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Case Report: Surgical Resolution of the Oviduct Impaction Using: Salpingohysterotomy in Female Scarlet Macaw (*Ara macao*).

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ABSTRACT

A 10-year-old female Scarlet Macaw was presented with a history of abdominal mass since one year ago. Diagnosis revealed that the patient had a hard mass in the ventral region of the coelom. The hard mass was removed surgically. Histopathological findings indicate the presence of necrotic cells, inflammatory cells and fibrin deposition in a compacted mass without any specific architecture. Thus, the findings confirm caseous materials of egg remnant. A definitive diagnosis of Oviduct impaction was concluded due to chronic retained eggs. Proper surgical treatment and management performed in this case had resolved and return the patient's condition to normal.

1. INTRODUCTION

The Scarlet Macaw (*Ara macao*) is a large, brightly coloured Neotropical parrot that is found in the tropical humid environment of the Amazon Rainforest. Based on the IUCN Red List (2016), most of the birds found in Malaysia originated from eastern Mexico, Guatemala, Belize, Colombia, Ecuador, Amazonian Peru and Brazil. The habitat for the Scarlet macaw is in the lowlands up to 500 meters and the emergent layers and canopies of the rainforest. Today, these birds seen are kept as pets in the captive by exotic bird lovers. The lifespan of a Scarlet Macaw varies based on the habitat and the quality of life that the bird lives. In the wild, it is expected the birds live approximately 30 to 50 years. These Macaws in captivity, however, was recorded to have a longer lifespan approximately 60 to 70 years compared with the wild (Young et al., 2012). Scarlet Macaw reach their sexual maturity around 3-4 years old for both male and female and the female starts laying eggs at 5-6 years old. Scarlet Macaw's yearly seasonal breeders and their mating behaviour are monogamous. They produce 2-4 eggs per brood per season (Caparroz et al., 2011).

The avian female reproductive tract is referred as the oviduct. The oviduct is a convoluted tubular structure responsible in the production of fully formed egg. The transportation of the ovum from the ovary, fertilization and deposition of albumen, membranes and shell on the ovum occurs in the oviduct (Srinivasan et al., 2014). Oviduct impaction is a consequence of salpingitis, cystic hyperplasia, metritis, egg binding and dystocia in breeding birds. Accumulation of eggs, egg materials and caseous purulent with calcareous materials are the common product of oviduct impaction (Joyner, 1994). Oviduct impaction in companion birds has been reported with life threatening clinical signs and high mortality (Reisinho, 2008). The clinical signs manifestation may vary depending on the location of the impaction and coexistence of the oviduct

infection. Common clinical signs include diarrhea, constipation, abdomen distension, recurrent anorexia, penguin like posture and reluctant to walk or fly.

The present case, reports the surgical resolution with salpingohysterotomy and an overview of the oviduct impaction in a scarlet macaw.

2. CASE REPORT

2.1 History and Clinical Findings

A 10-year-old female Scarlet Macaw (*Ara macao*), weighing 1.05 kilograms (Kg) was presented to the University Veterinary Hospital (UVH) in May 2017. History collected indicated that the patient had developed a soft abdominal mass about one year ago and the owner presented the bird initially to a private Veterinary Clinic.

In the private Veterinary Clinic, a fine needle aspiration (FNA) was performed on the soft abdominal mass, and findings revealed a yellow colored fluid without evidence of egg yolk. On presentation to UVH, the patient was bright, alert and responsive with a penguin stance. Clinical examinations indicated that the patient had a Body Condition Score (BCS) of 2.5/3, heart rate and respiration rate were 230 beat per minute and 45 breaths per minute respectively. A hard and compacted abdominal mass approximately 7cm x 5cm in diameter was noticed in the ventral region of the coelomic cavity.

2.2 Diagnostic Work Ups

Complete blood count and whole body ventrodorsal (VD) and lateral (Lat) radiographs were carried out as a routine diagnostic investigation. Haematological analysis showed heterophils at high normal and monocytosis (2.69×10^{9}/L) which was indicative of chronic inflammatory condition. Radiographic findings revealed radio-opaque mass with egg like shaped, but not readily recognizable as an egg at the cranioventral of the coelomic cavity (Figure 1). A tentative diagnosis of impacted oviduct was concluded which may be as a sequel to retain eggs, salpingitis or metritis.

2.3 Surgical Procedures

An exploratory ventral midline celiotomy and salpingohysterotomy was performed on the next day to remove the mass. The patient was fasted for approximately 12 hours prior to the procedure to avoid regurgitation. Face mask induction of 5% isoflurane (Isoflurane USP 100%, Piramal Healthcare Limited, India) vaporized in 100% oxygen at 1 L/ min with a non-rebreathing circuit. Surgical plane was maintained at 2.0-2.5% isoflurane and at the same oxygen flow rate using a non-cuffed 3.0mm endotracheal tube. The patient was administered with subcutaneous isotonic crystalloid solution; Lactated Ringer at a rate of 10 ml/kg/day (Compound Sodium Lactate, B. Braun Medical industries, Malaysia). The bird was placed in ventral recumbency on a heating pad and was prepared aseptically using chlorhexidine gluconate and painted with tincture iodine. A ventral midline incision was performed approximately 5cm in length directly on top of the mass (Figure 2). The incision was both on the coelomic cavity and the oviduct exposing a yellow-grayish mass within the oviduct. The mass was removed in small pieces using a Volkmann curette. Once the mass was removed, the oviduct mucosal was cleaned using gauze soaked with sterile 0.9% sodium chloride (0.9% sodium chloride, B. Braun Medical industries, Malaysia). All musculature layers were closed using 3-0, PDS® Plus Antibacterial absorbable sutures (Polydioxanone, Ethicon®, Belgium). The oviduct was closed using inverted continuous Lembert suture pattern, whereas the coelomic muscle and skin were closed using simple continuous suture pattern.

2.4 Post-Operative Care

Post-operative medications include antimicrobial, Enrofloxacin (10 mg/kg, i.m., s.i.d for 3 days and changed to oral medication for the next 7 days; Baytril 5%, Bayer, OLIC (Thailand) limited, Thailand) and non-steroidal anti-inflammatory, meloxicam (0.2mg/kg, i.m., s.i.d for 3 days; Melosafe, Safecon Lifesciences, India). Reassessment of the suture site on the following day appeared with intact sutures, clean and dry with minimal soft tissue swelling. The surgical site was cleaned daily with 0.9% sodium chloride and applied with antibacterial ointment, oxytetracycline HCL with polymyxin b sulphate (Terramycin® Ophthalmic Ointment, Pfizer, Inc.).

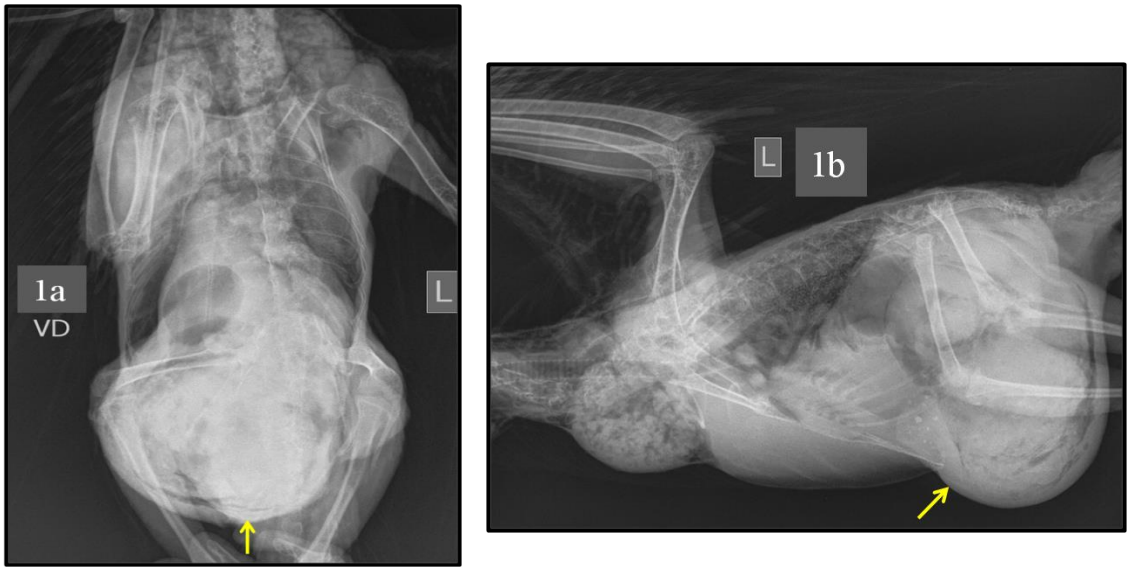
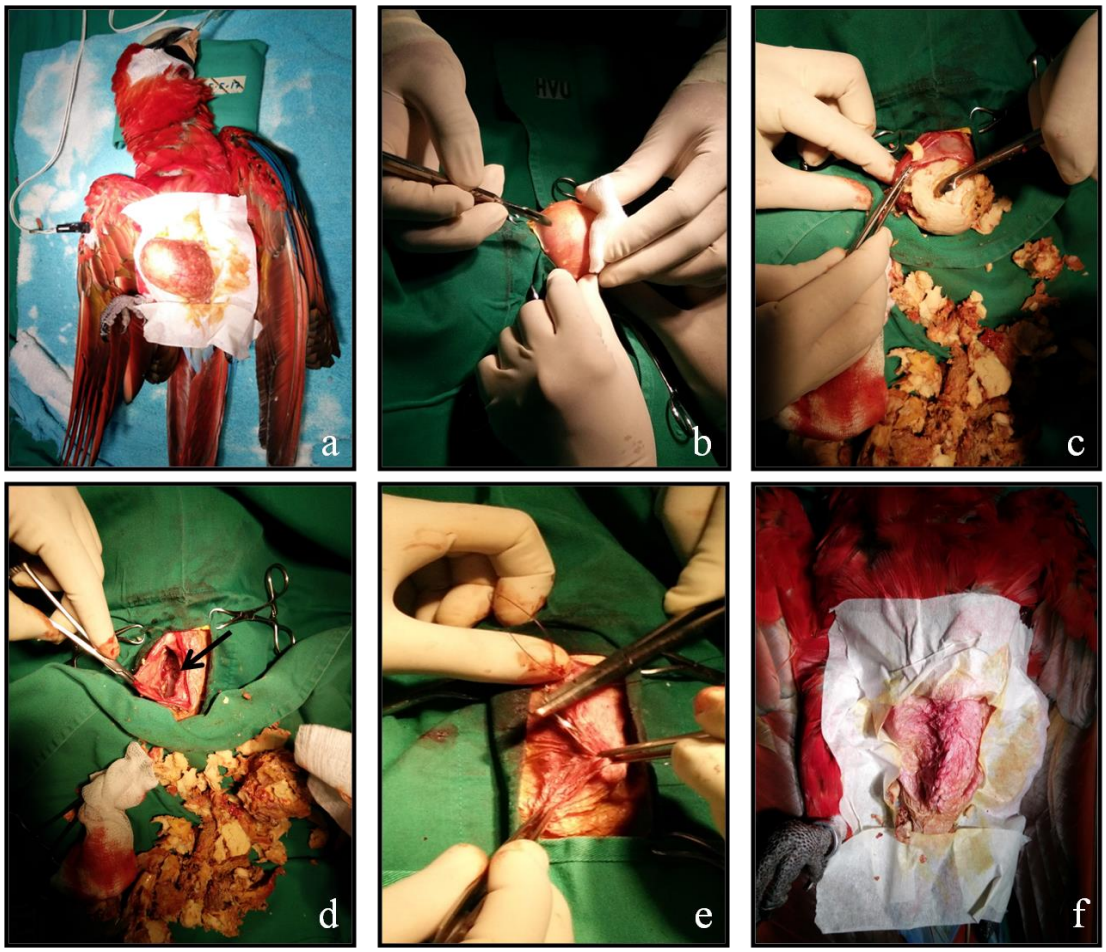


Figure 1. (a and b): an oval shape, mass indicating similar radiopacity with the gastrointestinal organs (yellow arrows) at the ventral region of the coelomic cavity.



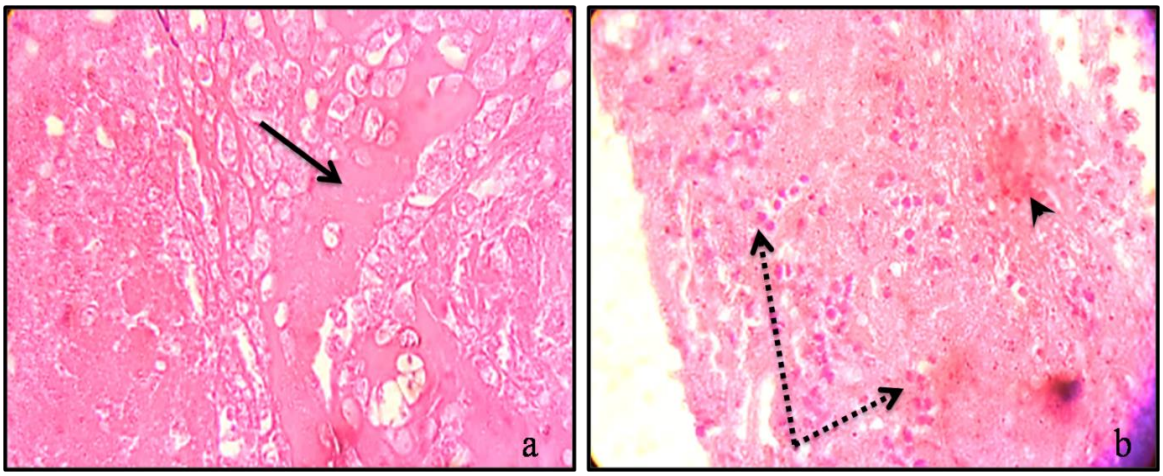


Figure 2. (a) Prominent distended abdomen with mass. (b) A midline celiotomy and salpingohysterotomy was made to expose the mass. (c) The caseous mass was removed with a Volkmann curette. (d-f) Uterus muscle layer (black arrow) was closed using inverted lambert continuous suture pattern separated from the abdominal muscles and skin. Both skin and abdominal muscles were closed with simple continuous pattern.

Figure 3. (a and b), Histopathological findings of fibrin deposition (solid arrow), inflammatory cells (square dots arrows), necrotizing cells (arrow head) in the compacted mass.

2.5 Histopathology

Histopathological examination of the mass demonstrates the presence of necrotic cells, inflammatory cells and fibrin deposition in a compacted mass without any specific architecture (Figure 3). Based on the clinical manifestation, surgical and histopathological findings, a definitive diagnosis of oviduct impaction was concluded. In one month follow-up of post-celiotomy and hysterotomy, the patient regained complete recovery and ambulatory function without any signs of surgical complications.

Figure 3. (a and b), Histopathological findings of fibrin deposition (solid arrow), inflammatory cells (square dots arrows), necrotizing cells (arrow head) in the compacted mass.

3. DISCUSSION

Oviduct impaction occurs secondary due to egg binding, inspissated egg material, salpingitis, metritis, excess mucin or albumin due to cystic

hyperplasia of the oviduct and dystocia (Bowles, 2002). However salpingitis has been reported as the most frequent cause for oviduct impaction followed by metritis and egg binding (Joyner, 1994). In the current case, a scarlet macaw was diagnosed with an impaction of caseous mass in the oviduct especially in the uterus or shell gland. The oviduct consist of five regions namely the infundibulum, magnum, isthmus, uterus and vagina (Doneley, 2016). Based on the history, clear yellow coloured fluid was aspirated via abdominocentesis. Egg yolk materials are common findings from a distended abdomen aspiration (Hadley, 2010). Coelomic fluid obtained may reveal a transudate or modified transudate (Jenkins, 2000). Any seepage of the yolk material in the uterus may lead to infection of the surrounding uterus and form an adhesion with the mucosal tissue (Bowles, 2002; Scagnelli and Tully, 2017). Thus a possibility of seepage might have occurred in this particular case that led to oviduct infection and progressed to an oviduct impaction. However, it is still unclear what condition had started first in this macaw, whether dystocia took place as the primary cause (Hadley, 2010) or salpingitis and metritis occurred due to an infectious or non-infectious etiology (Bowles, 2002) that led to an oviductal impaction. Calvo Carrasco and Sabater González (2017), describes large masses of yolk like material may be found in the oviduct, and have the appearance of concentric rings when transacted. Srinivasan et al., (2014) whereas, through his investigation of oviduct impaction in 5154 carcasses of commercial white leghorn layer chickens reported that compacted mass on cross section may show caseous granules of varying sizes and shapes, partially formed eggs, blood tinged fluid and caseous material to concentric layered rings of an impacted yolk and albuminous mass. It has been reported that the most common bacteria isolated based on biochemical physiognomies from bacterial culture were *E. coli*, *Pasteurella spp., Proteous spp., Klebsiella spp., and Streptococcus spp.* (Srinivasan et al., 2014; Calvo Carrasco and Sabater González, 2017). Biopsy for histopathological examination only reveals necrotic cells, inflammatory cells and fibrin deposition in a compacted mass without any specific architecture. In most oviductal impaction cases, clinical signs may be uncertain from asymptomatic to life threatening conditions. Clinical signs of coelomic distension, depression, inappetance, emaciation, reluctant to walk or fly, straining, brooding behaviour without egg laying, and oviductal prolapse in many severe cases secondary to abdominal straining might be exhibited alone or with combination of other clinical features (Bowles, 2002; Rosen, 2012; Srinivasan et al., 2014; Doneley, 2016). The potential effect of infection and pressure on the kidney and sciatic nerve must be a serious concern. Shock and death may eventually occur with continuous insult to the kidneys (Hadley, 2010). Only ventral coelomic distension without any life threatening signs was noticed in this patient. Birds with retained eggs or mass at the ventral coelomic cavity do not exhibit straining and dyspnoea whether they are symptomatic or asymptomatic with coelomic distension (Doneley, 2016). Blood picture may reflect leukocytosis with or without a relative heterophilia. Monocytosis may be indicated when the chronic type of impaction occurs. Radiography and ultrasonography are ideal modality to localize and characterize the mass (Rosen, 2012). Radiological findings may indicate soft tissue and mass opacity at the oviduct (Bowles, 2002; Rosen, 2012; Doneley, 2016). Coelomic fluid may occur sometimes concurrently in oviductal impaction due to coelomitis. Ultrasonography would be a helpful diagnostic tool as to obtain the coelomic fluid via ultrasound-guided fine-needle aspiration located within a specific space (Joyner, 1994; Bowles, 2002; Rosen, 2012). However, confirmatory diagnosis of oviductal impaction is through laparoscopy and laparotomy alone (Joyner, 1994; Jenkins, 2000; Bowles, 2002). Oviduct impactions are removed through a mid-line celiotomy, salpingohysterotomy or salpingohyterectomy. In many cases, salpingohysterectomy is indicated when oviductal impaction occurs concurrent with severe salpingitis, metritis and coelomitis (Jenkins, 2000; Bowles, 2002). Salpingohysterotomy was successfully carried out in the scarlet macaw without any post-operative complications or recurrence.

4. CONCLUSION

Reproductive disease may occur due to infectious or non-infectious etiology. Oviduct impaction imposed a life threatening condition and should be considered as an emergency case by the clinician, although clinical signs may vary depending on the severity, duration and location of the impaction in the pet bird. Clinicians should be familiar with the normal anatomy and physiology, including the ability to differentiate abnormalities of the avian reproductive system before any approach or potential treatment options to be applied. Early detection and intervention may provide a better prognosis. Prevention by providing optimum nutrition, diet, good husbandry practice and management is always a hallmark to avoid any avian reproductive diseases.

5. CONFLICT OF INTEREST

None of the authors have any potential conflicts of interest to declare.

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