonstrates that ventral access helps surgeons remove foreign objects in the ventriculus. We found it to be a fast and safe method that can be considered for the same species or other Anatidae. Furthermore, it would help to minimize anesthetic and surgical risks without intraoperative or postoperative complications like hypothermia and hemorrhage.

Gastrointestinal foreign bodies in companion animals are life-threatening surgical problems that require invasive surgery. Swallowing foreign bodies is an important cause of emergency visits in pet birds (3) . Ingestion of metallic foreign bodies was also reported in bird patients (1-3, 11) . FBs can be discovered anywhere in the digestive tract; however, they are commonly positioned in the proventriculus and ventriculus (3).

The initial diagnostic modalities in patients with clinical signs of gastrointestinal mechanical obstruction are survey abdominal radiographs, palpation, endoscopy, or exploratory laparotomy (12, 13).To diagnose foreign objects in the gastrointestinal tract of pet birds, the lateral and ventrodorsal views of routine radiographs are trustworthy solutions (14) . According to the precise history and radiographs that confirm the presence of a metal foreign body, laboratory tests can be avoided (15). In our case, according to the history of access to the needle and the absence of findings in the oral cavity during clinical examination, a radiographic test was a fundamental way to identify the ingested foreign item.

Limitations in the zone of feather removal cause the intraoperative sepsis to become controlled (16) , and it also helps to control and prevent hypothermia, whether intraoperative or postoperative, so the removing area around the incision zone was limited (17). Applying a heated pad and a towel during anesthesia can control hypothermia in patients (18) . This paper limited the area around the incision

zone, and the skin was draped about 4-5 cm to control sepsis and hypothermia.

Preventing fluid entrance into the lung field could be obtained by raising the bird's head between 30 to 40 degrees during the procedure (17). In this case report, the patient was laid in dorsal recumbency on a heating pad with the head elevated about 40 degrees, which is consistent with previous studies (17). In avian patients with foreign body abnormalities, several techniques could be used depending on the composition of FBs, size, location, type, and patient's condition, and the reliable results would be decreased by delaying diagnosis (14). Celiotomy is a reliable procedure in birds with foreign bodies in the ventricular cavity (19).

Respiratory depression from isoflurane is more significant in birds in comparison to mammals (20). Using oxygen leads to the prevention of hypoxia during abdominal surgery. In such a surgery in birds, changes in the mechanical properties of the respiratory system can occur, which causes a decline in the volume of breathing (19). In contrast to the study conducted by Champour and Ojrati in 2014, in which the bird was anesthetized with xylazine-ketamine, in the case described in this paper, general anesthesia was induced with isoflurane to the anesthesia machine with oxygen flow.

To recapitulate, there is widespread concern about keeping birds in a cage or free range at home. The logical idea is to keep them in a protected zone without access to ingestible foreign bodies.

Conflict of Interest

The authors declared no conflicts of interest.

Acknowledgements

The authors thank to Ms. Yazdani and Ms. Naderi for technical. We wish to thank prof. M. Taheri for her honorable contribution in proofreading the manuscript.

Authors' Contributions

NM drafted the manuscript, and MA critically reviewed and revised it. All authors have read and approved the final manuscript and agreed to the published version of the manuscript.

Funding

This research was funded by a grant (7508007-6-42) from the University of Tehran Research Council.

Data Availability Statement

Data are available from the first author upon reasonable request.

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