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CLINICAL REPORT

Dystocia and Cesarean Section in a Lioness (*Panthera leo*)

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ABSTRACT

A four-year-old pregnant African lioness with dystocia was referred to the university teaching hospital. History-taking revealed the parturition had started four hours ago, but the cubs couldn't come out due to incomplete dilation of the cervix. This article describes the procedures before, during, and after the surgical operation, including the anesthesia protocol performed and performing a Cesarean section through the midline celiotomy to remove a dead and two live cubs from the uterus and successfully heal the dam without any complications. This surgery was performed about three years ago. After the operation to date, the lioness is in perfect health and she gave birth to 2 and 3 healthy cubs, respectively in two of her last parturition with no need for any help.

Introduction

The lion (*Panthera leo*) is a member of the family Felidae and one of four big cats in the genus Panthera. Wild lions exist in Sub-Saharan Africa and Asia with a critically endangered remnant population. The life span of a lion is approximately 10-14 years in the wild, while in captivity they can live up to 20 years or more.[1] Although felines are considered induced ovulators, the leopard, tiger, and African lion are accounted in spontaneous ovulating species. Although the lion does not appear to be a classic spontaneous ovulator but rather a reflex ovulator like the domestic cat but can occasionally occur spontaneously.[2-6]

Lions are polyestrous, with heat lasting 4 days, and become sexually mature at 3-4 years of age.[1] First parturition in female lions occurs at period approximately 4 years of age and the gestation ranges between 107 and 120 days; in addition, the number of cubs is typically between 1 and 4, and the weight of newborns is approximately 1.3 kg.[1,7] The knowledge about dystocia in wildlife veterinary medicine is scarce.[8] Fetal distress is the main indication to perform a Cesarean section in queens.[9] Other indications for surgical resolution of dystocia include small pelvic size, fetal oversize, obstructive dystocia, and primary or secondary uterine inertia.[10] Although Cesarean sections are performed routinely in wild felines housed in zoological centers, very few scientific publications have reported cases of dystocia or consecutive Cesarean sections in wild felids.[8,9] To our knowledge, this case report is the first time in Iran and it is one of the very few reports available in this field that describe the medical and surgical management of a dystocia in an African lioness (*Panthera leo*) and the post-operative complications associated with this condition.

Case Description

A 4-year-old pregnant African lioness with an estimated

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body weight of 140–150 kg was housed in the Isar Complex of Maintenance and Rescue of Wildlife Animals in Kordan, Alborz province, Iran. After approximately 115 days of gestation of her first parity, she began parturition but after four hours, she could not complete the labor and the owner referred her to the university teaching hospital. Upon admission, the patient was in right lateral recumbency, because she was sedated and immobilized via injection of medetomidine HCl. (20 µg/kg/IM, Modern Veterinary Therapeutics Co., Germany) and Ketamine (3 mg/kg/IM, Alfasan Co., Netherlands) by using a blowpipe. The sedation was continued with a mixture of detomidin (20 µg/kg, IM, Detemo vet®, Ceva, Spain) and butorphanol (0.2 mg/kg, IM, Butodol-2, Neon laboratories, Mumbai, India). Thereafter, the cephalic vein was catheterized to the administration of fluid therapy with tepid lactated Ringer's solution (7 ml/kg/h) plus 50% dextrose bolus (250 mg/kg/IV) before and throughout the surgery. Physical examination revealed good body condition, dehydration (≤ 5%), wet and pink mucous membranes, normal capillary refill time (≤ 2 seconds), hyperthermia (39.2 °C), and bradypnea (13 breath/minutes). A vaginal exam confirmed the presence of a dead cub inside the undilated cervix. Obstetric manipulation was ineffective. Ultrasound exam (3.5–5.0 MHz, linear-array transducer, Ultra-Portable ExaGo®, France) showed three cubs in the uterus and determined that the first cub with no signs of fetal heart activity had entered into the cervix, but due to the incomplete dilatation of the cervix, it was stuck in the cervical canal and died, which ultimately led to the inability of the other cubs to come out. Therefore, it was decided to perform a Cesarean section.

Treatment and Outcome

The lioness was prepared for aseptic surgery and anesthesia induced by injection of ketamine (5 mg/kg, Alfasan, Netherlands) intravenously and maintained via the inhalation anesthesia with isoflurane (Terrell, Piramal Critical Care Inc., USA) (1-1.5%) in oxygen (4.5 l/min) (Figure 1). Heart rate, respiratory rate, central temperature, mean arterial pressure, arterial oxygen saturation, and end-tidal carbon dioxide concentration were monitored (Model: PEC15T08, Priemer Electromedical Care Co. Ltd, Iran) continuously during the surgery. The vital signs (heart rate, respiratory rate, color of mucous membranes, and capillary refill time) were recorded at five-minute intervals during the anesthesia. The lioness was placed on dorsal recumbency, and after following the pre-operative consideration like as hair clipping, shaving, scrubbing the abdominal area, and rapping an incision of approximately 30 cm length was made on the midline of the abdomen (Figure 2). During the surgery three cubs were expelled from the uterus, the first one was deceased (Figure 3) and the others were alive (Figure 4). The uterine incision was closed with a Cushing pattern using a polydioxanone (1 USP, Teb-Keyhan Co., Iran) and followed by a Lambert pattern using the same material. After removing the cubs, 3000 ml of tepid normal saline solution was used to clean the uterus and abdominal viscera and then was lavaged and suctioned before being closed the abdominal cavity. Closing the abdominal incision was performed in 3 layers: *linea alba* and subcutaneous tissues with a simple interrupted pattern using polyglactin 910 (1 USP, Teb-Keyhan Co., Iran) separately and skin with cross mattress using Nylon (1 USP, Supa Co., Iran). Twenty IU oxytocin (Royan Darou Co., Iran) was intramuscularly administered. The total anesthesia time was 90 minutes, and the surgery lasted 45 minutes. During anesthesia, the eyes were lubricated with saline solution to minimize the risk of corneal dryness. Immediately after delivery, the newborns received neonatal care consisting of clamping the umbilical cord, suctioning fluids from the nose and mouth with a bulb syringe, and rubbing with warm towels. Cardiorespiratory alterations were not detected during the procedure, and anesthetic recovery was smooth and without complications. Postoperative therapy for the dam included anti-inflammatory (carprofen: 2.2 mg/kg PO q12h for 5 days. Norbrook Laboratories Ltd., Newry, Northern Ireland), antibiotic (amoxicillin-clavulanic: 20 mg/kg PO q12h for 10 days. Aurobindo Pharma, USA, and cefalexin: 30 mg/kg PO q12h for 10 days. Flynn Pharma Ltd., Hertfordshire, UK) and vitamins (Vit E: 400 UI PO q24h for 5 days. Nature Plus, Inc., Stratford, USA).

Figure 1. Endotracheal intubation was performed.

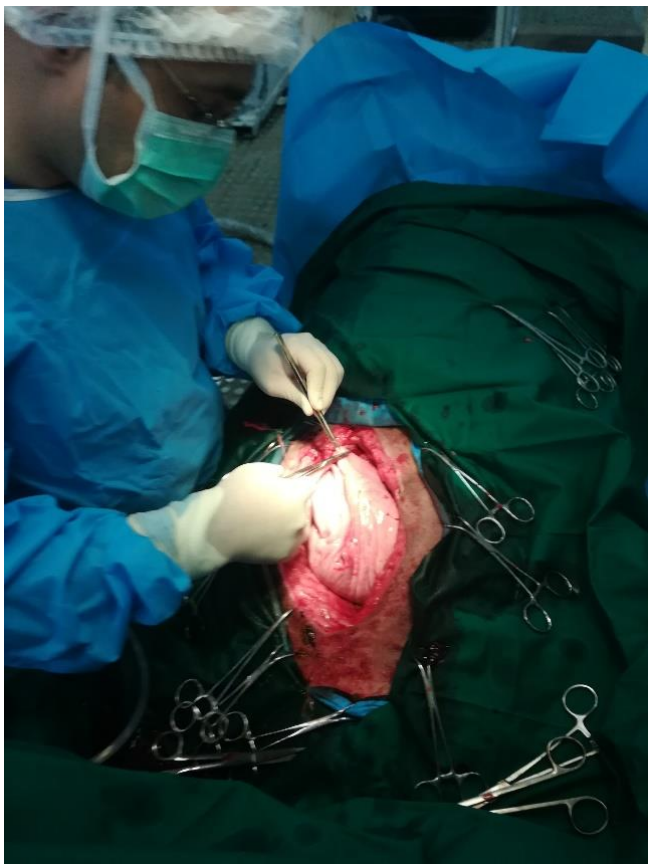

Figure 2. Try to exteriorize the gravid uterus from midline celiotomy.

Figure 3. The first cub that had died.

Figure 4. Two cubs that were resuscitated and survived.

Clinical Relevance

The C-Section can be considered to be a vital procedure and would be associated with complications such as hemorrhage, peritonitis, shock, uterine infection, and adhesion.[11] In this case, the Cesarean section was performed without challenging complications and two cubs were delivered alive. A Cesarean operation was conducted on a lioness at a zoo in Shenyang, northwest China's Liaoning Province, on October 14, 2005. Three dead cubs were exteriorized, after four hours of operation.[12] It was reported that the maternal mortality rates following Cesarean in dogs and cats vary from 0% to 4%.[11] Prompt referral, appropriate intervention either medical or surgical, accurate procedure, quick cub delivery, and vigorous lavage would be considered as success factors. Postoperative strict antibiotic therapy would be helpful to decrease the influence of bacterial infection in health recovery. The role of infection in the development of the observed clinical symptoms and the presence of bacteria in the vagina and uterus of healthy females were reported by many authors.[12] Flunixin (1 mg/kg, daily) and phenylbutazone (10 mg/kg, daily, PO) have been used in lions for up to 7 days with no adverse effects.[1,14] As we know, the carprofen has some side effects, such as vomiting, anorexia, and diarrhea.[15] However in this case carprofen was well tolerated and none of these occurred after oral administration. In December 2010, veterinary experts at the Serengeti Park near Hanover did not know one of the lionesses was pregnant until she gave birth to her first cub, which died two days later. Since they suspected that there were other cubs, the lioness was transferred to the veterinary university of Hannover. Examinations revealed that two other cubs were removed by C-section. The cubs did not have good general condition, but after two weeks of intensive care, they completely recovered their health.[16] Although the reported death and survival rates for Cesarean sections vary widely, 3.11% as the overall mortality has also been described.[17] On the other hand, the infertility consequence of C-section should be investigated more by researchers, however, some studies declared no big impact of Cesarean on further fertility.[17] Intensive care, case monitoring, and intrauterine lavage play key roles in survival and fertility rate.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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