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Unusual Large Intra-rumen Complex Phytobezoar in a 5 Year Old Tibetan Goat

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Abstract

Large number of species can suffer because of gastro-intestinal foreign bodies (bezoars); the word bezoar is derived from Arabic "badzehr" or the Persian word "padzahr", meaning an antidote for poisons, and those found in the goat were considered to have healing properties. Depending on the content, there can be phytobezoars, trichobezoars, trichophytobezoars, lactobezoars, lithobezoars or pharmacobezoars. In the last decades, due to urban development and pollution, it became difficult to ignore the adverse effects of nylon debris on the hayfield or pastures. Although small ruminants have a different prehension than bovines, they can introduce indigestible materials like plastic that may represent a core for the future bezoars. In this paper, a 5-year-old, 17 Kg body weight Tibetan doe was referred in January 2017 to the Teaching Veterinary Hospital (OVUD) at the Department of Veterinary Medicine University of Perugia, Italy, with a sudden occurrence of lateral recumbence, anorexia and opisthotonus. On presentation, the goat had poor body condition score, opisthotonus, congested mucous membranes, tachycardia, dyspnea, tympanic and atonic rumen. Body temperature was 34.7 °C and on transabdominal palpation, a large and consistent intra-abdominal mass was appreciated. At the ultrasound scan, the mass was characterized by a hyperechoic and irregular surface, extending from pelvic inlet to the cranial abdomen. A diagnosis of phytobezoar/trichobezoar was advanced. A left paralumbar fossa laparotomy was carried out in order to remove the foreign body; briefly, a local anesthesia was performed with 10 ml of lidocaine chlorhydrate 2% in a reverse L block technique. Upon partial rumen exteriorization and rumenotomy, the phytobezoar (35 X 30 X 25 cm and 2.3 Kg), composed of a compact mixture of ropes, jute packaging, electric wires, and plastic material, was removed; at external examination, it assumed the shape of the rumen. Postoperative therapy included administration of antibiotics and anti-inflammatory drug. An improvement of the clinical signs was observed in the following two days; then, nervous signs worsen and nystagmus appeared inducing us to perform euthanasia with 6 ml of Tanax® intravenously. At necropsy, the rumen contained a green and dense fluid and its mucosa papillae were alternatively thin and short, whereas the abomasum a compact and mixed foreign body. In conclusion, plastic litter and other indigestible materials could be lethal in small ruminants that are grazing in urban context. Late diagnosis and appearance of nervous symptoms did not allow the recovery of the clinical features even if a prompt rumenotomy was performed.

Keywords

Intra-rumen; Unusual; Phytobezoar; Tibetan goat

Introduction

Large numbers of species, including humans, pets, ruminants and wild animals have been noted as suffering because of foreign bodies (bezoars) at different levels of the gastro-intestinal tract [1-11]. The word bezoar is derived from Arabic "badzehr" or the Persian word "padzahr", meaning an antidote for poisons, and those found in the goat were considered to have healing properties and were therefore much sought after for medicinal purposes [2, 6,12]. In 1662, the English king, James the Ist, had a bezoar stone covered in gold included in his crown [2]. Goats were first connected with the term bezoar in the 12 century BC after stone-like concretions were found in the stomach of a Syrian goat [6]. Depending on the content, there can be phytobezoars, trichobezoars, trichophytobezoars, lactobezoars, lithobezoars or pharmacobezoars [4,13-14,8,11,12]. Mainly in young ruminants, because of fibers or trace element deficiency (copper, zinc cobalt, calcium, phosphorus, sodium, chloride, manganese, as well as vitamin or a protein deficiency) trichophagia could be noticed; this behavior is characterized by persistent suckling of congeners or excessive licking as a result of lice or mange infestation [1,9].

In the last decades, because of urban development and pollution, it became difficult to ignore the adverse effects of nylon debris on the environment, especially on the hayfield

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or pastures. Although small ruminants (sheep and goats) have a different prehension than bovines, they can ingest indigestible materials like plastic that may represent a core for the future bezoars, alongside of undigested nutrients [7,11]. Poorly digestion of plants / or hair results in fibers accumulation in the rumen, but especially in the abomasum. Here, under the influence of ruminal and abomasal movements, numerous conglomerates (possibly around plastic debris or milk clot as nucleus) can agglutinate firmly in one single forestomach. If the trichobezoars are small, they can go through intestines causing ulcer and melena [12].

In goats, clinical signs of phytobezoars are much more pronounced than sheep. It can be seen progressive loss of rumen contractions, distended rumen or abomasum (gas, hair, balls, feces), abdominal pain, lower milk production, anorexia, weight loss, decreased fecal production, lethargy [1,11]. Obstruction of the reticulo-omasal orifice by phytobezoars causes rumenitis, regurgitation, aspiration, pneumonia, and even death [10].

After a clinical (clinical signs and abdominal palpation) and paraclinical (abdominal computed tomography, radiography and ultrasonography) diagnosis, a surgical treatment must be applied depending both on the localization and the size of the bezoars [10, 12].

The aim of this case report was to present a chronic wasting syndrome secondary to a ruminal foreign body in a 5-year old Tibetan goat.

Anamnesis

A 5-year-old, 17 Kg bodyweight, intact female Tibetan goat was referred in January 2017 to the Teaching Veterinary Hospital (OVUD) at the Department of Veterinary Medicine University of Perugia, Italy, with a sudden occurrence of lateral recumbence, anorexia and opisthotonus. The patient lived with another doe and was fed exclusively with grains and on a small area of pasture, with any supplementation of hay, silage or minerals. They were routinely dewormed. On presentation at the OVUD, the goat had poor body condition score, slightly increased extensor muscles tonus and opisthotonus, congested mucous membranes, normal lymph nodes volume, tachycardia (100 beats/min), dyspnea with 50-60 breaths/min, tympanic and atonic rumen. Furthermore, she showed occasional pedalage behavior and induced vocalization by hindlimb's manipulation. Body temperature was 34.7 °C and on trans abdominal palpation, a large (about 30 cm of diameter) and consistent intra-abdominal mass, extending from pelvis to the cranial abdomen, was appreciated. Clipping and surgical scrub of the left paralumbar fossa were carried out; then a centesis of the rumen was performed through a 14G needle in order to evacuate the fermentative gas, and breathing distress moderately improved.

Diagnostic procedures

An intravenous access was applied through an 18G catheter into the right cephalic vein and a warm saline solution was administered in order to increase body temperature, alongside with an infrared lamp placed upon the animal. Ultrasound scan was performed and the intra abdominal mass was characterized by a hyperechoic and irregular surface, with posterior shadows, extending from pelvic inlet to the cranial abdomen, on both sides. A diagnosis of phytobezoar/ trichobezoar was advanced. Therefore, unwilling of the poor prognosis, we performed a left flank celiotomy.

Surgery

Due to marked depression in sensory, anesthesia was induced and maintained with Propofol® (4ml/bolus, IV), without any previous sedation. Surgical preparation of the left paralumbar fossa was achieved and local anesthesia was performed through subcutaneous injection of a total of 10ml lidocaine chlorhydrate 2% in a reverse L block technique. After incision of the abdominal wall, a foreign body into the rumen cavity was identified and upon partial rumen exteriorization (Figure 1) and rumenotomy, the phytobezoar (diameter of 35 X 30 X 25 cm and weighting 2.3 Kg), composed of a compact mixture of ropes, jute packaging, electric wires, and plastic material, was removed. The bezoar was extremely hard to the touch and did not produce fragments during removal; moreover, at external examination, it assumed the shape of the rumen and marks of the rumen grooves were evident, as showed in Figures 2 and 3.

Rumen wall was closed with a 2-0 metric absorbable suture (PGA®), in a two introverting layers suture pattern and the incision site was carefully washed with sterile saline solution. Finally, abdominal wall was closed with a 2-0 absorbable suture (PGA®), through simple continuous pattern.

Temperature at the end of the surgery was 35.7 °C and the doe was treated with antibiotics (1g Ceftriaxone®, diluted into 10 ml of saline solution, spread in peritoneal cavity) and anti-inflammatory drug (Desashock® 2mg/Kg, IV). Warmed saline solution supplemented with vitamin B complex (Superton® 50 mL, IV) was perfused during the surgery. Systemic antibiotic therapy was started with Clamoxyl® RTU (7mg/Kg, IM) and was continued the following days.

Post-operative therapy

The day after, the temperature slightly increased reaching 36.0°C but the doe appeared extremely weak but lying in sternal recumbence (Figure 4); she voluntarily assumed water and opisthotonus slightly improved. Vocalizations were easily induced by manipulation of hind limbs, whereas pedalage behavior disappeared. Rumen and gut kinesis did not rescue, while normal feces were eliminated. Venous blood sample was obtained from right cephalic vein in empty and EDTA-enriched Vacutainer tubes. Fluid therapy with warm Ringer Lactate and saline solution continued as well as antibiotics and vitamin complex. By the night, body temperature increased to 37.3°C.

Figure 1: Intraoperatory aspect of the exteriorized rumen through the left lateral flank laparotomy. The foreign body appears as an unique compact mass occupying entirely the ruminal cavity

Figure 2: Aspect of the complex phytobezoar after extraction from the rumen. The mass assumed the overall shape of the rumen and was extremely compacted and composed of indigested fibers associated to jute ropes and copper wires. The foreign body measured approximately 35x30x25 cm and weighted 2.3 Kg

Figure 3: More detailed view of the bezoar. Hair, plastic, indigested fibres and jute ropes could be seen on the surface

Figure 4: Temporary improvement post-surgery evidenced by the assumption of sternal recumbence

In Tables 1 and 2 are reported the hematology and biochemistry profiles that evidenced a marked hypocalcaemia and a slightly altered renal functionality. High creatinine kinase concentrations were due to muscle damage occurred during surgery. Therefore a slow calcium gluconate infusion was started and cardiac activity was monitored by activating an ECG.

The day-2 after surgery, hypocalcaemia was still present, opisthotonus worsen and body temperature dropped again to 35.7°C. A second infusion of calcium was then administered, together with vitamin complex, anti-inflammatory and antibiotics.

On third day, there were any improvement of the nervous signs and nystagmus appeared. Therefore, the doe was subjected to euthanasia with 6 ml of Tanax® intravenously.

Anatomopathological Examination

Necropsy evidenced irregular hemorrhagic foci on the lateral and caudal faces of the dorsal ruminal sac; the omentum was deeply infiltrated by fat tissue and presented several small and diffuse hemorrhagic spots on its ventral side. Rumen contained a green and dense rumen fluid and its mucosa papillae were alternatively thin and short. Within the abomasal cavity, a compact and mixed foreign body was found that was composed of both undigested roughage and copper wires. Abomasal mucosa appeared congested and thickened. Small intestine was distended by both gas and brown, catarrhal secretion, and its walls were congested, mainly in the duodenal tract. Cecum and ascending colon contained liquid feces, while the external surface of descending colon showed rare foci of ecchymosis and petechiae. Liver and spleen were slightly enlarged, even if they appeared normal in color and consistency. Gall bladder wall appeared thickened and congested, but normal in content. Descending colon, transverse colon and rectum were normal. Kidneys were intensively congested. Cerebral convolutions were thickened and showed small and irregular hemorrhagic foci, on the sub-arachnoid capsule, mainly in the frontal lobes and in the base of the encephalon. Hemorrhages were identified also in the meningeal space, ventrally to the brain and to the medulla oblongata.

Discussion

The bezoars that resulted from plastic particle pollution and indigestible fibers crops molded two different compact masses, one in rumen and the other one in abomasum. In human pathology, the stomach is the most common site of bezoars, followed by small intestines [15]. Regarding the ruminants, the rumen (87.2%) is a common place for bezoars followed by reticulum (12.8%) and abomasum [16]. The main type of bezoars is represented by plastic debris with a range of 52.33 – 59.00% [16,7], followed by textile, cotton, rope, plastic-cotton, textile-cotton, plastic gloves, plastic-textile, plastic-textile-cotton, hair balls and phytobezoars. These conglomerates's occurrence starts from nylon debris prehension and ingestion of high amounts of indigestible fibers, such as cellulose, hemi cellulose and lignin. The predisposing factors are represented by the absence of pyloric function, less gastric motility, several intra-abdominal coalescences, inadequate chewing and indigestible fibers consumption [15]. Plastic bags were more frequently observed in

Test	Result	Unit	Reference range
WBC	5.57	x 10^3/µL	4 – 13
RBC	13.96	x 10^6/µL	8 – 18
HGB	11.7	g/dL	8 – 12
HCT	35.4	%	22 – 38
MCV	25.4	fL	16 – 25
MCH	8.4	pg	5.2 – 8
MCHC	33.1	g/dL	30 – 36
PLT	167	x 10^3 /µL	300 – 600
Neutrophils	4.5	x 10^3 /µL	1.2 – 7.2
Lymphocytes	0.92	x 10^3 /µL	2 – 9
Monocytes	0.01	x 10^3 /µL	0 – 0.55
Eosinophils	0.02	x 10^3 /µL	0.05 – 0.65
Basophils	0.12	x 10^3 /µL	0 – 0.12

Table 1: Hematology profiles of the goat at the day of surgery. Reference limits were extrapolated by Smith et al. (2015)

Test	Result	Units	Reference range
Albumin	2.91	g/dL	2.7 – 3.9
Total Proteins	5.0	g/dL	6.4– 7.0
Total Bilirubin	1.12	mg/dL	0 – 0.1
Direct Bilirubin	0.92	mg/dL	0 – 0.1
Indirect Bilirubin	0.2	mg/dL	0 – 0.1
Glucose	49	mg/dL	50– 75
Urea	89	mg/dL	10 – 20
Creatinine	2.09	mg/dL	1.0 – 1.8
LDH	5102	UI/L	123 – 392
AST	878	UI/L	167– 513
Calcium	5.8	mg/dL	8.9 – 11.7
γGT	36	UI/L	20– 56
ALT	60	UI/L	27 – 210
Alkaline Phosphatase	301	UI/L	93– 387
Creatine Kinase	8365	UI/L	104 – 219
Phosphorous	9.9	mg/dL	6.5

Table 2: Blood biochemistry profile of the goat on the day of surgery. Reference limits were extrapolated by Smith et al. (2015)

sheep older than 4 years and in goats between 2 and 3 years of age [16,7]. Regarding the prevalence of foreign bodies in relation to body condition score, plastic was the most frequently encountered in thin (score 2) small ruminants. Goats and sheep with a body condition score 3 had plastic, hairballs, leather and plastic bags. In fat animals (score 4) was found just plastic and hair balls while obese ones (score 5) did not submit foreign bodies. No sex predisposition was found.

In the present case report, the doe was subjected to euthanasia due to previous poor health status, as she showed marked sensory depression, hypothermia and opisthotonus. Although the surgery and removal of the foreign body was carried out successfully, she did not overcome the clinical signs and worsened after two days, showing permanent lateral recumbence, horizontal nystagmus, marked opisthotonus and severe hypothermia. Due to the great size of the bezoar, we supposed that its formation occurred over years with chronic symptoms that did not allow the owner to be warned; only the occurrence of sudden recumbence and opisthotonus induced the owner to refer the patient to the Clinics. Probably the neurological signs were due to long-term mal absorption secondary to alteration of the rumen microflora; even if the post-operative care included complex-B vitamins, nervous system injuries were probably irreversible.

Conclusion

From this study, it can be seen that plastic litter and other indigestible materials could be lethal in small ruminants that are grazing in urban context. Late diagnosis and appearance of nervous symptoms did not allow the recovery of the clinical features even if we performed a prompt rumenotomy in order to remove the unusual large bezoar.

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