

Ultrasound evaluation of tympanic bulla in calves

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Introduction

Otitis media is a common disease in calves. Clinical diagnosis can be confirmed by diagnostic imaging such as radiography and computed tomography. Early diagnosis of otitis media by a field veterinarian with the aid of a practical diagnostic tool could prevent the condition from becoming chronic and the prognosis from worsening. Ultrasonography of the tympanic bulla (TB) has been described in dogs, cats, and rabbits. The objective of this study was to establish an ultrasonographic approach to the TB and adjacent structures in calves and to describe their ultrasonographic appearance.

Materials and Methods

The head of a neonatal bovine cadaver was boiled, dissected, and submerged in water for ultrasound examination. The structures previously observed on dissection were ultrasonographically identified in order to establish references for ultrasound evaluation of cadavers. Ultrasound evaluation was performed via a lateral approach on seven fetuses, two newborn calves, and four living calves of various ages. The probe was positioned caudally to the vertical mandibular ramus and ventral to the base of the ear. The region was examined with three different probes: linear, finger grip, and transrectal. Three different positions of the probe were used. Each probe and each position were evaluated in reference to the ease of identifying the anatomic landmarks.

Results

The tympanic bulla and adjacent structures were successfully identified and their ultrasonographic appearance described. The TB wall appears as a convex interface with an acoustic shadow, and the paracondylar process and stylohyoid bone are visible dorsally and ventrally, respectively. Liquid in the bulla allowed the ultrasound beam to pass through the tympanic wall, revealing the trabeculations as thin hyperechoic lines perpendicular to the tympanic wall in anechoic fluid. The presence of liquid in the fetal and neonatal (< 12 hours of age) bullae was observed. The linear probe offers superior image quality and handling ability. All three positions of the probe are useful. The exam was well tolerated in live, non-sedated calves.

Significance

Ultrasonography could detect acute, subclinical cases of otitis media, in which only serous exudate was present. For clinical cases of otitis media, ultrasonography not only confirmed the diagnosis, it also helped the practitioner to give a better prognosis and choose proper treatment duration in light of cellular exudate and bone changes seen in chronic cases. Ultrasonography has potential to be a useful tool, but its diagnostic value remains to be studied in clinical cases of otitis media in calves.