C-section technique and abdominal surgery

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Caesarean section via standing flank laparotomy is a relatively common procedure to resolve intractable dystocia in cattle. It is considered a clean contaminated surgery, and the aim is, ideally, to have a live and productive cow that can reproduce in the future as well as a live and viable calf.

Standing flank laparotomy is also performed to repair bloat wounds, conduct a rumenotomy, and to diagnose and treat a range of abdominal problems in cattle and other farm animal species. However, the success of these procedures and patient outcomes are closely linked to the veterinarian's familiarity with these procedures and their confidence in their own surgical skills (which is likely to strongly influence the timeliness of their decision to perform surgery). The good news is that surgical preparation of surgeon and cow, local anaesthesia of the flank, and opening and closing of the abdominal wall are the same or very similar for all cattle abdominal surgeries. This summary will provide updates on the most important surgical techniques in cattle and aims to provide tools to improve decision-making processes in cattle surgery.

Indications

C-sections/ dystocia

Elective c-sections

- Sometimes performed in valuable calves, such as embryo-transfer calves, to ensure the best possible outcome for the calf.
- Default for delivery of certain beef breeds as calves are too big to be born *per vias naturales*, for example breeds with double muscling like Belgian Blue.
- The content of the uterus is usually not contaminated as the cow would not be in active labour so remember that an elective c-section will be a cleaner surgery than an emergency c-section.

Emergency c-sections

- Feto-maternal or feto-pelvic disproportion due to relative or absolute fetal oversize (undergrown heifers!).
- Incomplete dilatation of the cervix (ringwomb) or problems with the maternal vulva/vagina or pelvis.
- Uterine torsion (some or most cases?).
- A fetal malpresentation that can't be corrected otherwise.
- Fetal monsters (schistosomes).

Emphysematous

- In some cases where a calf is emphysematous and a fetotomy can't be performed (closed cervix) a c-section might be indicated, however there is a considerable risk of contamination and peritonitis! Seriously consider whether the cow is not better off being euthanised.

Other abdominal surgery - to cut or not to cut?

Conditions that always require abdominal surgery to correct them are also referred to as 'abdominal catastrophes' and include torsion of the intestines at the root of the mesentery, other significant intestinal torsions, right displaced abomasum (with or without volvulus), intussusception, blockage/ obstruction of intestinal lumen (for example by blood clot (= haemorrhagic bowel disease), gravel, feed particles, phytobezoars, foreign bodies, etc.) and severe bloat.

Other conditions that can often require surgical intervention include left displaced abomasum, caecal torsion and some types of ileus.

In cows with suspected abdominal disease, the following findings are indicating that the patient likely needs surgical intervention ('red flags'):
- Very high heart rate (>100/min in cow, >120/min in calf).
- Severe colic (kicking abdomen, severe discomfort, going up and down).
- Full distended abdomen and very dehydrated.
- Not enough faeces, mucous in rectum.
- Feel loops of distended intestines on rectal exam.
- Severely distended intestinal loops on ultrasound (Ø>4.5cm) – a curvilinear rectal ultrasound unit works well!

Decision making for caesarean section

In most dystocia cases in New Zealand, the farmer cannot provide accurate information about when labour has started or when the waters of the cow have broken. It is probable that the cow has already tried to calve for a significant amount of time. Therefore, a rapid clinical assessment and decision to perform a c-section (<20min) is paramount to achieve a reasonable outcome. The condition of the cow at the time of surgery is the major determinant affecting the outcome of the procedure. Further to the indications listed above, the following aspects should be considered:
- What facilities and protection from elements are available for surgery? If it must be done out in the rain the chance for complications will increase.
- Are signs of fetal stress present (hyperactivity, meconium in uterine fluids)? -> get calf out fast!
- Is there soft tissue trauma present? -> c-section might be safer option.
- Are front feet crossing over when calf is pulled up into pelvis? -> sign that calf is too big to fit through birth canal.
- C-section might still be faster and better option than fetotomy for a fresh dead calf: have encountered more situations where in hindsight c-section would have been better choice than fetotomy (never the other way around).

If not enough progress has been made within 20 minutes, a serious condition of cow or calf precluding natural delivery has been identified, or the welfare of the cow or calf are impaired a c-section should be performed. If the surgeon is skilled and experienced this procedure can be done within 45–70 minutes and if a decision to perform a c-section is made early the outcome is more likely to be favourable.

Pre-operative considerations

- Preparation of surgical field: Chlorhexidine preferable over Iodine scrubs
- Surgical hand preparation: consider using alcohol-based surgical hand-rub (Avaguard®, Softa-Man®, etc.): convenient and effective for field surgery
- Try to avoid sedation with Xylazine in c-sections if possible
- 'K-stun' for more agitated/ fractious patients: effective protocol to 'disassociate' the patient from the procedure and obtund responsiveness but maintain consciousness and motor control: 0.01–0.025mg/kg Butorphanol + 0.02–0.05mg/kg Xylazine + 0.04–0.1mg/kg Ketamine combined in one syringe, given IM; suitable for c-sections due to lower xylazine doses, safe for calf. BUT consider implications for withhold times!
- Local anaesthesia: paravertebral, line or inverted L-block. Paravertebral has less risks for adhesions or peritonitis, associated with improved dam survival 14 days postoperatively compared to line/ L-blocks
- Facilities very important, cow might go down.

Surgical technique

- Standing right flank approach preferred for most abdominal problems/ catastrophes; standing left flank approach for c-section (current evidence strongly advises against lying approaches unless cow unable to stand for duration of surgery).
- Surgeon can consider double gloving.
- Opening of the abdominal wall always follows same technique, all muscle layers should be individually identified and incised to avoid accidental damage to abdominal organs.
- Assess all abdominal organs that are within reach; for abdominal catastrophes you need to find transition from full intestines to empty intestines, that's where problem is usually located.
- C-section: determine position and presentation of calf, then start to exteriorise calf in uterus through abdominal incision; you might have to create partial uterine torsion (if normal anterior presentation push calf over away from you by hooking fists under short ribs/ hip of calf); try and 'lock' hindleg in abdominal incision.
- C-section: incise exteriorised uterus with scalpel between claws of the calf, extend cut with scissors along greater curvature down to hock, avoiding big blood vessels/ cotyledons; extract calf, check for second calf; re-glove / re-scrub depending on level of contamination; close uterus with continuous inverting non-perforating suture pattern (Utrecht, Cushing or Lembert), ideally double-layer (oversewing) -> decreased dam deaths at 14 days by 37% in recent study.
- C-section: look after the calf!
  - Pour bucket of cold water over calf's head as soon as it is on the ground -> will trigger gasp reflex and full inflation of lungs.
  - Rub, place in sternal recumbency, clear airways.
  - Consider 'Madigan Squeeze' technique for maladjusted 'dummy' calves.
  - Don't hang them over a rail/ fence! If you want them upside down to drain fluids/ mucous then holding them by hindlegs for 20–30 seconds is enough.

Aftercare includes NSAIDs and antibiotics for 3–5 days, for c-sections also oxytocin to promote uterine contraction, calcium and starter drench if needed.

References

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