Simple Rumenotomy for Removing Foreign Bodies in Himalayan Tahrs (*Hemitragus jemlahicus*)

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ABSTRACT

Seven male Himalayan tahrs were strongly assumed to have accidently fed on foreign bodies in 2007. At the time, zoo caretakers witnessed missing fence padding, such as carpet, plastic awning, and ropes. The incident occurred the morning after the items had been set up to protect indigenous, wild long-tailed gorals from self injury caused by head butting the steel fence. Adult male Himalayan tahrs were obviously suspected of mostly eating the paddings mainly composed of carpet, thin and long plastic awning, and ropes. Even though they had not shown digestive problems, surgery was determined necessary in order to remove any indigestible foreign bodies.

Left flank rumenotomy was conducted on seven male Himalayan tahrs from April to May, 2011. After anesthesia with xylazine, rumenotomy was performed on a concrete floor, with legs and head secured by ropes. No access to water and hay prior to operation for two days was needed to make the surgical procedure done quickly. Two sheets of small hand towels protecting against inflow of ruminal contents were beneficial during surgery. Antibiotics were administered intramuscularly for seven days. No abscesses at the surgical site were found after surgery. Like domestic ruminants, wild ruminants also ingest metalic or non-metalic, indigestible foreign bodies by accident. Therefore, simplified rumenotomy must be developed to apply to those wild animals to lengthen their longevity and to advance the quality of life in captivity. This case report is the first showing how to perform rumenotomy of Himalayan tahr, a wild ruminant, in Korea.

(Key words : foreign body, Himalayan tahr, rumenotomy)

INTRODUCTION

Like domesticated ruminants, wild animals in captivity accidently ingest foreign bodies, leading to serious problems like zinc toxicosis and colonic obstruction (Wirtschafter *et al.*, 1977; Beroza *et al.*, 1981; Droual *et al.*, 1991; Murray *et al.*, 1997; Agnew *et al.*, 1999; Carpenter *et al.*, 2004; Davis *et al.*, 2009). The Himalayan tahr (*Hemitragus jemlahicus*) is also a wild ruminant. Clinical signs, such as reluctance to move, and an unusually arched back, might not be easily detected by zoo keepers due to the tahr's natural characteristic of trying to not to show weakness to conspecific species. This species belongs to the "near threatened" group of wild animals based on the classification established by IUCN. Like cattle, it has two uterine horns with a septum, possesses 4 to 5 cervical folds enough to transcervically inseminate (Yong *et al.*, 2010a,b), and is a ruminant which conducts chewing and swallowing foreign bodies with strong curiosity.

In this study, from April to May, 2011, we performed rumenotomy of seven male Himalayan tahrs, aging 7 to 12 years old, to remove foreign bodies that were assumed to have been orally consumed in 2007. Removal of the objects became urgent, as the suspected ingestion was confirmed by finding ruminal foreign bodies of another male Himalayan tahr that had lived in a same enclosure and died of thoracic puncture resulting from conspecific fighting in 2010 (Fig. 1H).

CASE REPORT

Before conducting rumenotomy one by one on the seven male Himalayan tahrs, weighing 50~60 kg, hay and water had not been allowed for 48 hours. However, lettuce and carrot were permitted. On the day of operation, xylazine hydrochloride (0.75 mg/kg; Rompun®, Bayer Korea Ltd.) was intra-

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muscularly administered using a blow dart. Once the animal dropped its chin onto a floor, legs and head were secured by ropes. The left flank region was clipped, washed with water, and disinfected with Povidone iodine before covering with sterilized surgical drape (No. 80107; Yuhan Kimberly, Korea) and antibiotic (1 ml; Combimycin®, Green Cross Ltd., Korea) injection (Haven *et al.*, 1992). 30 ml of local anesthetic (2% lidocaine) was injected for paravertebral nerve block (Horney, 1966). Wide incision of skin, subcutaneous tissue, muscle layers and peritoneum was necessary in order to allow the operator's fist freely in and out of the peritoneal cavity.

After exteriorizing posterior part of rumen, two sheets of small-sized towel, usually used for washing teats and udder of cows at dairy farms, were deeply put into between rumen and incision (Fig. 2A). Through a slit made on the top of exteriorized rumen, gas was released. A long incision was made and two ends of incision were held by gauze and Allis' forceps (Fig. 2B). Rumen was cautiously explored by hand while wearing a long-sleeved plastic glove (Fig. 2C), and foreign bodies were removed (Fig. 1A~1G).

1,000 ml of normal saline combined with antibiotics (Procillin® CHEILBIO Ltd. Korea and Streptomycin® Green Cross Ltd. Korea) were previously prepared for washing. After regloving, the first and second layers of rumen were closed by two inverting suture patterns, Cushing pattern and Lembert pattern, respectively, with No. 3 chromic catgut. After pouring antisaline of 600 ml into peritoneal cavity, the peritoneum and transverse abdominis muscle were sutured together in a simple continuous pattern, using No. 3 chromic catgut. The remaining muscle layers and subcutaneous tissue were sutured separately in a simple continuous pattern with No. 3 chromic catgut. Between sutures, all tissues were rinsed with antisaline. The skin was sutured in an interrupted horizontal mattress pattern with No. 3 Supramid.

For seven more days, antibiotic (1 ml; Combimycin®, Green Cross Ltd., Korea) was intramuscularly injected once a day. Removing suture material is not necessary.

DISCUSSION

Rumen impaction coming from feeding on indigestible, metallic or non-metalic objects like plastic bags, pins, nails, ropes and fiber is routine in goats and sheep (Adamu *et al.*, 1993; Hailat *et al.*, 1997; Igbokwe *et al.*, 2003; Geehan *et al.*, 2006).

In this study, we showed a simple method of Himalayan tahr rumenotomy using small-sized towels without postoperative complications. Compared to four techniques of surgery routinely used in cattle, such as skin suture fixation, Weingrath's ring, stay suture and skin clamp fixation (Dehghani *et al.*, 1995; Ismail *et al.*, 2007), this rumenotomy technique introduced here would be easy and cheap to apply to Himalayan tahrs in captivity.

When it comes to conspecific fighting during rutting season, the main attack strategy of this species is quickly approaching under counterpart's abdomen and lifting up with razor-like horns, resulting in punctures of thoracic or abdominal cavity. When feeding, the social rank of the species is the factor that determines which individual stays longer and eats more than the others. This is the most probable reason for the 12-year-old No. 1 male not eating indigestible foreign bodies (Fig. 1F).

The skin of Himalayan tahr is very hard to make a hole or incision. The skin suture fixation method requires suturing the rumen and skin with a single needle, but Himalayan tahr's skin is not easy to suture with a round-edged needle.

Preventing ruminal contents from leaking out of rumen during rumenotomy is the primary concern for successfully finishing the surgery. With a special device on which goats are restrained in a standing position, operators are comfortable while performing rumenotomy for a long time (Geehan *et al.*, 2006). In the rumenotomy of this study, surgery was performed on a concrete floor with the help of a legless, small wheel-fitted chair, which also made operators feel comfortable while performing this surgery for a long time.

Rumenotomy of goats in a lateral recumbency position was followed by postoperative inflammatory complications, as indicated by significant increases in total white blood cell count (Geehan *et al.*, 2006). However, polythene drape technique had been successfully used for reducing post-rumenotomy complications in goats (Adamu *et al.*, 1993). Even though the polythene drape technique needs surgical attachment to the rumen prior to rumenotomy incision (Adamu *et al.*, 1993), rumenotomy, as performed in this study, does not require sterilized towels surgically attached to rumen for reducing leakage of rumen contents into peritoneal cavity. The use of antisaline for lavage of the peritoneal cavity was beneficial to minimize post-rumenotomy complications, and a full of antisaline in the peritoneal cavity made it unnecessary to evacuate air before making a final stitch of peritoneum.

Abstinence from hay and water for two days enabled easy exploration of the ruminal cavity and discovery of any indige

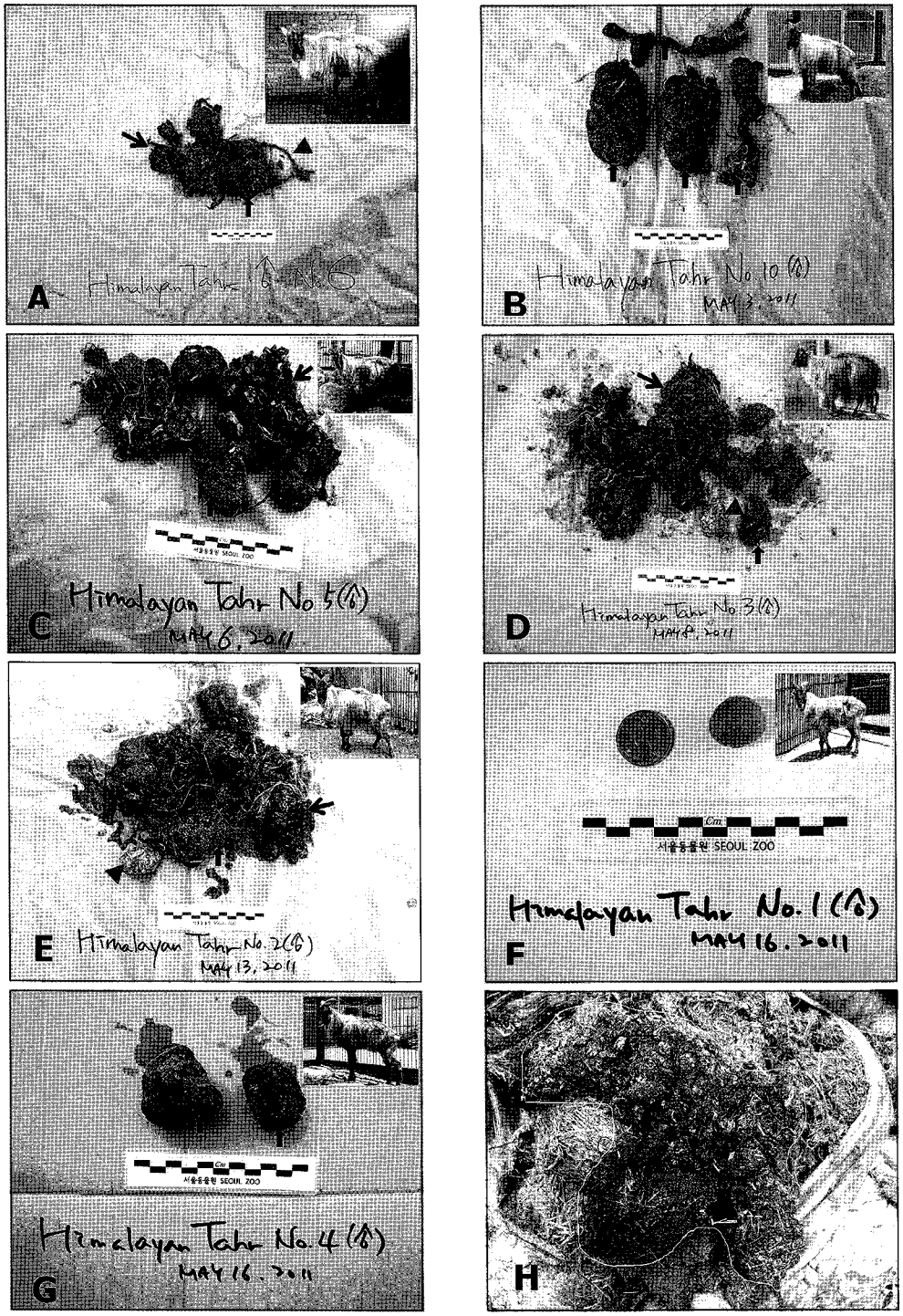

Fig. 1. Foreign bodies removed from male Himalayan tahrs. In the small boxes, located in the top right of each pictures, are male Himalayan tahrs from which foreign bodies are withdrawn. The recovered foreign bodies through rumenotomy were washed before taking pictures (A~G). The scale is 11 cm long. (A) Ropes (arrowhead), red-color carpet (thin arrow) and plastic awning were found. (B) Only plastic awning (arrows) was removed. (C) Carpet (thin arrow) and plastic awning (thick arrow) were removed. (D) A ball of ropes (arrowhead), carpet (thin arrow) and plastic awning (thick arrow) were removed. (E) Ropes (arrowhead), red-color carpet (thin arrow) and plastic awning were removed. (F) A small, hard mineral ball, like a bird egg, was found near to reticulum. (G) Only plastic awning (arrows) was removed. (H) In the rumen of a male Himalayan tahr, died of thoracic puncture during rutting season, a lump of carpet, rope and plastic awning (white line) was found at the autopsy.

stible foreign bodies. A lower quantity of ruminal contents than usual prevents leakage from spilling into the peritoneal cavity.

In conclusion, through a simple yet novel rumenotomy technique, which resulted in no postoperative complications, we successfully removed indigestible foreign bodies from Himalayan tahrs. To our knowledge, this is the first report in the world of rumenotomy for removing foreign bodies found in Himalayan tahrs.

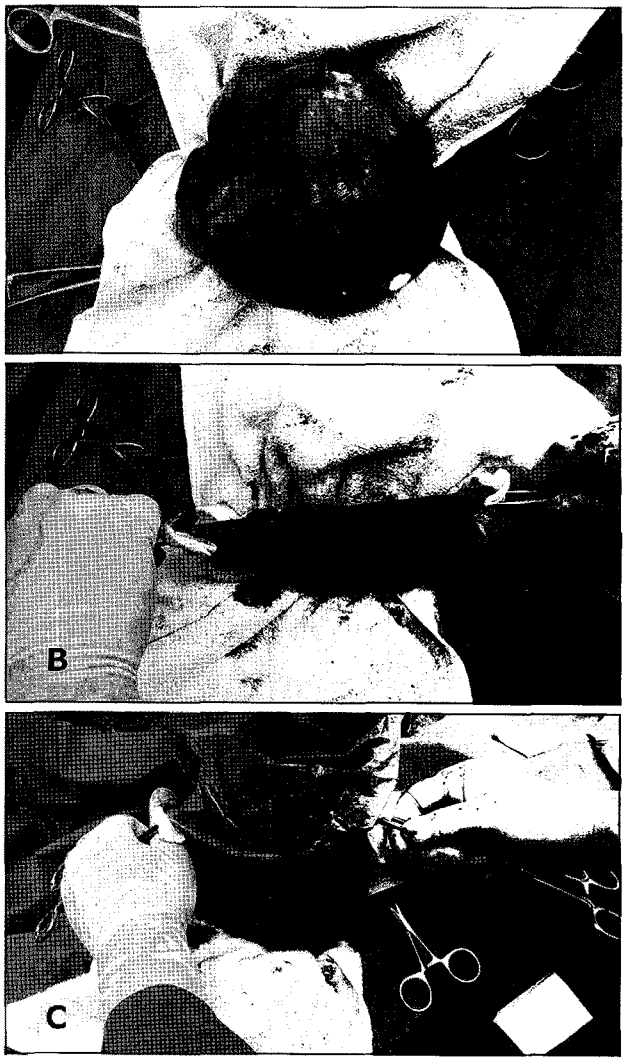

Fig. 2. Procedures of rumenotomy from exteriorization of rumen to exploration of foreign bodies in the rumen. (A) After opening the left flank, the upper caudal portion of rumen was exteriorized. Two sheets of hand towel were inserted into peritoneal cavity before making a slit on the rumen. (B) Ruminal gas was released through a slit and a long incision enough for operator's hand to enter the rumen was made and held with cotton gauze and Allis forceps. (C) During removing foreign bodies from the rumen, a long-sleeved, plastic glove usually used for rectal palpation of cows was needed.

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