

## Surgical Repair of Atresia Ani with Rectovaginal Fistula in an African Buffalo (*Syncerus caffer*)

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**Abstract :** A three-month-old female African buffalo born at Seoul Zoo showed signs of abdominal distension, bulging of the perineal skin, and small stool volume compared to feed intake. Upon physical examination, atresia ani with rectovaginal fistula was diagnosed. This case was subjected to surgery under inhalation anesthesia after injecting a sedative. Surgery was performed in two steps: anal reconstruction and closing the rectovaginal fistula. First, a circular skin incision was made at the end of the rectal pouch to create an anus, and then the skin of the anus and the mucous membrane of the rectum were brought into apposition by simple interrupted sutures. Second, the rectovaginal fistula was ligated on both vulval and anal side. Antibiotics were administered on every alternate day and the sutures were removed at ten days surgery under sedation. The rectovaginal communication was closed and the calf was able to urinate and defecate normally. The animal grew to become a normal adult without any complications. This is the first case report of atresia ani with rectovaginal fistula in an African buffalo, that was successfully treated by surgical intervention.

**Key words :** African buffalo, atresia ani, rectovaginal fistula, *Syncerus caffer*.

### Introduction

Atresia ani is a congenital malformation of the anorectum caused either by the failure of the urorectal fold to divide the cloaca completely or the failure of the fetal anal membrane that divides the rectum and anus during fetal development to break down. Consequently the anal opening is closed (1,3,22). The rectum may communicate with the urethra or the urinary bladder in males, and with the vagina in females. Affected calves show signs shortly after birth because they are unable to pass feces. One exception to this is affected females with rectovaginal fistula that can pass some feces through the fistula. They exhibit abdominal distension, colic, straining, tenesmus, signs of abdominal pain, depression, and progressive weakness (1,3,10,12). Without surgical correction atresia ani is a fatal condition due to the disruption of normal alimentary physiology (12,14).

This present report documents the surgical correction of a case of atresia ani with rectovaginal fistula in an African buffalo.

### Case

A three-month-old African buffalo (*Syncerus caffer*) calf presented with a history of voiding of feces through the vulva. The calf was born at Seoul Zoo and had been raised by its mother since birth. Other symptoms were abdominal distension, small stool volume compared to feed intake and

subcutaneous bulging in the normal region of the anus (Fig 1A) (9). Clinical examination was performed under sedation with xylazine (Xyzine 100; SF Co., LTD) 40 mg (23). This revealed the absence of an anal opening and the fistula between the rectum and vagina 3 cm anterior to the vulva. Blood was taken from the jugular vein and the body weight of the animal was measured to access its current health state. It weighed 61 kg and the results of CBC (Hemavet 950; Drew Scientific Group, USA) and serum biochemistry (Dri-Chem 3500i; Fujifilm, Japan) are shown in Table 1 (11). ALP (alkaline phosphatase) exceeded the reference range and CBC revealed a hypochromic microcytic anemia (19). Based on the history and clinical examination, the calf was diagnosed as atresia ani with rectovaginal fistula and surgical treatment was planned.

The calf was separated from its mother and kept in unfed condition for 24 hours before surgery. Xylazine was administered at 0.7 mg/kg body weight (40 mg) intramuscularly by means of a blowpipe (23). Once the animal was recumbent, a blindfold was placed over the eyes and a pulse oximeter (Veterinary Pulse Oximeter; Henry Schein INC., USA) probe was placed on an ear pinna to assess the oxygen saturation of hemoglobin (SaO<sub>2</sub>) and pulse rate. During surgery, the heart rate was 98-133 beats/min and SaO<sub>2</sub> was maintained at 95-100%. General anesthesia was induced and maintained with Isoflurane (Ifran; Hana Pharm Co., Ltd) 2.0-2.5% in oxygen (1.5 L/min) via a mask (18,23). The calf was positioned in left lateral recumbency with the tail held out the way. After surgical preparation of the area, a 4 cm diameter circular incision was made at 3 cm ventral to the tail, where bulging of the perineum was observed upon abdominal palpation (Fig

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**Table 1.** Biochemical and hematological results. Error bars indicate the mean  $\pm$  the standard deviation

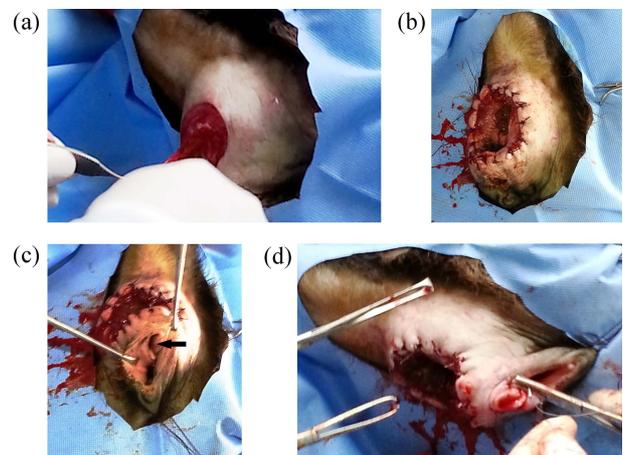
Test	Parameter	Result	Reference
Biochemistry	Total protein (g/dl)	5.9	7.1 $\pm$ 1.0
	Albumin (g/dl)	2.4	3.0 $\pm$ 1.0
	Direct bilirubin (mg/dl)	0.1	0.1 $\pm$ 0.1
	Total bilirubin (mg/dl)	0.1	0.5 $\pm$ 0.3
	GGT (U/L)	9	13 $\pm$ 6
	AST (U/L)	140	180 $\pm$ 121
	ALT (U/L)	12	32 $\pm$ 24
	ALP (U/L)	539	142 $\pm$ 135
	LDH (U/L)	353	484 $\pm$ 186
	CPK (U/L)	344	348 $\pm$ 341
	TG (mg/dl)	9	41 $\pm$ 26
	Total cholesterol (mg/dl)	207	123 $\pm$ 47
	Glucose (mg/dl)	119	125 $\pm$ 41
	UA (mg/dl)	0.6	0.9 $\pm$ 0.3
	Creatinine (mg/dl)	0.7	1.5 $\pm$ 0.3
	BUN (mg/dl)	11.8	19 $\pm$ 6
	IP (mg/dl)	8.7	7.4 $\pm$ 1.6
Ca (mg/dl)	7.9	9.4 $\pm$ 1.1	
Hematology	WBC ( $\times 10^3/\mu\text{l}$ )	4.26	6.310 $\pm$ 2.169
	NE ( $\times 10^3/\mu\text{l}$ )	1.53	2.831 $\pm$ 1.869
	LY ( $\times 10^3/\mu\text{l}$ )	1.98	2.559 $\pm$ 1.591
	MO ( $\times 10^3/\mu\text{l}$ )	0.74	0.246 $\pm$ 0.166
	EO ( $\times 10^3/\mu\text{l}$ )	0.01	0.186 $\pm$ 0.334
	BA ( $\times 10^3/\mu\text{l}$ )	0.00	0.093 $\pm$ 0.073
	RBC ( $\times 10^6/\mu\text{l}$ )	12.7	9.26 $\pm$ 2.12
	Hb (g/dl)	9.4	13.1 $\pm$ 2.5
	Hct (%)	33.7	38.3 $\pm$ 9.2
	MCV (fl)	26.5	41.8 $\pm$ 9.4
	MCH (pg)	7.4	14.3 $\pm$ 2.7
	MCHC (g/dl)	27.9	34.6 $\pm$ 3.4
	PLT ( $\times 10^3/\mu\text{l}$ )	303	422 $\pm$ 170

2A) (8,16). A circular piece of skin was removed and subcutaneous tissues were dissected bluntly until the blind end of the rectum was exposed. While the distal end of the rectum was held with two Allis tissue forceps, a 3 cm diameter circular incision was made on rectal blind end. The rectal mucosa was apposed to the perineal skin by a simple interrupted suture pattern that covered the whole circumference using nylon # 1-0 (Blue Nylon; Ailee Co., LTD, Korea) (Fig 2B) (6,10,15).

Following the reconstruction of the anus, the rectovaginal fistula was closed separately. First, the fistula was isolated by approaching the dorsal wall of the vagina (Fig 3A). It was transected and the opening was closed with simple interrupted sutures using polygalactin 910 # 2-0 (Vicryl; Ethicon, USA) (Fig 3B). The fistula on the ventral wall of rectum was transected and closed in a similar manner (6,9,21). The reversal agent atipamezole (Sedastop; Yuhan Corp) 10 mg at quarter the dose of the administered xylazine was given intramuscularly (23).



**Fig 1.** (A) Appearance before surgery. Note the fecal matter voided through the vulva and bulging of the perineal skin, (B) Appearance immediately postoperative after correction of atresia ani with rectovaginal fistula.



**Fig 2.** (A) A circular skin incision was made at the end of the rectal pouch to create an anus, (B) The skin of the anus and the mucous membrane of the rectum were brought into apposition by simple interrupted sutures, (C) Note rectovaginal fistula (arrow) on dorsal wall of the vulva, (D) The fistula was transected and the opening was closed with simple interrupted sutures.

Aluminum wound spray (Aluspray; Vetoquinol) was applied on the surgical wounds immediately after surgery (Fig 1B). Meloxicam (Metacam 2%; Boehringer Ingelheim) 0.5 mg/kg and amoxicillin (Bivamox LA; Boehringer Ingelheim) 15 mg/kg were administered subcutaneously once during surgery and amoxicillin was administered repeatedly on alternate days for 10 days postoperatively (22). The calf was found to urinate and defecate normally the day after surgery. Under sedation with xylazine 40 mg, the sutures were removed after 10 days of surgery. The surgical wounds healed uneventfully, the rectovaginal fistula closed completely, and the animal grew to become a normal adult without complications.

## Discussion

Atresia ani is classified as one of four types. Type I is described as the development of a relatively normal rectum and a patent but stenotic anus. In Type II, the rectum ends in

a blind pouch and the developed anus is absent. Type III is defined by the formation of a blind pouch in the proximal rectum and without any anus developing. Type IV is characterized as the formation of a blind pouch in the proximal rectum with a normally developed anus (7,14,21). Contrast radiography is considered important for differentiating between the four types of atresia ani and determining the position of the fistula (1,2). In the present case radiographic studies were not performed because the clinical signs and physical examination findings were sufficient to diagnose Type II atresia ani (4,6).

Patients with atresia ani should be operated on as soon as possible to avoid deterioration of the physical condition, irreversible megacolon, and possible ascending urinary tract infection (4,17). Since the calf in this case was undomesticated wildlife, observation was limited and as it defecated partially through the rectovaginal fistula, it was difficult to find abnormalities until the intake of dried forage was increased. It has also been reported that some of these signs are not evident while the animal is on a liquid diet (5,13,17).

Atresia ani with rectovaginal fistula are commonly treated by two surgical techniques. In the first method, the fistula is isolated, and transected, and the rectum and vulvar defects are closed separately. The anal opening is reconstructed later. In the second method, the rectum is transected cranial to the fistulous opening, the affected segment is removed, and the terminal part of the rectum is then sutured onto the anus (6). In this case, surgery was performed without resection of the terminal portion of the rectum because the method is simpler and less traumatic (17). We just modified the first method by reconstructing the anus followed by closing the fistula. Some postoperative complications may occur such as fecal incontinence, persistent megacolon, rectum prolapse, anal stricture and recurrent cystitis (7). We did not see any complications related to congenital abnormalities or surgical trauma after surgical correction in this case.

In the present case ALP elevation and hypochromic microcytic anemia were shown prior to the operation. It would have been better if additional hematological analysis had been performed to examine any changes several months later. This was not carried out because it was burdened with anesthesia for the venipuncture. After all, the surgical intervention seemed to bring a favorable outcome since the calf grew up to a normal adult size.

The inheritance of atresia ani as reported in swine and lambs is possible in calves (10,16). Atresia ani in wildlife has been recorded in North American bison (*Bison bison*) and Asian water buffalo (*Bubalus bubalis*), but there have been no published cases for African buffalo (3,20). To our knowledge, this paper documents the first case of atresia ani with rectovaginal fistula in an African buffalo and its surgical management.

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