



## THERAPEUTIC DECISION IN ACUTE ABDOMINAL DISORDERS OF THE COW

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### 1. INTRODUCTION

A current overview of acute abdominal disorders in cattle has been recently published (Van Metre *et al.* 2005). The clinical signs of acute abdominal disorders vary greatly. Typically, the veterinarian is presented with a cow that has become ill suddenly and has stopped eating and defaecating. The abdomen may be dilated on the left side, right side or both sides, and the entire side of the abdomen or only the dorsal aspect may be affected. The dilated abdomen may be “papple”-, barrel- or pear-shaped (Radostits *et al.* 2000). Occasionally, affected cows have colic symptoms, which are usually mild and include restlessness, shifting of weight from one hind foot to the other, spastic flexion of a hind limb, lowering of the back, tail swishing and bruxism. Rarely, colic symptoms are severe in which case kicking at the abdomen, kicking out with a hind limb, lying down and standing up and sweating are seen. The back may be arched or sunken, and the abdominal wall may be relaxed or tense. An arched back indicates parietal pain and a sunken back corresponds with visceral pain (Stöber *et al.* 1987). Sometimes, urination is abnormal.

In cattle with acute abdominal disease and severe symptoms, a rapid diagnosis is paramount to avoid irreparable organ damage. In the past, an exploratory laparotomy was often quickly resorted to as a diagnostic aid in acute abdomen in cattle with no clear diagnosis. Today, many farmers will consent to exploratory laparotomy only when the prognosis is good and the procedure has a reasonable chance of being curative. If the prognosis is poor, an exploratory laparotomy should be avoided; it causes unnecessary pain to the patient, is expensive and often the animal is no longer marketable. Thus, the goal of abdominal surgery should be treatment rather than diagnosis of the disease. To achieve this goal, all available and pertinent non-invasive diagnostic aids must be employed to establish a diagnosis before surgery is performed. An accurate diagnosis allows for specific treatment or for slaughter or humane euthanasia of the patient. In general veterinary practice, the clinical examination assumes an extremely important role because adjunctive diagnostic aids are often not readily available. An organ-specific diagnosis can be made in the majority of disorders based on the results of a thorough clinical examination. Likewise, an aetiological diagnosis is often possible too. Many abdominal disorders can be diagnosed based on the results of a thorough clinical examination.

## **2. DIAGNOSTIC WORK-UP FOR ACUTE ABDOMINAL DISORDERS**

### **2.1 Clinical examination**

Viewing the cow from all sides as well as the determination of the general condition of the animal, the heart and respiratory rates, the rectal temperature and the colour of the oral mucous membranes, auscultation of the rumen and intestine, swinging and percussion auscultation of both sides of the abdomen, foreign body tests, rectal examination and urinalysis should all be part of a clinical examination. In many cases, a definitive diagnosis can be made based on the results of a clinical examination. For example, traumatic reticuloperitonitis, displacement or volvulus of the abomasum, caecal dilation and uterine torsion can usually be accurately diagnosed on clinical examination. A decision as to whether treatment is appropriate can then be made.

### **2.2 Analysis of blood and ruminal fluid**

Sometimes, a diagnosis cannot be made based on the results of clinical examination. Under field conditions, the semiquantitative determination of the ruminal chloride concentration and the glutaraldehyde test are indicated to obtain additional diagnostic information. The concentration of ruminal chloride indicates whether the animal has abomasal reflux syndrome and can provide information about the localisation of the disease (Breukink *et al.* 2006). For instance, a high ruminal chloride concentration in a cow with acute abdomen indicates that the cranial part of the gastrointestinal tract is affected; abomasal displacement, acute pyloric stenosis or an ileus of the proximal small intestine are examples of possible disorders. The glutaraldehyde test is also easy to carry out in the field. A marked reduction in the clotting time indicates a massive inflammatory lesion, such as suppuration or an abscess (Braun *et al.* 1995). Whenever possible, a complete blood cell count and the determination of the concentrations of urea, creatinine, bilirubin and electrolytes as well as the activities of the liver enzymes should be done. Blood gas analysis is also desirable. The results of these tests often provide information about the localisation, nature and severity of the disorder.

### **2.3 Ultrasonographic examination**

Other diagnostic aids may be required to establish a diagnosis. Ultrasonography is an ideal method of examining the abdominal cavity and can be a useful adjunct to radiography. As well, it can be done on the farm. Clinically important acute abdominal disorders that can usually, but not always, be diagnosed on clinical examination include traumatic reticuloperitonitis (Braun *et al.* 1993), right displacement of the abomasum/abomasal volvulus (Braun *et al.* 1997), small intestinal ileus (Braun *et al.* 1995), dilation and retroflexion of the caecum (Braun *et al.* 2002), obstructive cholestasis (Braun *et al.* 1995), urolithiasis (Braun *et al.* 2006), reticulo-omasal stenosis, pyloric stenosis (Braun *et al.* 1997) and ascites (Braun *et al.* 1997). All these disorders can be diagnosed using ultrasonography except for acute traumatic reticuloperitonitis, in which the foreign body has penetrated or perforated the reticular wall. Radiography of the reticulum is the method of choice for diagnosing this disorder because metal foreign bodies in the reticulum are very rarely seen via ultrasonography (Braun *et al.* 1993). Ultrasonography is ideal for visualising fibrinosuppurative changes in the reticular wall (Braun *et al.* 1998), although these are seldom the cause of acute symptoms.

The ultrasonographic examination is carried out on standing non-sedated cattle using a 3.5-MHz linear transducer. When a tentative diagnosis has been made based on the results of the clinical examination, only the area thought to be affected is examined; if, for instance, cholestasis is suspected, the right side of the abdomen under the ribs is examined. However, even experienced veterinarians may have problems with pinpointing the organ affected in a cow with suspected acute abdomen. In such cases, the left and right sides of the abdomen from the shoulder to the hip as well as

the ventral abdomen are examined via ultrasonography. Normally, the reticulum (Braun *et al.* 1994), spleen (Braun *et al.* 1994), rumen (Braun *et al.* 1994), abomasum (Braun *et al.* 1997) and sometimes the gravid uterus are seen on the left side. On the right side, the liver (Braun *et al.* 1990, 1994), omasum (Braun *et al.* 1997), abomasum (Braun *et al.* 1997), small intestine (Braun *et al.* 1995), large intestine (Braun *et al.* 2001), right kidney (Braun *et al.* 1991) and sometimes, depending on the stage of pregnancy, the uterus are seen. A transrectal ultrasonographic examination may be required to evaluate the left kidney, left ureter, urinary bladder and pelvic cavity (Braun *et al.* 1993). The remainder of the paper describes the most important findings and treatment possibilities of the aforementioned acute abdominal disorders in cattle.

### 3. ACUTE TRAUMATIC RETICULOPERITONITIS

**Main clinical findings:** fever, arched back, positive foreign body tests.

**Diagnosis:** usually based on clinical findings; sometimes based on radiographic findings (typical: foreign body penetrating or perforating wall of reticulum).

**Treatment:** magnet per os and antibiotics for 3 to 7 days.

With no response to treatment: Radiography of the reticulum to determine whether the magnet is in the reticulum and the foreign body is attached. In practice, ruminotomy, euthanasia or slaughter may be elected when there is no response to treatment (Braun *et al.* 1993, 2003).

### 4. RIGHT DISPLACEMENT OF THE ABOMASUMS/ABOMASAL VOLVULUS

**Main clinical findings:** swinging and percussion auscultation are positive on the right side; a dilated abomasum may be palpated transrectally.

**Diagnosis:** usually based on clinical findings; in unclear cases, ultrasonography may be used - the abomasum is dilated and trapped between the liver and right abdominal wall, hypoechogenic ingesta and abomasal folds are seen ventrally, reverberation artifacts caused by gas are seen dorsally (Braun *et al.* 1997, 2003, 2004).

**Treatment:** immediate surgical correction or slaughter.

### 5. ILEUS OF THE SMALL INTESTINE

**Main clinical findings:** no or very little faeces with mucus and/or blood in the rectum; dilated loops of intestine are palpable transrectally in only about 40 per cent of cases (Braun *et al.* 1995).

**Diagnosis:** usually based on clinical findings: in unclear cases, ultrasonographic examination of the right abdominal wall is useful - dilated loops of small intestine with a diameter greater than 4.0 cm, usually with no motility, are seen. Fluid is often seen between the loops of intestine. A few dilated loops of intestine in the cranial region of the abdomen indicate an ileus in the cranial part of the small intestine. Multiple dilated loops of small intestine in the entire right side of the abdomen indicate an ileus in the caudal part of the small intestine.

**Treatment:** immediate surgical correction or slaughter in cattle with dilated loops of small intestine. Exceptions are ileus caused by hypocalcaemia (treated with intravenous infusion of calcium) and ileus caused by toxemia, e.g., with *E. coli* mastitis (mastitis treatment).

**Prognosis:** depends on the type and cause of the ileus - Haemorrhagic Bowel Syndrome has a poor prognosis, volvulus has a guarded prognosis and intussusception and obstruction of the small intestine by a bezoar have a good prognosis.

## 6. CAECAL DILATION

**Main clinical findings:** no or very little faeces with mucus and/or blood in the rectum. In cases with caecal dilation and no retroflexion, the caecum can be palpated transrectally. Caecal torsion around its longitudinal axis can also be palpated (Braun *et al.* 1989 ).

**Diagnosis:** based on rectal findings.

**Caution:** transrectal palpation of a dilated caecum with cranioventral or craniodorsal retroflexion may not be possible. Ultrasonographic examination from the right flank can be used to visualise dilation and retroflexion of the caecum (Braun *et al.* 2002).

**Treatment:** conservative treatment with neostigmine, intravenous infusion of a sodium chloride and glucose solution and intravenous infusion of calcium may be used in cases of caecal dilation without torsion and retroflexion (Braun *et al.* 1989). In all other cases, right flank laparotomy and emptying of the caecum are required.

**Prognosis:** good.

## 7. LIVER ABSCESS

Large liver abscesses that cause acute stenosis of the cranial part of the gastrointestinal tract may result in acute abdominal symptoms.

**Main clinical findings:** enlarged abdomen, marked decrease in feed intake and faecal output.

**Diagnosis:** usually not possible based on clinical findings. Ultrasonography can be used to locate a large abscess, which is usually between the reticulum and liver (Braun *et al.* 1997, 1998).

**Treatment:** transcutaneous lancing and draining of the abscess under the guidance of ultrasound provided that the abscess is located immediately adjacent to the abdominal wall (Braun *et al.* 1998, 2005). Otherwise, lancing and draining the abscess can be attempted from within the reticulum via ruminotomy (Fubini *et al.* 1985).

**Prognosis:** good.

## 8. OBSTRUCTION OF THE BILE DUCTS

**Main clinical findings:** colic, icterus, bilirubinuria, photodermatitis.

**Major biochemical findings:** hyperbilirubinaemia, marked increase in the activity of  $\gamma$ -glutamyl-transferase ( $\gamma$ -GT).

**Diagnosis:** a tentative diagnosis is based on clinical findings. A definitive diagnosis is based on the ultrasonographic findings, which include dilation of the intrahepatic and/or extrahepatic bile ducts and/or gallbladder (Braun *et al.* 1995).

**Treatment:** spasmolytic drugs and magnesium sulfate are given initially. When there is no response within 24 hours of treatment, surgery is indicated to prevent rupture of the gallbladder (Braun *et al.*

2005). The approach is from the ninth to 11<sup>th</sup> rib, depending on the ultrasonographic findings. Cholecystoduodenostomy (Dirksen *et al.* 1976) is attempted, usually after resection of the ninth, 10<sup>th</sup> or 11<sup>th</sup> rib, to provide sufficient space for surgery.

## 9. RENAL COLIC

The most common condition is obstruction of the ureter(s) in cows. The cause is either pyelonephritis, in which blood clots or pus lead to obstruction, or obstructive urolithiasis, in which a solid concrement creates an obstruction.

**Main clinical findings:** colic, dysuria, abnormal urine.

**Diagnosis** (Braun *et al.* 2006; Gründer *et al.* 2002; Van Metre *et al.* 2002): transrectal palpation may reveal a dilated ureter and/or enlarged kidney, urinalysis may reveal haematuria and/or proteinuria and ultrasonographic examination may show a dilated ureter and/or abnormal kidney.

**Treatment:** unilateral nephrectomy.

**Prognosis:** good when only one kidney is affected.

## 10. ASCITES

Ascites is often missed during clinical examination because a pear-shaped abdomen is only visible in advanced cases and fluid is only detected during rectal examination when the ascites is severe. Ultrasonography is the method of choice for identifying fluid, even small amounts, within the abdominal cavity. Ultrasound-guided abdominocentesis is also straightforward, and the fluid collected can be examined to differentiate inflammatory and non-inflammatory processes (Braun *et al.* 1997, 2005).

### 10.1 Non-inflammatory ascites

**Most important causes:** chronic heart disease and severe liver disease with portal hypertension. Other causes include renal disease (amyloidnephrosis), intestinal (ileus), peritoneal (tumours) and vascular disorders (thrombosis of the caudal vena cava).

**Ultrasonographic findings:** accumulation of hypoechogenic fluid in the abdomen.

**Diagnosis:** the cause of the ascites is determined using the results of the clinical examination, haematological and biochemical analyses, ultrasonography and abdominocentesis.

Treatment is indicated only when the cause is attributable to ileus or portal hypertension caused by a liver abscess or fascioliasis. In both cases, the cause must first be addressed; after successful treatment, the ascites quickly resolves.

### 10.2 Inflammatory ascites

**Cause:** peritonitis due to various disorders including reticular foreign body, abomasal ulcer and fascioliasis.

**Ultrasonographic findings:** accumulation of anechogenic to hypoechogenic fluid in the abdomen. Echogenic bands of fibrin are often seen floating within the fluid. Echogenic deposits of fibrin on the peritoneum or on the internal organs are also commonly seen.

**Diagnosis:** the results of the clinical examination, haematological and biochemical analyses, abdominocentesis, ultrasonography and radiography of the reticulum are used to establish a diagnosis.

Treatment will vary with the cause. In cases of generalised peritonitis, treatment is almost always contraindicated regardless of the cause.

## **11. SUMMARY**

In cows with acute abdominal disorders, rapid diagnosis and treatment are imperative to prevent irreparable organ damage and improve the prognosis. In the past, an exploratory laparotomy was often quickly resorted to as a diagnostic aid in cows with acute abdomen, in which the results of other tests were inconclusive. Today, many cattle owners will consent to exploratory laparotomy only when the prognosis is good and the procedure promises to be curative. Thus, all non-invasive diagnostic aids must be used to decide whether surgery is necessary. An accurate diagnosis allows specific treatment or slaughter/euthanasia to be performed. In bovine practice, the clinical examination assumes an extremely important role, because adjunctive diagnostic aids are often not readily available. The majority of disorders can be diagnosed based on the results of a thorough clinical examination. However, when a diagnosis is not possible in practice, the concentration of ruminal chloride should be determined and a glutaraldehyde test carried out. If feasible, a complete blood cell count and serum biochemical profile can be carried out; the results often provide information about the location, nature and severity of the disorder. Ultrasonography, accompanied with radiography, if necessary, is an excellent method of diagnosing abdominal disorders in cattle. This paper presents the most important findings, diagnosis and treatment of acute traumatic reticuloperitonitis, right displacement of the abomasums/abomasal volvulus, ileus of the small intestine, caecal dilation, liver abscess, biliary obstruction, renal colic and ascites.

## **12. KEY WORDS**

Cattle, acute abdomen, diagnosis, therapy.

## **13. RESUME**

Chez les bovins présentant une affection abdominale aiguë, l'établissement précoce du diagnostic et du traitement sont indispensables pour prévenir l'apparition de lésions organiques irréparables et améliorer le pronostic.

Dans le passé, la laparotomie exploratrice était souvent le seul recours d'aide au diagnostic d'une affection abdominale aiguë, lorsque les autres examens se révélaient insuffisants. De nos jours, les éleveurs consentent à l'utilisation de la laparotomie exploratrice uniquement lorsque le pronostic est favorable, ou que les chances de succès thérapeutiques sont bonnes. Ainsi, toutes les techniques d'aide au diagnostic qui sont non-invasives doivent être utilisées pour apprécier l'utilité de l'intervention chirurgicale. Un diagnostic précis permet de choisir entre un traitement approprié, ou la réforme de l'animal (abattage ou euthanasie). En pratique bovine, l'examen clinique est extrêmement important, car les examens complémentaires sont souvent difficilement accessibles. La plupart des désordres peuvent être identifiés sur la base des résultats d'un examen clinique minutieux. Cependant, lorsque le diagnostic n'est pas possible en pratique, la concentration ruminale des ions chlorure doit être mesurée et un test au glutaraldéhyde réalisé. Lorsque cela est possible, des examens hématologiques et biochimiques sanguins peuvent être réalisés ; les résultats apportent souvent des informations sur la localisation, la nature et la sévérité de l'affection. L'échographie, associée à la radiographie, si nécessaire, est une excellente technique d'aide au diagnostic des désordres abdominaux chez les bovins. Cet article présente les données majeures qui ont été obtenues pour le diagnostic et le traitement de la réticulo-péritonite traumatique, de

dilatation/torsion de la caillette et du volvulus abomasal, de l'iléus intestinal, de la dilatation du caecum, des abcès hépatiques, de la lithiase biliaire, de la colique néphrétique et des ascites.

#### **14. MOTS CLES**

Bovin, affection abdominale aiguë, diagnostic, traitement.

#### **15. ZUSAMMENFASSUNG**

Bei einer akuten Erkrankung des Abdomens mit gravierenden klinischen Symptomen ist es wichtig, so schnell wie möglich eine genaue Diagnose zu stellen, da sonst wertvolle Zeit verloren geht und irreparable Organschäden auftreten können. Früher wurde bei Kühen mit akutem Abdomen bei Unklarheit relativ schnell eine Probeparotomie durchgeführt, um weiteren Aufschluss über die Erkrankung zu erhalten. Heute sind die Landwirte vielfach nur dann bereit, eine Laparotomie durchführen zu lassen, wenn die Prognose günstig gestellt und die Kuh mit dem Eingriff geheilt werden kann. Es muss deshalb vor einer operativen Therapie mit allen Mitteln versucht werden, die Diagnose auf nichtinvasivem Weg zu stellen. Je genauer die Diagnose gestellt wird, desto gezielter kann eine Therapie durchgeführt oder der Rat zu Schlachtung gegeben werden. Da in der Praxis die Hilfsmittel oft begrenzt sind, kommt der klinischen Untersuchung eine extrem wichtige Rolle zu. Die Mehrzahl aller Krankheiten kann mit Hilfe einer exakten klinischen Untersuchung diagnostiziert werden. Wenn keine Diagnose gestellt werden kann, sollen unter Praxisverhältnissen als weiterführende Massnahmen das Pansenchlorid bestimmt und ein Glutaltest durchgeführt werden. Wenn die Möglichkeit besteht, kann eine komplette Blutanalyse durchgeführt werden. Diese Untersuchungen erlauben oft weitere Rückschlüsse auf den Sitz, die Art und den Schweregrad der Erkrankung. Als weitere diagnostische Massnahme kommt die Ultraschalluntersuchung in Betracht. Diese eignet sich, zum Teil in Kombination mit der Röntgenuntersuchung, hervorragend, um Erkrankungen im Abdomen des Rindes näher abzuklären. Die wichtigsten Befunde, das diagnostische Vorgehen und die Therapie der akuten traumatischen Reticuloperitonitis, der rechtsseitigen Labmagenverlagerung, des Dünndarmileus, der Blinddarmdilatation, des Leberabszesses, der Obstruktion der Gallengänge, der Nierenkoliken und des Aszites werden kurz dargestellt.

#### **16. SCHLÜSSELWÖRTER**

Rind, Akutes Abdomen, Diagnostisches Vorgehen, Therapie.

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