

## What Is Your Diagnosis?



Figure 1—Right lateral recumbent radiographic view of the pelvic area of a 4-year-old sexually intact male crossbred goat-sheep after positive contrast cystography, via cystotomy tube, and urethrography were performed.

### History

A 4-year-old sexually intact male crossbred goat-sheep was examined for dysuria, urolithiasis, and urethral obstruction. Eight hours prior to examination, the owners noticed the animal vocalizing and straining to urinate. The referring veterinarian dislodged some crystals and debris during an unsuccessful attempt to catheterize the urethra. At that time, the animal passed 100 to 150 mL of urine after the crystals were removed. A temporary tube cystotomy (20-F Foley catheter, 30-mL balloon) was performed at Colorado State University to allow time for resolution of the urethral obstruction. Multiple uroliths were removed from the animal's bladder during the procedure. Additional treatment included IV administration of fluids, antimicrobials, and nonsteroidal anti-inflammatory agents; oral administration of ammonium chloride; and SC administration of morphine. After 7 days, the urethra was still obstructed, and the animal continued to have episodes of dysuria and stranguria. Positive contrast cystography, normograde urethrography, and retrograde urethrography were performed (Fig 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn page ▶



Figure 2—Same radiographic view as in Figure 1. A urachal diverticulum is present in the apex of the urinary bladder (a) with vesicoureteral reflux occurring into the caudal portion of the ureter (b). Contrast material is filling into the corpus spongiosum penis (c) and the bulbi penis veins (d). The cystostomy tube is seen in place (e), and there is narrowing of the urethra (f).

## Diagnosis

**Radiologic diagnosis**—Communication between the urethra and the corpus spongiosum, urethral stricture, mild cystitis, and presence of a urachal diverticulum (Fig 2).

## Comments

Positive contrast cystography, normograde urethrography, and retrograde urethrography were performed 1 week after surgery. Diluted sodium meglumine contrast material was used to perform the contrast studies. Cystography was performed by use of a cystostomy tube. On the cystogram, the wall of the urinary bladder is slightly thickened, compared with normal, and a urachal diverticulum is evident in the apex of the urinary bladder. Vesicoureteral reflux is also evident. On the retrograde urethrogram, contrast material fills the corpus spongiosum penis and the bulbi penis veins, which drain the corpus spongiosum penis. A urethral stricture is present, most likely secondary to chronic inflammation induced by the urethral calculi. The stricture is visualized best on the normograde urethrogram.

There are few reports<sup>1</sup> of lower urinary tract contrast studies in sheep and goats in the veterinary literature. The normograde urethrography performed in this animal was useful for diagnosing the urethral stricture. Positive contrast normograde urethrography via cystostomy tube has been reported to be the best technique to visualize lower urinary tract structures and assess the resolution of an obstructive lesion.<sup>1</sup> Triple

contrast cystography (double contrast cystography and pneumoperitoneum) was found to be the best radiographic contrast study to assess the bladder wall, compared with positive contrast cystography and double contrast cystography.<sup>2</sup>

Obstructive urolithiasis is one of the most common clinical conditions in small ruminants, and the most common site is the urethral process.<sup>3-5</sup> Complications associated with communication between the urethra and the corpus spongiosum are the risk of air embolism if room air is used as a contrast agent and erection failure attributed to fibrosis and subsequent occlusion of the corpus cavernosum penis.<sup>6,7</sup> The latter condition can be diagnosed by performing cavernosography.<sup>6</sup>

Air embolism also has been reported in cats with adenocarcinoma of the urinary bladder and chronic hemorrhagic cystitis and dogs with necrosis of the urethra.<sup>8,9</sup> Air enters the venous system through bleeding capillaries or vesicoureteral reflux.<sup>8</sup>

In the animal of this report, the urethral obstruction subsequently resolved after continued treatment. The animal was discharged from the hospital 34 days after admission. The owners were instructed to feed a grass hay diet and provide long-term ammonium chloride supplementation to acidify the urine.

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