

## What Is Your Diagnosis?

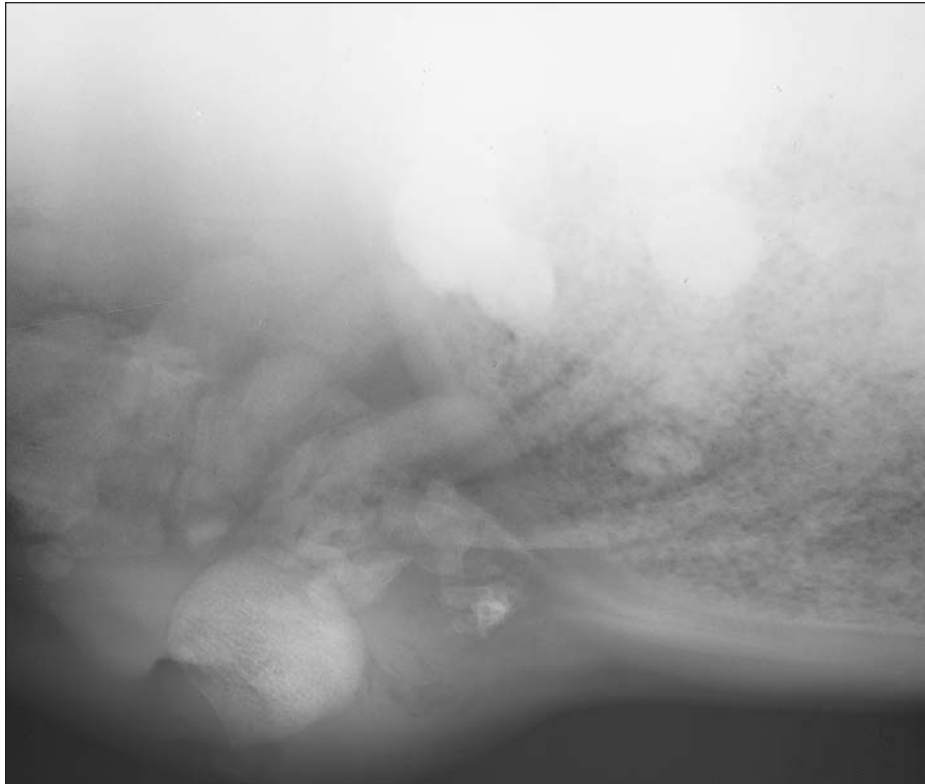


Figure 1—Lateral radiographic view of the caudal region of the sternum of a 5-year-old llama evaluated because of a draining tract of 5 months' duration.

### History

A 5-year-old sexually intact male llama (body weight, 120 kg [264 lb]) was admitted for evaluation of a draining tract located in the mid-sternal region. The owner had discovered the tract 5 months prior to admission. Initially, the llama had been treated with trimethoprim-sulfadiazine (15 mg/kg [6.8 mg/lb] of body weight, PO, q 12 h) for 2 weeks, followed at a later time with procaine penicillin G (22,000 U/kg [10,000 U/lb], IM, q 12 h) for 1 week. Ivermectin was administered orally once. These treatments did not resolve the draining tract. The owner believed that the llama initially had a decreased appetite, but when admitted to the teaching hospital, the llama's attitude and appetite were within acceptable limits.

The only abnormality detected during physical examination was the draining tract. The tract consisted of 2 skin wounds that were separated by 5 cm of unaffected skin. The wounds communicated with each other, and a large amount of purulent debris matted the hair surrounding the wounds. A lateral radiographic view of the sternal area was obtained (Fig 1).

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



Figure 2—Same radiographic view as in Figure 1. Contrast was adjusted during photography. Notice the circular bony opacity surrounded by a thin lucent line ventral to the sternum (white arrow). Dorsal to the bony opacity, smooth, irregular excessive bony proliferations suggest chronicity. Several circular mineralized bony opacities (black arrows) are evident in the region of the first compartment of the stomach.

## Diagnosis

**Radiographic diagnosis**—A smoothly marginated bony mass with an internal trabecular pattern consistent with a ventrally luxated caudal sternebra, soft tissue swelling and free gas associated with the lesion, and multiple gastroliths in the region of the first compartment of the stomach (Fig 2).

## Comments

A thin lucent line outlines the bony mass, and excessive bony proliferation in the region of the affected sternebra suggests chronicity. To delineate the extent of the draining tract, a fistulogram was obtained after intralesional injection of 15 ml of diatrizoate meglumine and diatrizoate sodium. The draining tract did not communicate with the thoracic or abdominal cavities, but contrast material was evident surrounding the circular bony opacity (Fig 3).

The llama was anesthetized and positioned in dorsal recumbency, and the area surrounding the tract was aseptically prepared for surgical exploration. Samples of purulent debris deep in the tract were collected for bacteriologic culture and susceptibility testing. Skin connecting the 2 wounds was incised, and an unattached, spherical, hard mass 5 cm in diameter was removed from within the tract. The tract itself was roughly spherical and lined by smooth fibrous tissue. After lavage of the tract and debridement of skin edges, the wound was packed with sterile gauze, and a stent bandage was sutured in place. Tetanus toxoid was administered IM. Flunixin meglumine (1.1 mg/kg [0.5 mg/lb], IV) was administered once daily for 3 days, but antibiotics were not administered. The llama was discharged from the hospital 3 days after surgery.

Samples incubated under aerobic conditions yielded  $\beta$ -hemolytic *Streptococcus* spp, *Escherichia coli*, and

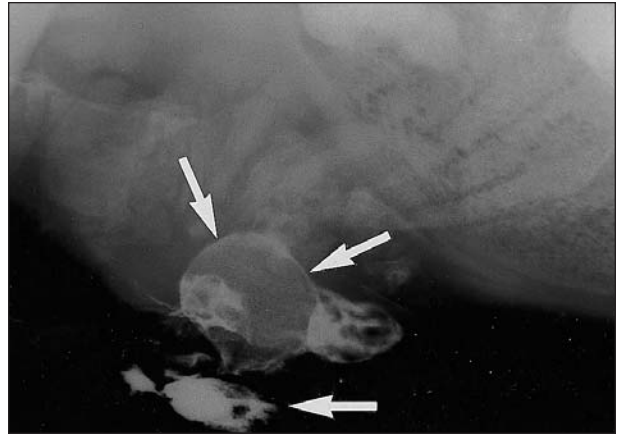


Figure 3—Lateral radiographic view of the caudal region of the sternum of the llama described in Figure 1, obtained after injection of 15 ml of diatrizoate meglumine and diatrizoate sodium into the draining tract. Notice the contrast material surrounding the circular bony opacity and within the draining tract (arrows). The tract does not communicate with the thoracic or abdominal cavities.

*Actinomyces bovis*, whereas anaerobic incubation yielded a heavy growth of mixed flora. The predominant colony type was *Bacteroides fragilis* ( $\beta$ -lactamase positive). Histologic evaluation of the decalcified hard mass removed from the tract revealed a trabecular bony structure with empty lacunae formed by smooth lamellar bony tissue and needle-like crystalline material that radiated between the necrotic bone. The histopathologic diagnosis was sequestered bone with apparent inorganic, insoluble, linear crystalline deposits between bony trabeculae.

Six weeks after surgery, the surgical site had healed, and the owner reported that the llama was healthy. The owner believed that this aggressive male llama likely traumatized its sternum while charging at fences. The smooth margination and spherical shape of the bony fragment, protracted clinical course, and bacterial infection supported a diagnosis of an atypical sequestrum. Alternatively, trauma to the sternebra during development may have resulted in a second site of ossification. Results of radiography, particularly abnormalities detected on the fistulogram, were used to help formulate the treatment plan for this llama. The gastroliths were considered an incidental finding; gastroliths are commonly found in the stomachs of camelids, and when located in the first compartment, they usually do not impair gastric function.<sup>1</sup>

1. Fowler ME. Digestive system. In: Fowler ME, ed. *Medicine and surgery of South American camelids*. 2nd ed. Ames, Iowa: Iowa State University Press, 1998;347-349.

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