Radiographic Projections for Detection of Pneumoperitoneum

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In the literature

Ng J, Linn KA, Shmon CL, Parker S, Zwicker LA. The left lateral projection is comparable to horizontal beam radiography for identifying experimental small volume pneumoperitoneum in the canine abdomen. *Vet Radiol Ultrasound*. 2020;61(2):130-136.

Pneumoperitoneum can be an important indicator of GI perforation.

FROM THE PAGE ...

In the absence of trauma or penetrating wounds, pneumoperitoneum can be an important indicator of GI perforation. However, detection of small amounts of free gas can be difficult to distinguish from intraluminal gas on standard radiographic projections. Obtaining images with horizontal beam projection could enhance detection of free gas. Air may be more likely to accumulate against the body wall and may be more easily distinguished from intestinal gas with either ventrodorsal or lateral horizontal beam projections.[1] However, a small cadaveric study failed to find a difference in the accuracy of horizontal beam projections over standard views in detection of pneumoperitoneum.[2] To investigate this further, the present study evaluated whether use of horizontal beam projections improves the ability to detect abdominal free gas and whether the level of training of the radiographic interpreter impacts accuracy.

To gauge the sensitivity of radiographic detection of free air, intraperitoneal catheters were placed in 14 research dogs and 0 mL, 2.5 mL, 5 mL, or 10 mL of air was injected in the abdominal cavity. Radiographs were then taken using standard left lateral and ventrodorsal projections and lateral and ventrodorsal horizontal beam projections in a randomized order.

All films were interpreted by 3 board-certified radiologists and 3 nonspecialist clinicians who were blinded as to air volume, dog identity, and time of image acquisition

but not to the radiographic projection used. Each image was assessed as being definitive for no free air (0), uncertain (1), or having free air (2). Scores were then compared to determine the odds ratio of predicting whether air was present. Overall accuracy was higher with standard left lateral (80.4%) and lateral horizontal (78.9%) projections as compared with standard ventrodorsal (60.7%) and ventrodorsal horizontal (65.5%) beam projections. There was no significant difference in the accuracy of standard left-lateral and lateral horizontal beam projections. This suggests that horizontal beam projection did not increase the ability to detect air. The board-certified radiologists had higher overall accuracy (74.9%) than the nonspecialist clinicians (67.9%), particularly with the 5-mL and 10-mL quantities. Results suggest that standard left lateral and/or lateral horizontal beam projections provide the best opportunity for identifying small-volume pneumoperitoneum, and review by a board-certified radiologist can help increase the accuracy of diagnosis.

… TO YOUR PATIENTS

Key pearls to put into practice:

1. In the absence of trauma or penetrating wounds, pneumoperitoneum typically indicates GI perforation, which can lead to life-threatening sequelae.
2. Standard left lateral and lateral horizontal beam projections are associated with the highest accuracy and odds of detecting free gas. In this study, there was no significant difference between these 2 projections, suggesting a horizontal beam does not significantly enhance accuracy compared with standard left lateral projections.
3. Review by a board-certified radiologist can increase the accuracy of detection of pneumoperitoneum.

References

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2. Marolf A, Blaik M, Ackerman N, Watson E, Gibson N, Thompson M. Comparison of computed radiography and conventional radiography in detection of small volume pneumoperitoneum. *Vet Radiol Ultrasound*. 2008;49(3):227-232.