# ASSIGNMENT COVER SHEET

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**(Including this one)**

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Please attach details if you are seeking Special Consideration

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Signed: 21 July 2009
Assessment Item 2

History
Number 769 was a Holstein heifer. She had been mated naturally to one of a team of 5 black poll bulls and had been grazing pasture for the last 12 months.

She had calved in the paddock approximately 12 hours prior to being seen by the vet. The producer had made no attempts at treatment. Her dead calf remained on the ground nearby; it was still partially encased in foetal membranes.

A physical examination revealed a heart rate of 148 beats per minute (although this may have been artificially elevated as it was taken after the heifer made several attempts to stand) and the heart sounds were of normal intensity. She had a rectal temperature of 37.8°C. She was bright, alert and responsive, and made repeated attempts to rise when approached. During attempts to rise, she appeared to be unable to adduct her hindlimbs. A vaginal examination revealed a 10cm tear in the right vaginal wall and there were no retained foetal membranes. On rectal examination, the uterus had contracted appropriately. A urine dipstick was within normal ranges for all tests.

Differential diagnoses for a down cow include:
- Metabolic diseases: Hypocalcaemia, hypomagnesaemia, hypophosphataemia, hypokalaemia, ketosis
- Toxaemia/shock caused by: acute coliform mastitis, acute diffuse peritonitis, carbohydrate engorgement, prolapsed or rupture of the uterus
- Injury to pelvis/limbs: radial paralysis, dislocation of the coxofemoral joint, rupture of the gastrocnemius
- Degenerative myopathy/ Downer cow syndrome/calving paralysis
- Bovine spongiform encephalopathy

Differentiating between the differentials
In the field, differentiating between these conditions is usually based on clinical signs. As the cow was alert, responsive and not generally weak, toxoaemia/shock, hypocalcaemia, ketosis and hypokalaemia as less likely. Temperature was only slightly below normal range (38.0-39.0°C (Jackson & Cockcroft, 2002)); this may have been due to the low ambient temperature. This observation makes an infectious process less likely. Bovine spongiform encephalopathy is unlikely due to the acute onset of the disease.

Palpation of the limbs and pelvis revealed no obvious fractures or soft tissue swelling, and manipulation did not elicit any crepitus. These findings decrease the likelihood of fracture or dislocation as the cause of the cow’s recumbency.

Elimination of the above conditions leaves us with metabolic diseases and downer cow syndrome. A negative reaction to ketones on a urine dipstick makes a diagnosis of ketosis unlikely. The normal intensity heart sounds decrease the likelihood of hypocalcaemia or hypomagnesaemia. The tear in the vaginal wall is indicative of a traumatic birth, and inability to adduct the hindlimbs may indicate nerve damage (Radostitis, 2007). For these reasons, calving paralysis was diagnosed as the primary cause of recumbency, with potential secondary downer cow syndrome.
Further diagnostic testing

The only diagnostic testing used in this case was the urinalysis provided by the urine dipstick. Other testing that could help to differentiate between the differential diagnoses includes serum biochemistry and haematology. Serum biochemistry would evaluate the levels of calcium, magnesium, phosphate and potassium, making the diagnosis of deficiencies of any of these ions apparent. Creatinine kinase would likely be elevated for all differentials due to prolonged recumbency. The presence of abnormal white cell counts on haematology would indicate infection. Further neurological examination could be used to differentiate sciatic or obturator nerve damage, both of which may be implicated in calving paralysis. The inability to adduct one or both hindlimbs is indicative of obturator nerve damage, while damage to the sciatic nerve causes weakness in the hindlimbs and knuckling at the fetlocks (Radostits et al., 2007).

Treatment

The cow was treated with 1.5 packs (250mL total) of 5% dextrose, 25mL tolfejec (40 mg/mL tolfenamic acid) intravenously, 45mL oxytet LA (oxytetracycline 20mg/mL) intramuscularly, 1 pack (350mL) of 4-in-1 subcutaneously, and 250mL propylene glycol (ketol) orally. The dextrose, 4-in-1 and propylene glycol were administered to partially provide requirements for energy and mineral ions for maintenance, as the cow was not eating and, as a periparturient cow, had high energy demands. The tolfejec was administered as pain relief and to reduce inflammation and swelling that may be causing compression of the nerves within the pelvis. Long-acting oxytetracycline was administered to combat potential infections due to the vaginal tear or prolonged recumbency. As a wide spectrum of bacteria be implicated in any infection in this cow, a broad-spectrum antibiotic was used. The producer was advised to provide the cow with shelter, to roll the cow to the other side every four hours, and to provide passive physiotherapy. Another 45mL oxytetracycline was left for the producer to administer in three days.

Other treatment options include attempting to lift the cow with hip lifters, or supporting a standing posture using a warm water bath (Smith, 2002).

Prognosis

The prognosis for this case is guarded. If the producer provides the necessary nursing care, her chances of survival are increased.

Epidemiology and Future Management

Calving paralysis occurs mostly in heifers that have had a traumatic calving. Downer cow syndrome occurs as a sequela to a primary cause of recumbency, generally when the cow has been recumbent for several hours prior to treatment.

Options for future management include prevention by choosing bulls/AI sires of the same breed with low birth weight ABVs to join the heifers, or use sires with low birth weights such as Jerseys. Ensure that heifers meet target joining weights prior to joining, and are fed appropriately throughout gestation to allow for heifer growth without maximising foetal growth are additional methods to reduce dystocia and associated calving paralysis. Close monitoring of the springing heifers may enable to producer to detect heifers experiencing difficulty calving as provide assistance in a timely manner. Prevention of prolonged recumbency by early detection and treatment will reduce the incidence of downer cow syndrome.
Reference List


Smith, B. P. (2002). Large animal internal medicine (3rd ed.). Missouri; Mosby.
Assessment Item 2 – Case report

Traumatic Reticuloperitonitis - Pericarditis

Case Background
This case was investigated over a period of 2 weeks, during which period 2 different vets had visited the cow on separate occasions. Vet A undertook preliminary investigations. A presumptive diagnosis was made by vet A and confirmed by vet B 2 weeks later. Vet B formed a definitive diagnosis during post mortem examination of the cow.

The details given below are a combination of findings from both vets. The clinical signs as well as objective/subjective analyses described below were recorded prior to post mortem examination since this was the one and only time that I had examined the cow.

Animal Details

3 year old dairy cow
2nd lactation
No history of previous veterinary attention recorded

Signalment

Dairy cow
Dairy cow > 2 years of age
Feeding on silage or hay daily
Recently calved

Clinical Findings

Reported by Vet A (2 weeks earlier)
- Underweight (condition score 4/9) – anorectic
- Temperature 39.1 degrees
- Reduced milk out put
- Mild dyspnoea (slightly shallow)
- Avoidance of movement
- Slight abduction of the elbows
- Significant ‘washing machine’ heart murmur - holosystolic grade 4 out of 5 murmur + palpable thrill over cardiac region.

Reported at time of recent visit/post-mortem
- Deterioration of condition since previous visit – also reported by farmer
- Underweight (condition score 4/9) – anorectic
- Pyrexia
- Agalactic
- Marked submandibular, parasternal muscles (brisket) and ventral oedema
- Dyspnoea (shallow, abdominal respiration)
- Extended neck
- Salivation
- Arched, hump-back stance
- Abducted elbows
- Dullness (almost absence) of heart sounds (indicating pericardial effusion) + decreased amplitude of peripheral pulse → subsequent to significant heart murmur 2 weeks earlier
- Tachypnoea
- Jugular distension
- Decreased ruminal contractions
- Faeces dry and reduced
- Gait – reluctant shuffle and cautious
- Grunting on defecation/urination, walking

**Differential Diagnosis –**
*Including how it is possible to differentiate between differential diagnoses based on presenting clinical signs*

**Differential Diagnoses**
- Causes of abdominal pain + fever
  - **Peritonitis**
    - Extension of infection from other causes infections including:
      - Traumatic reticuloperitonitis (TRP) – high index of suspicion
      - Perforation of leakage of a abomasal ulcer (+ concurrent abomasal displacement)
    - Sequelae to:
      - Acidosis
      - Severe salmonellosis cases
      - Septic metritis/endometritis or pylonephritis
      - Mediastinal abscess
      - Complication of caesarean surgery
      - Abdominal catastrophe
- Causes of ventral oedema + heart murmur + pulmonary oedema
  - Bilateral congestive heart failure (CHF) –Due to →
    - **Valvular disease**
      - Endocarditis (resulting in either valvular stenosis or insufficiency)
      - Rupture of valve or chordae tendineae
    - **Myocardial disease**
      - Myocarditis – bacterial, viral, parasitic or toxic
      - Myocardial degeneration – nutritional or toxic
      - Cardiac lymphosarcoma
    - **Hypertension**
      - Pulmonary hypertension – Brisket disease (mountain disease), cor-pulmonale (low index of suspicion)
    - **Pericardial disease**
      - Traumatic (perforation of pericardial sac) or extension from other infection (pleurisy or myocarditis)
- Causes dyspnoea with abdominal breathing and abducted elbows (+ friction rubs)
  - **Pleuritis and pleural effusion**
    - Primary pleuritis → causes of bronchopneumonia
      - *Pasturella multocida*
      - *Mannhymica haemolytica*
      - *Arcanobacterium pyogenes*
- Secondary pleuritis
  - TRP or extension from other causes of peritonitis, liver abscesses, tumours, external trauma
- Causes of rumen hypomotility + anorexia (not all)
  - Hypocalcaemia
  - Vagal indigestion
  - Anorexia or reduced intake
  - Peritonitis
  - Ketosis
  - Carbohydrate engorgement

Clinical signs of CHF in combination with pain in the cranial abdomen suggest, that it is most likely CHF is not the primary pathology since causes of CHF are generally not painful and generally pyrexia is not usually a common finding. Pericarditis is recognised by the absence or muffling of heart sounds associate with the presence of pyrexia and persistent tachycardia – however, it is not possible to differentiate a traumatic or infectious cause of pericarditis without percardiocentesis.

The presence of cranial ventral abdominal pain (as indicated by xyphoid pressure, stance, gait) helped to differentiate from causes of more caudal abdominal pain such as perforation of abomasal ulcers which typically cause pain over a larger area of the abdominal wall and usually on the right hand side. Carbohydrate engorgement as a cause of peritonitis was ruled out by absence of tinkles/splashing noises in the rumen and feed history. A more conclusive diagnosis could be made on abdominocectesis.

Other causes of rumen hypomotility other than peritonitis (ie ketosis or indigestion) are usually not painful and vitals generally remain within normal limits unless there is an underlying complication. Absence of gross abdominal distension or distended viscous on rectal palpation helps to rule out abdominal catastrophes and absence of an audible ping or tinkle rules out abdominal displacement or volvulus which are considered more common causes of agalactia, tachycardia, anorexia.

Cause of appetite and milk yield fall are often very general and non specific and includes acetonaemia. However, falls in appetite and milk production are generally abrupt in TRP but slowly over a period of several days and not to the same degree in acetonaemia.

Therefore since it is uncommon that the above clinical signs (CHF signs plus abdominal pain) occurring simultaneously without an underlying pathology, it was suggested that TRP + pericarditis is highly likely. This hypothesis is further supported by history, signalment and prior experience.

**Diagnostic work-up**

*Including how this helped to differentiate between the differential diagnoses.*

**Date – 3rd July 2009**

**Clinical Examination Findings**

### OBJECTIVE

- Temperature – 39.4
- Heart Rate – 90 bpm (increased)
- Respiratory rate - 39.4 °Celsius

- Urinalysis – Ketone bodies present (mild reading)

**SUBJECTIVE**
- Rectal Examination- NAD – rumen size reduced probably due to anorexia
- Vaginal Examination- NAD
- Thoracic auscultation
  - Increased lung sounds (some crackles present)
  - Marked tachypnoea and dyspnoea evident (shallow abdominal breathing)
- Cardiac auscultation
  - Heart sounds difficult to discern (almost absent) over cardiac region c.f significant heart murmur 2 weeks earlier.
- Abdominal auscultation
  - Rumen contractions -reduced rate and intensity.
  - No evidence of audible ‘ping or tinkle’
- Pressure on the xyphoid elicited painful response.
- Skootch test +ve (indicating abdominal pain) – reluctance to dip back when pinched firmly along the withers.
- Deterioration of condition since previous visit – also confirmed by farmer
- Farmer reported agalactia
- Marked submandibular, parasternal muscles (brisket) and ventral oedema
- Extended neck
- Ptyalism
- Arched back stance
- Abducted elbows
- Dullness (almost absence) of heart sounds (indicating pericardial effusion) + decreased amplitude of peripheral pulse → subsequent to
  - Tachypnoea
  - Jugular distension
  - Decreased ruminal contractions

**ASSESSMENT**
Cow in poor body condition (BCS 3.5/9), respiratory distress and displaying obvious signs of congestive heart failure (CHF). Significant deterioration of condition over 2 week period and failure to respond to antimicrobial therapy satisfactorily.

Positive pain response to xyphoid and skootch test are together considered the most sensitive means of demonstrating cranial abdominal pain. In light of this response and the current clinical presentation TRP should be considered highly likely.
Respiratory noises (crackles) and effort is suggestive of pulmonary oedema which would also fit with left sided CHF secondary to pericarditis and pleural effusion.
Absence of heart sounds over enlarged cardiac region suggests presence of significant pericardial effusion continuing to progress since previous visit where a significant heart murmur was detected.

**PLAN**
- Euthanasia
- Carry out post mortem examination in the hopes of finding a foreign body.
Prior to P.M. note submandibular, brisket, ventral oedema, arched back stance and dyspnoea

Looking into cranial abdomen (diaphragm) – note the adhesions between the reticulum and diaphragm. A tract was identified leading from the cranioventral reticulum to the diaphragm surrounded by fibrous tissue

Large quantities of abdominal and pericardial fluid (foul smelling) containing fibrinous clots and adhesions. Note thickening of the pericardial sac.

The culprit – 3cm fencing wire found inside reticulum magnet

Other diagnostic options available

Other diagnostic/testing options that could have been carried out include:

- Thoracic percussion (determine the area of pleural effusion as identified by a ventral line of dullness)
- Abdominocentesis (confirm peritonitis)
- Pericardiocentesis (confirm pericarditis and provide temporary therapeutic benefits)
- Survey radiology or contrast radiography of the reticulum (theoretical suggestion but not usually practical or practiced in reality)
- CBC – to help separate infectious from non infectious causes and distinguish acute from chronic conditions (not diagnostic)
- Ultrasonography- Allows assessment of reticular motility and presence of adhesions/abscesses, fibrinous deposits
Treatment and Advice
Including justification of the course of action

On initial visit vet A prescribed 5 days of Oxytetracycline AB - This was chosen since OTC is a broad spectrum and inexpensive AB (which the farmer already had access to) and the milk withholding periods are relatively short. The response to this was therapy was transitory.

On suspicion of TRP a rumen magnet was also instilled via probang.

The farmer was advised at the initial visit of the high probability of TRP and therefore poor response to these conservative treatments. The owner was initially advised to monitor the condition of the cow and call the clinic if she deteriorated further. The suggestion of a post mortem examination if warranted was discussed and the owner was in agreement out of personal curiosity.

Conservative treatment was initially justified because the veterinarian was suspicious that TRP was involved and further investigations and treatments (mentioned below) were restricted by cost and practicality. A magnet was considered an affordable final attempt to help immobilise the foreign body (even if it was used with a degree of scepticism at the time) and possibly stabilise condition. Antibiotics were warranted on the basis of clinical findings and clinical experience. Selection of AB was based largely on requirement for a cheap and broad spectrum agent.

Further treatment options for the presumptive diagnosis

Other treatments that are suggested in the literature include the following non conservative treatments:
-Rumentomy
Surgical removal of the foreign body through rumenotomy incision. Reports show 80-90% recovery following this procedure assuming complication free recovery. Usually considered if there has not been a marked improvement following 3 days of conservative therapy.
-Drainage of reticular abscesses
Under ultrasound guided transcutaneous incision

Prognosis

Case prognosis – Poor ;
Failure to respond to antimicrobial therapy and progression of clinical condition over a 2 week period both support a guarded/poor prognosis.
Suggestion of euthanasia and post mortem examination was based on veterinary experience with similar cases which eventually die of heart failure within 2-4 weeks of obvious clinical signs of cardiac insufficiency.
Chronic cases of TRP are usually culled on the basis of poor production, failure to respond to therapy and ill thrift.
Diagnostic result validity and reliability

The most sensitive antemortem testing involved with this case was the skootch (withers pressure) test and xyphoid pressure tests; both of which indicated pain in the cranial abdomen. This pain response is considered unique to TRP in cattle. Therefore it could be concluded that such tests have a moderate-high level of validity and reliability in the diagnosis of TRP.

A post mortem examination where the causative foreign body is identified is definitive for TRP (in association with recognised clinical signs) and therefore highly reliable and valid.

A post mortem examination which fails to find the foreign body in a cow showing clinical signs which are strongly suggestive of TRP obviously has a lower validity and reliability than if the foreign body is found. Support for the diagnosis of TRP in such a situation is further strengthened by necropsy findings that are highly suggestive of those recognised in TRP. In addition understanding case signalment, clinical findings combined with a history of grazing hay/silage will help to increase the index of suspicion.

Further diagnostic work/testing or treatment/advice
Including reasoning

A post mortem was requested in this case to resolve the farmers’ curiosity for an answer and therefore attempt to provide a definitive diagnosis.

Epidemiology of TRP

Adult dairy cattle are most commonly affected 93% of which are over 2 years old in one study. The disease is more common in cattle fed on prepared feeds, particularly hay or silage made from fields that contain old rusting fences or baling wire, or when pastures are on areas or sites where buildings have recently been constructed, burned, or torn down.

The median days of occurrence was on 113 days after calving and there is a suggestion that pregnancy causes increased abdominal pressure which accentuates clinical disease to become significant. The typical foreign body is a metallic object, such as a piece of wire or a nail, often greater than 2.5 cm in length.

Prevention and control/management of TRP
- Whilst there is mixed opinions regarding the use of prophylactic magnets placed in the reticulum there is a suggestion that magnets should be used in all cattle over the age of one.
- Cattle should be kept away from construction sites and other such industrial areas. Housing areas should be free of scrap metal areas.
- Crop fields should be monitored for metal debris
- Silage/hay should be sourced from credible sources of good quality
- Processed feed can be passed over magnets to recover any magnetic foreign bodies prior to feeding.
- When several or a cluster or TRP occurs the nature of the feed supply should be considered as a risk factor. Avoid the use of metal tires to secure silage piles.
- Keep cattle away from sites of new construction, and completely removing old buildings and fences
Bibliography


http://www.vet.uqa.edu/VPP/clerk/caveto/index.php