Clinical Case

A newborn male Welsh pony foal, born without an anal opening, was admitted for treatment (Figures 1 and 2). On presentation, the foal displayed signs of mild abdominal discomfort indicated by intermittent uneasiness, looking at the abdomen, and stretching into a “sawhorse” stance. The foal was observed to urinate normally. Pulse, mucous membrane color, and capillary refill time were within normal limits. The physical examination revealed no other abnormalities.

Before surgery, a simple incision was made through the skin in the anal region using local anesthesia (Figure 3). However, the rectum was not identified by this procedure.

In preparation for surgery, penicillin (16 mg/kg q12h IV), gentamicin (3 mg/kg/day IV), and flunixin meglumine (0.6 mg/kg/day IV) were administered. The foal was premedicated with xylazine (1.1 mg/kg IV) and diazepam (0.01 mg/kg IV), and anesthesia was induced with ketamine hydrochloride (2.2 mg/kg IV) and maintained with isoflurane in oxygen using a semiclosed circuit system. The foal was placed in right lateral recumbency, with its tail pulled dorsally, allowing easy access to the anal region. An 8-Fr urinary catheter was placed in the urethra to facilitate intraoperative identification of that structure.

To provide sufficient exposure for dissection of the rectum, a midline skin incision was made, extending from 2 cm dorsal to 2 cm ventral to the anal region. Using blunt dissection, the rectal pouch was identified approximately 3 cm cranial to the skin surface. After further blunt dissection of the perirectal tissue,
the rectal pouch was retracted to the level of the skin. During this procedure, an approximately 2-mm urethral defect, possibly caused by inadvertent severance of a small rectourethral fistula, was observed 4 to 5 cm cranial to the skin surface. Because of the small size of the patient and the relative inaccessibility of the cranial part of the intrapelvic urethra, the decision was made to treat the urethral defect by temporary urinary diversion rather than attempt primary closure of the urethral mucosa over the urinary catheter. To form an anal opening, a 2-cm circular portion of skin was removed from the anal region. The rectal pouch was incised, and the edge of the rectal mucosa and skin were apposed and sutured in a simple interrupted pattern with 2-0 polyglactin 910. The skin incision was closed dorsal and immediately ventral to the anus. The ventralmost part of the skin incision was left open for drainage.

The foal was then placed in right dorsolateral recumbency, with its left hindlimb maximally abducted, and the ventral abdomen was prepared for surgery. An 8-cm midline skin incision was made, extending caudally from the umbilicus. The caudal part of the incision was directed approximately 2 cm to the left of the prepuce followed by right retraction of the prepuce to expose the midline for deep incision. After the peritoneal cavity was opened, the urinary bladder was exposed by maintaining traction on the urachus. The end of a 14-Fr Foley catheter was placed in the abdomen through a small incision lateral to the laparotomy. The catheter was tunneled subcutaneously a short distance before entering the abdominal cavity. A 2-0 polyglactin 910 purse-string suture was placed on the ventral surface of the urinary bladder, followed by a stab incision in the center of the purse-string. Urine was aspirated using a surgical suction pump. The end of the Foley catheter was passed into the bladder lumen through the stab incision, after which the purse-string suture was tied. The balloon of the Foley catheter was inflated with saline; then the laparotomy was closed routinely and the catheter secured to the ventral body wall by several 1-polyamide sutures.

After surgery, the foal urinated through the Foley catheter and defecated normally. During the first 4 postoperative days, the foal often stretched into a “sawhorse” stance, probably due to slight discomfort caused by the anorectoplasty. Eight days after surgery, the foal was anesthetized for removal of the Foley catheter. A laparotomy through the previous incision was performed, including an elliptic incision around the umbilicus for routine removal of the urachus and the umbilical arteries. After deflating the balloon, the catheter was removed and the cystotomy closed with a two-layer continuous inverting 2-0 polyglactin 910 suture. The laparotomy and the small incision through which the catheter had exited were closed routinely. The foal urinated normally after the second surgery and was discharged from the hospital 5 days later.

At a follow-up examination 5 months postoperatively, the foal was in good body condition. Although the owner reported that the foal showed signs of fecal incontinence, partial anal sphincter function was observed during the clinical examination (Figure 4).

Discussion

Anal atresia is a congenital malformation that occurs in various domestic species and may be associated with other anomalies of the digestive tract or urogenital system. In horses, a possible hereditary background has been suggested, and records indicate a low incidence of the condition.
Surgical treatment of this anomaly has been described.\textsuperscript{4,7}

Several morphologic variations of anal atresia are possible: A thin membrane may cover the anus or, more frequently, the rectum may end blindly some distance from the anus, as occurred in the case reported here. This malformation may occur as a single defect or in association with other anomalies, especially of the urogenital tract.\textsuperscript{1,8,9} Anal atresia with or without associated urogenital anomalies results from faulty organogenesis of the fetal cloaca during embryonic development\textsuperscript{10} and is considered to be inherited in pigs and calves.\textsuperscript{1}

In horses, a possible hereditary background has been suggested;\textsuperscript{11,12} consequently, affected animals should not be used for breeding purposes.

In male horses, anal atresia is often associated with a rectourethral fistula that may go undetected during the clinical workup because feces are not usually passed through the urethra.\textsuperscript{7} In the case reported here, a small urethral defect was observed after careful dissection of the perirectal tissue and was speculated to be the result of inadvertent traction on, and severance of, a small rectourethral fistula. However, a corresponding defect in the thin and friable rectal wall could not be identified. Identification of a rectourethral fistula is best achieved by a contrast urethrogram or, if the anus has been surgically opened, a barium enema.\textsuperscript{5,7}

Previous reports on surgical management of anal atresia associated with a rectourethral fistula have recommended that the resulting defects in the urethra and the rectum be sutured.\textsuperscript{4,6,7} In this case, the urethral defect was located 4 to 5 cm cranial to the perineal skin surface and, because of the small size of the patient, surgical accessibility was poor. It was therefore decided to treat the urethral defect by temporary urinary diversion through a tube cystostomy, which has been described previously and is commonly used for treating urinary obstruction or urethral trauma in small ruminants and dogs\textsuperscript{11,12}; to my knowledge, however, there are no published reports of its use in horses. No untoward effects of the tube cystostomy were observed, and the temporary diversion of urine allowed the urethral defect to heal by second intention.

An alternative to tube cystostomy would have been to place an indwelling transurethral catheter.\textsuperscript{13} Because of the contaminated nature of the anorectoplasty procedure, however, indwelling transurethral catheterization was thought to be associated with an increased risk for ascending urinary tract infection; thus tube cystostomy was chosen instead. In a recent study in dogs, no significant differences in urethral healing were observed when comparing the effects of transurethral catheterization and tube cystostomy on experimentally induced urethral anastomoses.\textsuperscript{14}

Apart from some minor modifications, the anorectoplasty technique used for treating this patient has been previously described.\textsuperscript{4,7} During anal reconstruction, efforts should be made to preserve the sphincter, if present. However, lack of sphincter control and resulting fecal incontinence are not a problem in horses, and these patients can mature normally and become serviceable.\textsuperscript{4} In the case reported here, the anal sphincter was poorly developed, and no special effort to preserve it, other than careful dissection of the perineal and perirectal tissues, was undertaken. Although slight gaping of the anus was evident when the tail was held up at follow-up 5 months postoperatively, some sphincter function was observed.

In conclusion, this case indicates that temporary urinary diversion by tube cystostomy is a viable surgical technique for treating urethral defects in foals and can be successfully combined with previously described reconstructive techniques for treating anal atresia.

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References


Atresia Ani

The accompanying case report describes the correction of anorectal agenesis and associated rectourethral fistula in a foal and outlines the difficulties associated with diagnosing and treating this congenital condition. Regardless of species, diagnosing and treating this condition and its subtypes are indeed challenging. Although there is a paucity of literature on this condition in large and small animals, there are several similarities among species.1–7 As stated in this case report, atresia ani is the result of abnormal embryologic development of the rectum and anus. The prevalence of this condition is unknown because many affected animals die or are euthanized without treatment.

A classification scheme, adapted from human medicine, describes four variations of the condition8:

- **Anal stenosis (type 1 atresia ani)** is congenital stenosis of the anus. Affected animals often remain clinically normal until weaning, when constipation and tenesmus become evident.

- **Membranous atresia (type 2 atresia ani)** is persistence of the anal membrane at the terminal end of the rectum, resulting in an imperforate anus.

- **Anorectal agenesis (type 3 atresia ani)** is termination of the rectal pouch cranial to the anal canal. Although the rectum ends blindly, there is frequently a fistula to the urethra in males or the vagina in females. This fistula results from a failure to develop a complete urorectal septum. In humans, anorectal agenesis is ter-

mination of the rectum superior to the puborectalis muscle.8 This is the most common type of anorectal anomaly and accounts for approximately two-thirds of anorectal defects in humans.

- **Rectal atresia (type 4 atresia ani)** is normal development of the anus and terminal rectum but termination of the cranial rectum as a blind pouch within the pelvic canal.

In all forms of atresia ani, the external anal sphincter reportedly develops normally. Animals with type 2, 3, or 4 atresia ani are commonly presented for clinical signs of abdominal distention and discomfort. Animals with a rectovaginal or rectourethral fistula are typically recognized by the passage of fecal material from the vagina or urethra.

Treatment options for atresia ani are based on the anatomic abnormalities present and the overall condition of the animal. The majority of animals with this condition are small, young, and in poor systemic health. In cases of anal stenosis, gentle dilation or bougienage is recommended. If this fails, resection of the stenotic area may be necessary. Membranous atresia is treated by incising the anal membrane in a dorsoventral direction, opening the blind end of the rectum, and suturing it to the subcutaneous tissues and skin. Animals with anorectal agenesis are treated similarly, although additional dissection and mobilization of the blind pouch of the rectum are necessary to achieve an interface with the skin. When a rectovaginal or rectourethral fistula is also present, the procedures may be performed in a stepwise fashion: atresia ani is corrected first, and the fistula is closed during a second procedure. Rectal atresia may necessitate an abdominal or dorsal approach to the rectum to facilitate anastomosis of the terminal colon with the rectum and anus.

The prognosis for animals with atresia ani is reportedly poor. However, this determination is based on a relatively small number of reported cases that include all types of the disorder.1–7 Correction of atresia ani and concurrent congenital abnormalities has resulted in fecal incontinence in a majority of reported cases in small animals.1,2,4

**Cystostomy Tube Placement**

The technique used to place and remove the cystostomy tube for urinary diversion following urethral trauma in this foal varied from the standard technique used in small animals. As in this case, a ventral midline celiotomy is typically performed to isolate the urinary bladder. A Foley or mushroom-tip (in cases in which maintaining urinary diversion for long periods is necessary) urinary catheter is introduced through a stab incision into the bladder and secured using a purse-string suture as described.9,10 In small animal patients, the bladder is then sutured to the body wall around the exit site of the tube using interrupted nonabsorbable or absorbable sutures. After allowing 5 to 7 days for a firm adhesion to form between the body wall and bladder, the urinary catheter may be removed either by deflating the bulb of the Foley catheter or, in the case of a mushroom-tip catheter, by gentle traction without a second surgical procedure. No effort is made to close the body wall or skin,
and the resulting cutaneous fistula closes within 24 to 48 hours after tube removal. In addition, when placing a tube cystostomy to achieve urinary diversion because of a urethral tear, the tube is connected to a closed collection system to minimize the residual volume of urine within the bladder. This minimizes the amount of urine leakage through the urethral tear when the animal attempts to void normally.

Tube cystostomy is used in small animal patients to achieve urinary diversion in cases of acute bladder or urethral trauma, following surgical repair of the urethra, and in cases of urinary obstruction secondary to neoplasia of the bladder neck or urethra. Tube cystostomy care includes cleaning the tube–skin interface and maintaining the tube within a bandage or stockinette to prevent trauma or entrapment of the tube. Patients treated for long periods with a cystostomy tube have an increased risk of urinary tract infection; therefore, their urine should be monitored for changes in color and odor consistent with infection and they should be treated appropriately.

Summary

Atresia ani is a life-threatening congenital condition diagnosed in very young animals. The age, size, and overall body condition of these patients complicates surgical correction of the anomaly. Involvement of the urinary tract by failed formation of the urorectal septum or trauma when correcting atresia ani adds further complexity to the condition. The use of tube cystostomy, as in the reported case, facilitates repair and healing of the urethra.

References