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Clinical Management of Intestinal Impaction and Colic in an Asian Elephant

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Abstract. Intestinal impaction and resultant colic is a common non-infectious disease condition reported in captive Asian elephants. If not detected and treated in time, it can prove fatal for the animal. A 16-year-old female Asian elephant presented with severe colic, a distended abdomen, absent food and water intake and inability to pass dung. The case was diagnosed as intestinal impaction on clinical signs and history. It was successfully treated with the administration of NSAIDs, stool softeners, systemic fluids, antibiotics, and encouraging physical activity.

Introduction

Intestinal impaction is not an uncommon condition affecting the Asian elephant (*Elephas maximus*) in captivity (Chandrasekharan *et al*. 2009; Sarma 2011). It is a non-infectious disease condition resulting from partial or complete obstruction of the intestinal tract by undigested food material, foreign bodies or a hard faecal bolus (Dumonceaux 2006). We have examined 15 such cases in captive Asian elephants and in all of them, a hard faecal mass was the cause of impaction. It can be very painful and uncomfortable for the elephant and, if not diagnosed and treated in time, can prove fatal. Compared to other species, surgical management of intestinal impaction in elephants is difficult and challenging, because of the large visceral cavity, large intestinal volume, and higher chances of incision dehiscence. Therefore therapeutic management is the preferred mode of treatment. Here we describe one such case of intestinal impaction in an Asian elephant and its clinical management.

Case details

A sixteen-year-old female Asian elephant presented with a history of rapid bloating of the abdomen and lack of defaecation for over 7 h. The animal was reported to have fed normally on fodder of sorghum crop till evening. At around 8:30 pm, the keeper had noticed the elephant showing signs of discomfort, groaning, and with a bloated abdomen, and had immediately reported it. Clinical examination was carried out within 2 h of reporting of the case.

On observation, the elephant exhibited symptoms of tenesmus like frequent squatting and straining to expel the faeces, along with restlessness, trunk biting, frequently sitting down and standing, inappetance, an abnormal posture with hind legs spread apart, and groaning. A pear-shaped bloated abdomen was noticed on physical examination (Fig. 1). The elephant continued to exhibit symptoms such as frequent sitting and standing, changing positions, groaning, tenesmus, intermittent open mouth gaping, and restlessness, suggestive of severe colic. Analysis of CCTV footage showed that the elephant had not defecated after 1:00 pm. The rectal temperature was recorded to be normal (37.1ºC). Per-rectal examination was carried out to check for any object or faecal bolus causing obstruction in the rectum. However, the rectum was found to be empty. The condition was tentatively diagnosed as colic resulting from intestinal obstruction, and immediate treatment was initiated.

An attempt was made to administer 100 ml of antacid and anti-bloat syrup (DIGENE®, Abbott India Limited, Goa, India) orally to the elephant. But it was unsuccessful as the elephant was

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Figure 1. The pear-shaped bloated abdomen of the elephant.

reluctant to take anything orally and refused to swallow the syrup.

The body weight of the elephant was known to be 3300 kg from recent records. The non-steroidal anti-inflammatory drug meloxicam (MELONEX POWER™, Intas pharmaceuticals Ltd., Ahmedabad, India) was administered intramuscularly at a dosage of 0.1 mg/kg body weight to give relief from pain. Ceftriaxone sodium with Tazobactum (Inj. INTACEF TAZO®, Intas pharmaceuticals Ltd., Ahmedabad, India) at a dosage of 4 mg/kg was administered intravenously to avoid secondary infections from an obstructive mass and from the affected intestinal wall (Greene *et al*. 2018). An enema was given with 1800 ml liquid paraffin, by inserting a 1.3-cm-diameter flexible tube approximately 4 feet inside the rectum and injecting paraffin with a 400 ml plastic syringe connected to the tube (Fig. 2). The tube was lubricated with liquid paraffin before insertion to avoid injury to the rectal mucosa.

After the enema, the elephant was encouraged to walk and sit down and stand up a few times. Within two hours of the enema, the bloating started reducing and the elephant released some gas rectally. The frequency and intensity of colic symptoms also reduced. But signs of tenesmus persisted. Within the next two hours, the animal developed bloating again, with the recurrence of severe colic symptoms.

Enema was given again with 35 l lukewarm water mixed with 2 l of liquid paraffin. The enema mixture was kept in a plastic bucket, and a 40-watt submersible electric pump was immersed in it. The 1.3-cm-diameter flexible tube was connected to the pump. The other end of the tube was inserted about 4 feet inside the rectum. The enema mixture was administered by running the pump (Fig. 3). Approximately one third of the mixture flushed back out. However, the remaining mix was retained inside.

The animal was given a long walk of about 4 km early morning. She did not defecate during the walk but passed gas rectally, thus relieving the bloating. Fluid therapy was initiated with intravenous administration of 5.5 l of Ringer Lactate (RL, Inven Pharmaceuticals Pvt. Ltd., Dhar, India), 3.5 l of 5% Dextrose Normal Saline (DNS, Inven Pharmaceuticals Pvt. Ltd., Dhar, India), 1 l of multi-electrolytes (K-LYTE, Kunal remedies Pvt. Ltd., Lucknow, India) and 600 ml of amino acids (ASTYMIN-3, Tablets (India) Ltd., Chennai, India).

Around 10:50 am, the animal urinated. The urine volume was less than normal. The rectal temperature at this point was recorded as 36.4ºC. Blood samples were collected for lab analysis. The serum biochemistry and hematologic values were found to be normal. The PCV was 31.5%, indicating that the levels of hydration were optimal with the systemic and rectal administration of fluids (Sarma 2011). A digestive

Figure 2. The assembly of flexible tube and 400 ml syringe used for giving liquid paraffin enema.

Figure 3. The assembly of bucket, motorised pump and flexible tube used for giving lukewarm water and paraffin mixture enema to the elephant.

mixture containing 100 g ground ginger, 100 g asafoetida, 100 g ground garlic, 100 g black salt, and 500 g jaggery, was offered to the elephant, which she ate.

Around 3:30 pm (after 17.5 h of therapy), the animal started voluntarily eating a small quantity (2 kg) of fruits. She was then given 800 ml of liquid paraffin, 200 ml of a laxative syrup (CREMAFFIN, Abbott India Limited, Goa, India), and 3 ml digestive tonic (DIGIVET®, Hivet, Haryana, India) orally.

Around 6:10 pm, the elephant started eating sorghum crop fodder and at 9:50 pm she defaecated after 32 h. A single bolus was expelled, which was large, elongated, dry and hard (Fig. 4). The elephant immediately started to drink water and consume fodder normally. Intravenous administration of INTACEF TAZO was repeated along with 12 l of K-LYTE infusion. Liquid paraffin 400 ml and 3 ml of DIGIVET® tonic were given again orally. It was advised to keep the elephant separate from other elephants and allow her to take only 40 kg of sorghum crop fodder with water to drink ad-libitum. Rectal temperature was recorded as 35.8ºC.

During this second night till the next day morning at 9:30 am, the elephant defecated 5 times and drank about 60 l of water. The bloat subsided completely (Fig. 5). She was given long walks both in the morning and evening. She defecated two more times before 5:30 pm during the day. Softened surfaces and borders of the dung balls indicated efficient stool softening action of the liquid paraffin, which helped the obstructing dung mass to pass smoothly through the rectum.

The course of antibiotic and oral liquid paraffin (400 ml) once a day, and 3 ml Digivet thrice a day, was continued for the next 3 days. Oral probiotic (ECOTAS™, Intas pharmaceuticals ltd. Ahmedabad, India) at a dosage of 6 boli once a day, was given for 5 days.

Discussion

Elephants are hindgut fermenters and pass large amounts of low-quality forage through the gastrointestinal tract in a short period of time (Clauss *et al*. 2003). Fermentation and digestion mostly happens in the caecum and colon. The gastrointestinal transit time in captive Asian elephants is 21–55 h (Dierenfeld 2006). Asian Elephants usually drink 200–255 l of water a day, consuming 50–60 l at a time (Cheeran 2009).

Intestinal impaction, either complete or partial, is known to be caused by undigested food, ingestion of dirt, foreign bodies, clay, or sand that becomes impacted in the gastointestinal tract. Old elephants are prone to impaction from partially digested food due to problems in mastication resulting from worn out teeth (Greene *et al*. 2018). Consumption of large amounts of feed with high fiber content in a short period of time also causes obstruction, leading to colic. The reluctance to drink water due to the colic results

Figure 4. The first faecal bolus expelled by the elephant after 32 h without defaecation.

Figure 5. The bloat subsided after the treatment and expulsion of impacting faecal mass

in dehydration thus aggravating the intestinal stasis (Dumonceaux 2006). Cases have also been reported resulting from the consumption of large amounts of raw rice paddy (Sarma 2011). Once dehydration arises, it is followed by electrolyte imbalance, endotoxic shock, and circulatory collapse. The condition may lead to recumbency and death in the case of peracute colic.

The first vital sign noticed in intestinal impaction is a lack of defecation for a period longer than normal, which is accompanied in many cases by bloating of the abdomen. A healthy elephant defecates about 15–20 times a day (Cheeran 2009). If an elephant has not defecated for long, it maybe suffering from a serious digestive disorder, such as intestinal impaction, intussusception or volvulus. Following the lack of defecation, animal will stop feeding and show signs of colic. Based on the severity of the symptoms and duration, the colic could be per-acute (severe), acute (moderate) or chronic (mild). The typical symptoms of colic in elephants are; kicking the belly, frequently sitting down and getting up, lying down and flipping over from side to side. In severe colic, these symptoms are accompanied by frequent opening of mouth (yawning appearance) and holding and biting the trunk in the mouth. Elephants, showing such symptoms with the absence of appetite and defecation for a considerable time, could have partial or complete intestinal obstruction, volvulus or intussusception. The history is vital in differentiating between these. For example, if the animal was noted eating soil, or there was a sudden change in diet, overeating, drinking less water, etc., obstruction is likely. Elephants suffering from arthritis or lameness with reduced movement and lack of exercise may also be prone to reduced gut motility and thus impaction. On the other hand, a history of incidents such as falls, symptoms of aerophagia or sudden changes in diet may indicate volvulus or intussusception (Wiedner *et al*. 2012). In most cases, we have observed that impaction and colic occurred mainly due to factors like reduced gut movement, dehydration, or inadequate exercise, rather than from ingested items.

The first step in suspected intestinal impaction is a per-rectal examination to check for an obstructive mass in the rectum. In many cases, a large dry dung mass stuck in the anterior portion of the rectum maybe found. This mass can be slowly and gently pulled out by lubricating it with liquid paraffin. The examination also helps assess rectal motility. The administration of analgesics such as NSAIDS during initial stages of treatment helps reduce colic, and thus to calm down the elephant, which makes further treatment easier.

If the obstructive mass is not within reach during the per-rectal examination, further treatment should be carried out. In most such cases, elephants are not receptive to oral medications. Thus an enema with a stool softener should be given after administration of an NSAID. Liquid paraffin is excellent for this purpose. Intravenous fluid therapy must be initiated as soon as possible to avoid severe dehydration and for electrolyte replacement as well as for intravenous administration of medications. In elephants, the large volumes of fluid required for maintenance is a challenge. As per the recommended dose of 40–60 ml/kg/day, an adult elephant would need to be administered 120–160 l of fluids in 24 h, which is challenging under field conditions. Therefore, intravenous fluid administration can be supported by rectal administration of

fluids (Mikota 2006). Rectal administration of a lukewarm solution of oral rehydration salts such as ORS (Cipla, Mumbai, India) in water, is efficient for maintaining fluid and electrolyte balance. In cases of suspected infection, a course of systemic antibiotics needs to be given for 3 or more days depending on the time taken by the animal for recovery.

Clinical recovery is generally rapid after the elephant expels the obstructing mass, which in most cases is a large ball of dry, undigested food material. Depending on the size and quantity of the obstructing mass, and the part of the intestines it was stuck in, it may take several hours after initiation of treatment for the elephant to expel the mass. The longest time we have observed for the expulsion of an obstructing mass was 46 h. Even after complete clinical recovery, continuation of oral rehydration solution is recommended for a few days to avoid the recurrence of impaction from dehydration, especially in hot climatic conditions. During recovery, it is advisable not to put the elephant back on standard quantities of diet immediately but to give lesser quantities for the first 24 h. Routine exercise must be encouraged to promote normal gut motility. Giving exercise walks, or if that is not possible, distributing feed in different locations of the enclosure to encourage walking is a good practice (Ullrey *et al*. 1997).

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