

Ultrasonographic evaluation of massive abdominal wall swellings in cattle and buffaloes

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Abstract: Eight cows and 7 buffaloes with massive abdominal wall swellings were examined. The aim of the ultrasonographic study was to learn the contents of the abdominal wall swellings. They were divided into 4 groups: Group I (prepubic tendon rupture or hernia), Group II (fibrino-cystic swelling), Group III (abscess), and Group IV (inflammatory swelling). Palpation of the swelling in semidorsal recumbency, needle aspiration, or surgery was used to confirm the diagnosis. In animals of Groups I, II, and III, in the ultrasound, the muscles appeared to separate from the skin at the margin of swelling, thus creating a gap. In this gap, intestines or viscera were seen in Group I, fluid and fibrin shreds in Group II, and encapsulated cavity with uniform echogenic contents in Group III. Intact muscles were followed up to the hernial ring in Group I and throughout the swelling in Groups II and III. From the ultrasound, a gradual increase in the total abdominal wall thickness was observed in Group IV. To conclude, ultrasonography can differentiate hernia from fibrino-cystic, abscess, or inflammatory abdominal wall swellings in bovinds.

Key words: Ultrasonography, hernia, abscess, fibrino-cystic swelling, bovine

Reducibility and palpation of hernial ring are pathognomonic for hernia, but irreducibility does not rule out this condition. Abdominal wall swellings in large animals located ventrolaterally are difficult to evaluate because of the location, massive size, temperament of the animal, and pain (1,2). In human medicine, ultrasound has a high accuracy in distinguishing hernia from other swellings (3–5). The objectives of this study were to describe the application of ultrasonography in differential diagnosis of massive abdominal wall swellings in bovine animals.

Fifteen adult female bovine animals (7 buffaloes and 8 cows) were investigated. They were found to have massive abdominal wall swellings in the ventrolateral or prepubic area (Figures 1–4). Palpation of the swellings was done in standing and in semidorsal recumbency. Hair was clipped over the abdominal swelling and the surrounding area. Ultrasonography was done in the standing position using 7.0 to 12.0 linear and 2.0 to 5.0 MHz curvilinear multifrequency transducers (Wipro Logiq III ultrasound machine). The transducer was moved dorsoventrally or craniocaudally starting from the healthy wall towards the

swelling. The diagnosis was confirmed by palpation of the swelling in semidorsal recumbency, needle aspiration, or surgical exploration. Based on the contents of the abdominal wall swellings, the animals were divided into 4 groups: Group I (prepubic tendon rupture or abdominal wall hernia; 6 buffaloes and 4 cows), Group II (fibrino-cystic swelling; 1 buffalo and 2 cows), Group III (abscess; 1 cow) and Group IV (inflammatory swelling; 1 cow). The abdominal wall thickness over the swelling and at the adjoining healthy abdominal wall was recorded in Group I. These values were analyzed statistically using Student's t-test.

Physical examination of massive abdominal wall swellings (n = 15) revealed soft contents in 14 animals. These contents were well defined and firm in 1 cow (Group IV). In Group I, palpation in standing position showed the hernial ring in 2 cows and 1 buffalo only, while in semidorsal recumbency, the hernial ring was noticed in all the animals. Ultrasonography revealed separation of muscles from the skin at the start of the swelling, thus creating a gap between the tissues. In this gap, the viscera or motile loops of intestine were observed close

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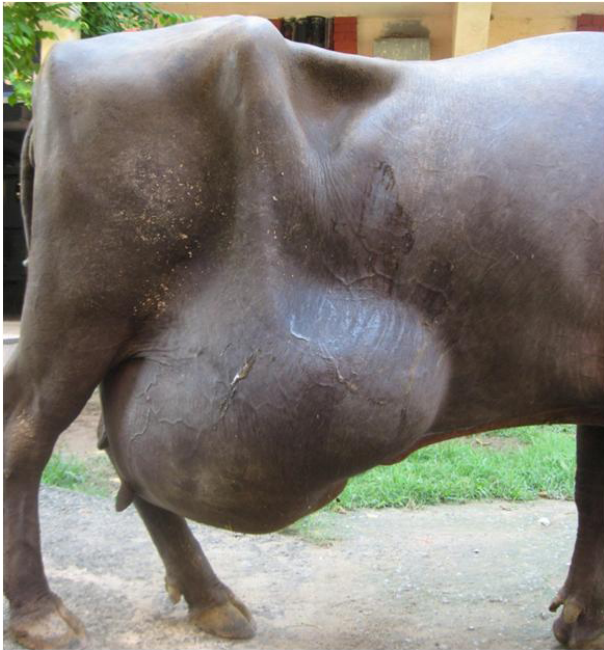


Figure 1. Massive abdominal wall swelling near the udder in a buffalo diagnosed with prepubic tendon rupture.

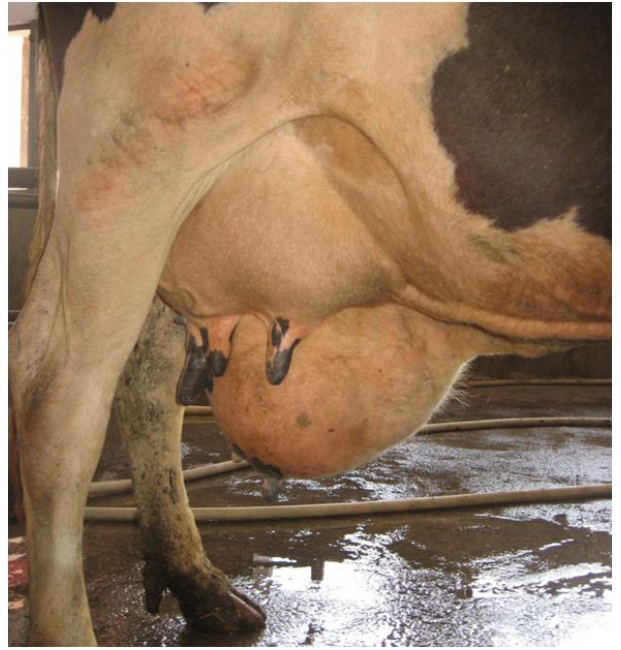


Figure 3. Massive abdominal wall swelling near the udder in a cow diagnosed with an abscess.



Figure 2. Massive abdominal wall swelling at ventrolateral location in a buffalo diagnosed with fibrino-cystic swelling.



Figure 4. Massive abdominal wall swelling at ventrolateral location in a cow diagnosed with inflammatory swelling.

to the transducer, suggesting prepubic tendon rupture or abdominal wall hernia (Figure 5). The separated intact muscles appeared to extend invariably towards the hernia ring (Figure 5). The thickness of the abdominal wall was significantly more at the healthy site (2.27 ± 0.2 cm, range: 1.67–3.36 cm) compared to that over the swelling ($0.98 \pm$

0.1 cm, range: 0.77–1.37 cm) in Group I (Figure 6). Surgery confirmed the diagnosis of prepubic tendon rupture or abdominal wall hernia in all the animals of Group I.

In Groups II and III, ultrasonography revealed similar findings to those observed in Group I, i.e. separation of muscles from the skin at the start of the swelling, creating a

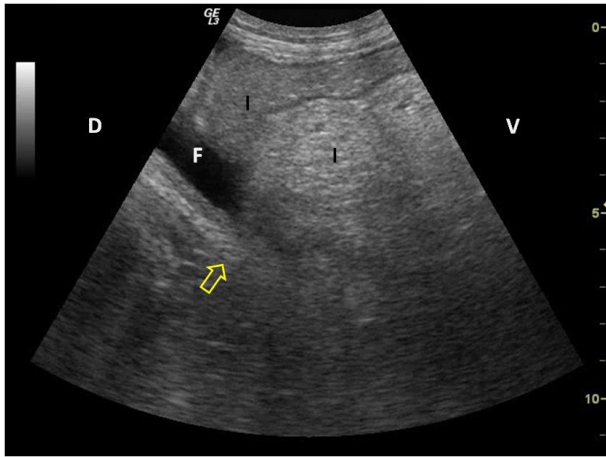


Figure 5. Ultrasound image, using 5.0 MHz curvilinear transducer, showing separated intact muscle layer from skin extending invariably towards hernial ring (arrow) in buffalo. F: fluid, I: intestines, D: dorsal, V: ventral.

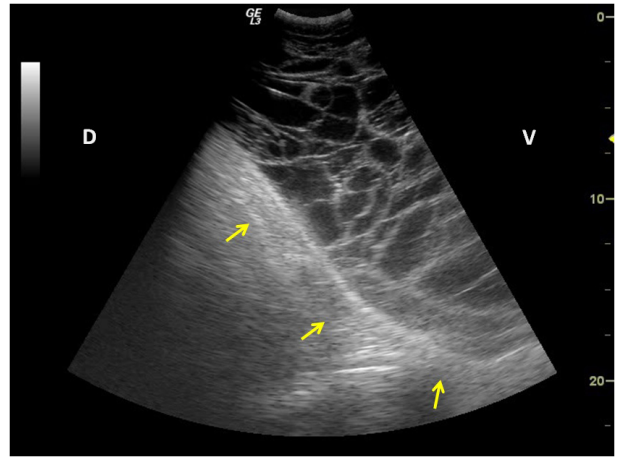


Figure 7. Ultrasonographic image, using 3.0 MHz curvilinear transducer, showing fluid and fibrin shreds in the gap between the muscles and skin, indicating fibrino-cystic swelling in a buffalo. Arrows indicate intact underlying muscle layer. D: dorsal, V: ventral.

gap between the tissues. Detection of fluid and fibrin shreds in this gap indicated fibrino-cystic swelling (Figure 7) and the cavity with echogenic contents indicated an abscess (Figure 8). Moreover, it was possible to visualize intact underlying muscles beneath the fibrino-cystic swelling and abscess. The diagnosis was confirmed by needle aspiration and surgical drainage. Cytology confirmed transudate or sterile fluid (Group II) or pus (Group III). In group IV, ultrasonography revealed a gradual increase in the total abdominal wall thickness, and abdominal viscera were seen away from the transducer over the swelling as compared to an adjacent healthy site, suggestive of inflammatory swelling (Figure 9). This animal responded to conservative medication.

The possible reason for the difficulty to palpate the hernial ring in a standing position in Group I could be the presence of excessive viscera in the hernial sac that was extended between the separated muscles and skin. On ultrasonography, viscera were observed close to the transducer over the intact muscles near the hernial ring, therefore masking palpation of the hernial rent in standing position. In simple and reducible hernias, ultrasonographically, the discontinuity of the muscle defect is seen, which accurately assesses the hernial ring (6,7). However, in semidorsal recumbency, spontaneous reduction of the viscera detected hernial rent. Incarceration

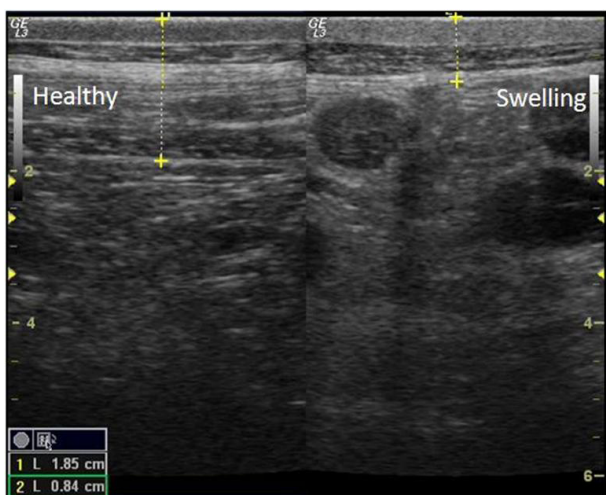


Figure 6. Ultrasound image, using 7.0 MHz linear transducer, showing presence of loops of intestine close to the transducer as compared to an adjacent healthy site in a buffalo, suggestive of prepubic tendon rupture or hernia.

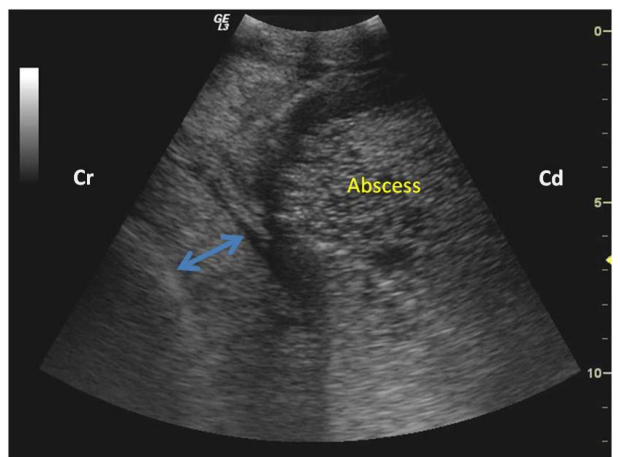


Figure 8. Ultrasonographic image, using 5.0 MHz curvilinear transducer, showing cavity with echogenic contents in the gap between the muscles and skin, suggestive of an abscess in a cow. Double-headed arrow indicates intact underlying muscle layer. Cr: cranial, Cd: caudal.

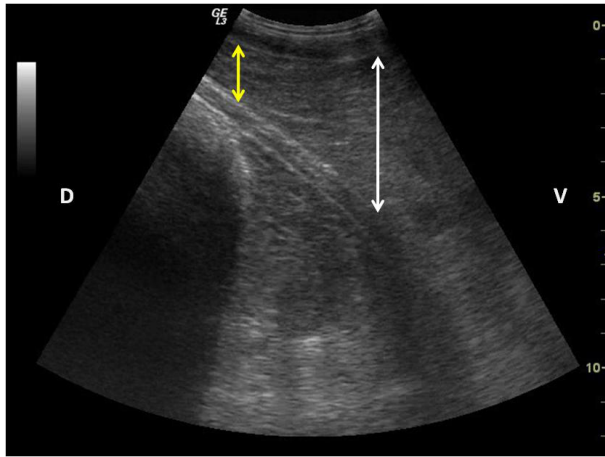


Figure 9. Ultrasonographic image, using 5.0 MHz curvilinear transducer, showing thickened abdominal wall over the swelling (white arrow) and visualization of viscera away from the transducer compared to that at a healthy site (yellow arrow), indicating inflammatory swelling in a cow. D: dorsal, V: ventral.

was not recorded in any of the cases and irreducibility was associated with the massiveness of visceral contents. Casting of the animal is stressful and there are high chances of self-inflicted injuries to the animal. Moreover, this is not advisable in animals in advanced stages of pregnancy. In contrast, ultrasonography is feasible in the standing position and is less stressful, safe, simple, sensitive, and a dynamic mode of imaging in order to examine the abdominal wall (8). Ultrasonography has also been used to examine umbilical masses or swellings to diagnose umbilical hernia, omphalitis, abscess (6,7,9,10), or midline incisional hernia (11). The findings of the present study suggest that comparing total abdominal wall thickness over the swelling and at an adjoining healthy

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site ultrasonographically might be used as an important criterion for diagnosing abdominal wall hernia. Similarly, Wilson et al. (11) examined midline celiotomy wounds in horses using ultrasonography postoperatively and noticed gradual thinning of abdominal wall at the site of surgery in animals that developed incisional hernia.

Fibrino-cystic swellings (Group II) might be a sequel to chronic irritation resulting in accumulation of transudate followed by fibrino-cystic contents. The authors could not trace a similar condition in the cited literature. Inflammatory abdominal wall swelling might be confused with abdominal wall hernia because of similar clinical signs and history of acute onset. Acute cases of abdominal wall hernias accompanying inflammation might cause difficulty in making a correct assessment during physical examination. In these circumstances, ultrasonography has proven to be a reliable diagnostic tool (1,11). Linear array high frequency transducers provide better resolution and are reliable for scanning of any abnormal lumps or body wall swellings. They also distinguish skin from abdominal muscles for accurate measurement (8). However, for assessing deeper lesions, 2.0 or 5.0 MHz transducers should be used.

In conclusion, ultrasonography is a noninvasive, safe, simple, reliable, and dynamic imaging modality for investigating abdominal wall swellings in the standing position. It differentiates abdominal wall hernias from fibrino-cystic, abscess, and inflammatory swellings in bovine animals.

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