

Management of umbilical diseases

Pierre-Yves Mulon, DVM, DES, DACVS
University of Tennessee College of Veterinary Medicine
Knoxville, TN 37996

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Umbilical infections are the most under-diagnosed pathology in young calves.¹ Infection of the umbilicus can have significant effects on the calves' development and mortality rate. Early detection of umbilical infection is important to avoid its progression of the infection deeper in the umbilical remnants. Once infection is established, the treatment necessitates either drainage or en-bloc removal of the umbilical structures. This presentation focuses on the surgical treatment of severe umbilical infections, their clinical presentations, the different surgical techniques and their associated outcomes, as well as the possible post-operative complications.

Clinical presentation of umbilical diseases

Any swelling, tenderness at the umbilicus should be taken seriously by the farmers. When observed, one swelling cannot be differentiated from another, and a simple hernia is very look-alike to an omphalo-phlebitis (Figure 1).^{2,4} Palpation is the key to easily differentiate hernias from infected umbilical structures.

The calf physical examination may remain within normal limits for the attitude and vital signs. Specific attention should be brought to the palpation of the joints as the calves may have been septic and bacteria could have seeded in some joints, being responsible for hematogenous septic arthritis. When infection of the umbilical structures pulls the bladder cranially, the heifers often demonstrate pollakiuria and some calculus could be present on the hair ventral to the vulva.

Figure 1: Clinical presentations of calves suffering from various umbilical diseases: **A)** Omphalitis, **B)** Infection of the urachus canal, **C)** Reducible non-infected umbilical hernia, **D)** Omphalophlebitis



Omphalitis are always firm upon palpation and non-reducible. If the calf is young enough, a mild sedation can be administered and the calf placed in dorsal recumbency to gently pull on the umbilicus and evaluate/palpate if an enlarged remnant runs either caudally or cranially.

However, a definitive diagnosis is obtained by performing an ultrasonographic examination of the abdomen. A complete evaluation of the umbilical structures of a calf can be obtained using a linear 7.5 MHz probe in young animals, however a 3.5 MHz curvilinear probe will offer a deeper penetration of the tissue and could be necessary in larger calves. Ultrasonography will allow to differentiate between simple omphalitis (abscess contained at the umbilicus) from omphalo-phlebitis (abscessation of the umbilical vein), infection of the urachus canal or omphalo-arteritis (abscessation of one of the umbilical arteries).^{5,6}

Blind insertion of a needle in the umbilical swelling to rule in or out the presence of pus is discouraged with the wide availability of ultrasonography. It carries unnecessary risks of perforating an incarcerated gastrointestinal segment and contamination of the peritoneal cavity.

Surgical treatment

Simple umbilical hernias are a heritable trait and surgical correction should be discussed with the owner to make sure this is well understood. Conservative management can be attempted if the hernia is small. Larger hernias or hernia in calves older than 2 months should be repaired surgically.²⁻⁵

Omphalitis (umbilical abscesses) can be simply lanced to drain the pus. Sometimes a hernia can occur after the resolution of the infection due to the defect in the body wall. Such hernias require surgical repair, but should not necessarily be considered heritable as they result secondary to an infectious process. Attention should be paid to the complete absence of infected tissue prior to surgery to avoid increase risk of secondary surgical site infection.

Umbilical infections involving the umbilical remnants require more invasive surgeries for en-bloc resection of the infected umbilical structure or eventually its marsupialization of the body wall of the calf. An elliptical skin incision is performed on both side of the umbilicus and blunt dissection of the subcutaneous tissue allows to expose the fibrous tissue surrounding the umbilical abscess. The abdomen is opened laterally to the abscess on the left cranial aspect of the abdomen as it minimizes the risks of inadvertent penetration of the infected structure. The abdomen is palpated and the abdominal incision is continued in order to free the umbilical abscess, identification and protection of the infected remnant is very important during this surgical step. The abdominal incision is extended cranially or caudally for infection of respectively the umbilical vein or the urachus canal and umbilical arteries.

Double ligation of the non-infected persistent remnant is performed first to leave the infected structure last. The deeper organs of the abdomen are protected and isolated from the infected structure with laparotomy sponges prior to continue.

For infection of the urachus canal, a partial apical cystectomy is performed to complete the en-bloc resection.

Resection of the umbilical vein is not always achievable if the infection invades the liver parenchyma and marsupialization of it may be necessary to control the infection. A circular incision is performed laterally and slightly cranially to the

ventral abdominal incision, and the abdominal muscle are incised along the orientation of the muscle fiber. The umbilical vein is passed through the lateral incision and secured to the skin, making sure to not penetrate its lumen. The umbilical vein is transected to allow the pus to drain either immediately after the surgery of 24 hours later depending on surgeon's preference.

Outcome

Resection of the umbilical remnant carries an overall good prognosis, however complications are much more frequent following marsupialization of the vein than any other umbilical surgeries. In a retrospective study on 87 cases of young animals that underwent surgical treatment of umbilical swelling, Williams et al. describe an overall positive outcome of 99%, however, the complication rate was high (73%).⁷ In a specific study on omphalophlebitis, Marchionatti et al. described an overall success rate of surgical treatment for 89%. A better prognosis was associated with en-bloc resection compared to marsupialization of the umbilical vein.⁸ The presence of a septic arthritis during initial evaluation had a negative effect on the outcome.⁸

Surgical site infection is the most common complication.⁷ Contamination of the wound can be secondary to an inadvertent spillage of purulent material, or due to the duration of the surgery. Meticulous hemostasis is paramount to lower the risk of surgical site infection, and copious lavage with isotonic saline during closure of the abdomen reduces contamination.

Surgical site infection can lead to dehiscence of the body wall closure and secondary formation of incisional hernia. Corrective surgery for incisional hernia should be delayed by 6 to 8 weeks to allow the fibrous tissue to mature and be strong enough to have sufficient suture holding power for adequate apposition of the tissue.

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