Umbilical Hernias & Abscesses

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Recommended umbilical care
- Dip it once & keep it clean. If dipping is effective, the cord should shrivel (from ~14 cm to ~6 cm) within the first 6 days of life. In most calves it is dry by 48 hours.
- Ensure dip solution is clean, not expired and not caustic

Terminology
- Omphalitis – inflammation of umbilical structures (very general term). Simple umbilical abscesses are limited to the subcutaneous tissue in the area of the umbilicus and are nonreducible.
- Omphalophlebitis – inflammation of the umbilical vein
- Omphaloarteritis – inflammation of the umbilical arteries
- Patent or persistent urachus: persistence following birth of the tubular connection between the bladder and the umbilicus. (Urachus should be closed at birth.)
  o Diagnosed by visualization of urine exiting the urachus during/after normal urination or a constantly wet umbilicus
  o Rarely occurs in calves
- Umbilical hernia – heritable trait or secondary to infection; uncomplicated or simple hernias are non-infectious umbilical disorders where hernia ring easily palpable, and hernia reducible.

Every major and easily palpable joint must be palpated on a calf with umbilical infection. They are highly susceptible to septic arthritis. The most common joints involved are carpus, stifle and tarsus.

Anatomy review: Umbilical structures in a neonatal calf
- 2 umbilical arteries – branches of the internal iliac artery; actively retract after rupture of the umbilical cord via smooth muscle contraction causing closure of lumen; regress to form round ligaments of the bladder
- 2 umbilical veins – form one trunk upon entering the abdomen, goes to the liver & specifically the left branch of the portal vein; does not retract, but collapses and then regresses to become round ligament of the liver
- 1 urachus – connection between the bladder and the allantoid envelope of the placenta

You can **ultrasound umbilical structures** if you have an ultrasound (just about any ultrasound!!!)

Abdominal ultrasonography of the liver in a heifer. The infected vein (black arrowheads) can be located on the right side of the abdomen from the umbilicus to the liver. It appears as a tubular enlarged structure close to the portal circulation (white arrowheads), with permission from A. Desrochers

- Visualizing the diameter of the structures infected helps in surgical planning and to decide what protocol of anesthesia to use.
- A 5 or 7.5 Mhz sectorial probe without standoff is used to evaluate umbilical structures. A 5 Mhz linear probe for rectal ultrasound can give you good result if the animal is small and the structure involved close to the umbilicus. Ultrasound examination starts from the umbilicus and progress toward the bladder or the liver.

**Surgery**

The drugs, dosages and routes of administration as well as the suture materials recommended in these notes are what from peer-reviewed literature and textbooks on this topic. While the drugs may not be labeled for use in ruminants, AMDUCA permits extra-label drug use in order to allow treatment modalities when the health of an animal is threatened or suffering or death may result from a failure to treat.

- Drain the abscess if it is large or ready to rupture
  
  o Allow 7-14 days of drainage
  o Flush it well with large volume of tap water with an iodine solution for about a week
  o Hydrotherapy helps decrease the swelling after you drain the abscess.
  o The calf is started on Pen G (22 000 IU/kg q12) for 5 days or until the swelling is down and incision edges are not bleeding when manipulated
  o At this point, you have two choices based on the size of the abscess:
    ▪ Let it heals and reschedule the surgery in 3 weeks
    ▪ If the swelling is gone and drainage is small after one week of medical therapy, then, the incision is sutured with a purse string and the surgery is performed.

- Pre-op
  
  o NPO – This is a critical point and the duration should be based on the following criteria: Weight, Size of the hernia and expected incision length and Type of feeding.
    ▪ 12 hours for bottle fed or suckling calves (< 6 week-old or < 75 kg)
    ▪ 36h (roughage)-24h(grain)-12h(water) for larger animals.
    ▪ If the defect is large or the animal weighs more than 350 kg use the following schedule: 48-24-24
  o Meds
    ▪ You have to achieve high tissue level of antibiotics during the surgery; therefore the best time to administer it is right before surgery.
      • Continue for 2-3 days for clean and clean contaminated surgery
      • 5-7 days for contaminated surgery
      • Choice antibiotic will be different if there is concomitant septic arthritis
    ▪ Anesthesia protocol
      • Always perform a local anesthesia with lidocaine 2% before the final sterile scrub. Avoid large amount of anesthetic solution and anticipate your surgical incision length.
      • NSAID routinely administered just before the surgery
      • Simple hernia < 3 fingers
        o Xylazine (0.1mg/kg I.M.) and Ketamine (2 mg/kg I.M).
        o Repeat the ketamine if needed after 30 minutes of surgery.
• Large hernia or infected urachus, arteries or omphalophlebitis
  o Deep sedation/general anesthesia: Triple drip I.V. to effect (2 ml/kg of GG 5%, containing 0.1 mg/ml of Xylazine and 1 to 2 mg/ml of Ketamine
  o Epidural anesthesia: High epidural anesthesia with lidocaine provides good analgesia of the caudal part of the incision with hind limb paralysis.
    ▪ This epidural should be done aseptically with lidocaine from a new bottle.
    ▪ It is a coccygeal epidural (needle 20G or 18G on older calves) where the total volume injected is 0.15 ml/kg of a combine solution of lidocaine 2% (without epinephrine) and 0.05 mg/kg of xylazine. The solution is given slowly over 3-5 minutes and the calf is left to rest on sternal recumbency for 10-15 minutes before the surgery.
  o A nasotracheal tube (7mm) is often passed while the animal is on dorsal recumbency ready to be prepared for the surgery. Oxygen or anesthetic machine can be hooked up rapidly as needed.

- Prep
  o Dorsal recumbency (in a V trough for smaller calves)
  o Secure limbs well; Shave large & wide
  o Purse string the opening to the abscess to avoid contaminating your surgical site
- Fusiform incision (length of the incision should be 4X the width)
  o In cattle, most people agree to do an open herniorrhaphy because the chance of having an infected structure or adhesion in the hernia sac is higher than in other species. Also, resection of the hernia ring provides better healing of the abdominal incision.
    ▪ The abdominal wall is incised along the lateral aspect of hernia ring, just to get one finger through the incision and explore the abdomen.
    ▪ Incision of the ring is continued and hernia sac removed
  o If environment is highly contaminated and the hernia sac is clear of infection and adhesion, a closed repair is indicated but the hernia ring should be scarified or refreshed with a scalpel blade.
- Take it ALL out
  o Suture the omentum to close the defect with absorbable suture in simple continuous pattern.
  o Apical cystectomy
    ▪ Delicate dissection at the caudal aspect of the incision to avoid cutting the urachus...
    ▪ The urachus is always adhered to the peritoneum and the omentum. Careful dissection with scissors until the apex of the bladder can be exteriorized. Do not hesitate to extend your incision more caudally if dissection or exteriorization is difficult
• Resect en bloc bladder apex & abscess
• Place 2 inverted layers in a continuous pattern with USP 2-0 absorbable suture material on a swaged on taper needle. Avoid suture penetration of the bladder mucosa.

○ Did you palpate cranially to double check for omphalophlebitis?
  • These are challenging and complicated medical and surgical cases; consider referring or managing in a hospital setting. Don’t forget to check for septic arthritis!
  • Very delicate manipulation of the vein. The wall is much thinner than an infected urachus.
  • The vein is always adhered to the peritoneum. Careful dissection with scissors and fingers until the liver is reached.
  • If the vein is tapering off near the liver, en bloc resection is possible with double ligatures. If not, marsupialization has to be done.
  • A circular skin incision is performed at the right para-costal area. Muscles are bluntly dissected. Marsupialization through the abdominal incision has been associated with wound infection, dehiscence and hernias.
  • Verify that the umbilical stump is not leaking before moving it through the abdomen and to the marsupialization site.
  • The vein is exteriorized as much as possible without excessive tension. The vein fibrous wall is sutured to the muscle layers with interrupted horizontal mattress. A second suture is done between the vein and the skin.
  • The purse string on the umbilical stump is removed when the calf is standing for the first time. The vein is very gently irrigated every day with a diluted solution of iodine until it comes out clear. Avoid excessive pressure because rupture of the umbilical vein has been reported as well as rupture of into the bloodstream.

• Complications are more frequent than other umbilical surgical procedures:
  • Post-surgical pain
  • Excessive granulation tissue at the marsupialization site
  • Herniation at the marsupialization site
  • Rupture of the vein if too much pressure is applied during irrigation
  • Septic arthritis

○ Did you palpate caudally to double check for omphaloarteritis?
  • Double ligation on both arteries.
  • Avoid excessive tension when handling the arteries – don’t tear the internal iliac artery!!!!
  • The ventral approach allows visualization of the umbilical arteries and the enlarged urachus.
- Closure
  - Suture choice & pattern
    - Body wall – strong, absorbable suture that has prolonged holding strength & good knot security.
      - PDSII USP1, Maxon USP 0 (<100kg) or PDSII USP 2, Maxon USP 1 (>100kg)
      - Cruciate or simple continuous (interrupted in the middle) patterns are fine, and save time & material compared to simple interrupted, which is fine too.
    - SubQ – absorbable USP 2-0 suture in a simple continuous pattern
    - Skin – cruciate or Ford interlocking pattern
  - Rinse, rinse, rinse in between each layer with sterile, isotonic saline
  - Protect the incision – belly wrap for 48 hours to avoid wound contamination and to decrease pressure on the suture line.
- Post-op
  - Restricted activity & hay intake so that digestive organs do not put unnecessary stress on the abdominal wall closure.
  - Gradually increase hay intake to free choice over 5 to 7 days. (Start out with ¼ flake once or twice a day.)