

Sinus trephination and horn problems

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Abstract

Conditions of the head requiring surgery in cattle are not uncommon when considering the incidence of conditions such as ocular squamous cell carcinoma, surgical dehorning, sinusitis and trauma-related injury. Surgery involving the eyes in cattle is relatively common, whereas surgery of the paranasal sinuses is less common. Surgery for conditions of the head tend to have a more favorable prognosis when there is early intervention.

Key words: bovine, sinus, horn, longhorn, trephination

Sinusitis

Frontal sinusitis in cattle is the most common sequela of dehorning procedures during which the frontal sinus was exposed following removal of the horn. However, it can also be seen following traumatic fracture of the horn and/or frontal bone, tipping of horns (such as commonly seen in rodeo bucking stock), and sequestration of bone secondary to dehorning. Similar to the horse, the frontal sinus is the largest of all the sinuses. However, in cattle, the frontal sinus is more compartmentalized which can make treatment of sinusitis more complicated. The caudal frontal sinus is the most expansive, extending into the horn (if present) as the cornual diverticulum in mature animals. Also unique to ruminants, a second diverticulum is located behind the orbit, identified as the postorbital diverticulum which is often the site for retention of purulent material beyond reach of fluid during a routine sinus lavage. The further compartmentalization of the caudal frontal sinus by irregular osseous and membranous partitions can make successful treatment of purulent sinusitis a challenge due to the inability to thoroughly and completely lavage the sinus. The frontal sinus normally communicates with the nasal passage via multiple fenestrations into the ethmoid meatuses.

Diagnosis

When clinical signs support a diagnosis of sinusitis, namely lethargy, inappetence, mucopurulent to purulent nasal discharge, head pressing, and/or head tilt, sinus lavage is a critical component of treatment. In acute cases of sinusitis when there is still drainage observed from the nostrils, lavage can be performed through a small hole created in the caudal frontal sinus using a 4 mm Steinman pin inserted with a hand chuck. This hole will accommodate the male end of a fluid administration set or Simplex outfit which will allow for routine lavage procedures. When lavage through a relatively small opening with a simple fluid administration set is unproductive, or there is an outflow obstruction of the communication with the nasal passage, further intervention will be needed. Chronic cases of sinusitis, complicated by the presence of inspissated pus, necrotic debris, bone sequestra, or thick secretions, usually require more invasive approaches to the sinus. Additionally, antibiotic treatment alone will not be curative in purulent sinusitis and frequent high-volume lavage is also required. Access to the frontal sinus can be achieved via trephination or osteotomy (sinus flap). For trephination, either a Galt or Michele trephine will be required. The advantage of the Galt trephine is that it results in a larger access portal to the

sinus. The appropriate site should be chosen to best access the affected sinus. (Figure 1) Radiographs can help determine the optimal site for the portal based on fluid location.

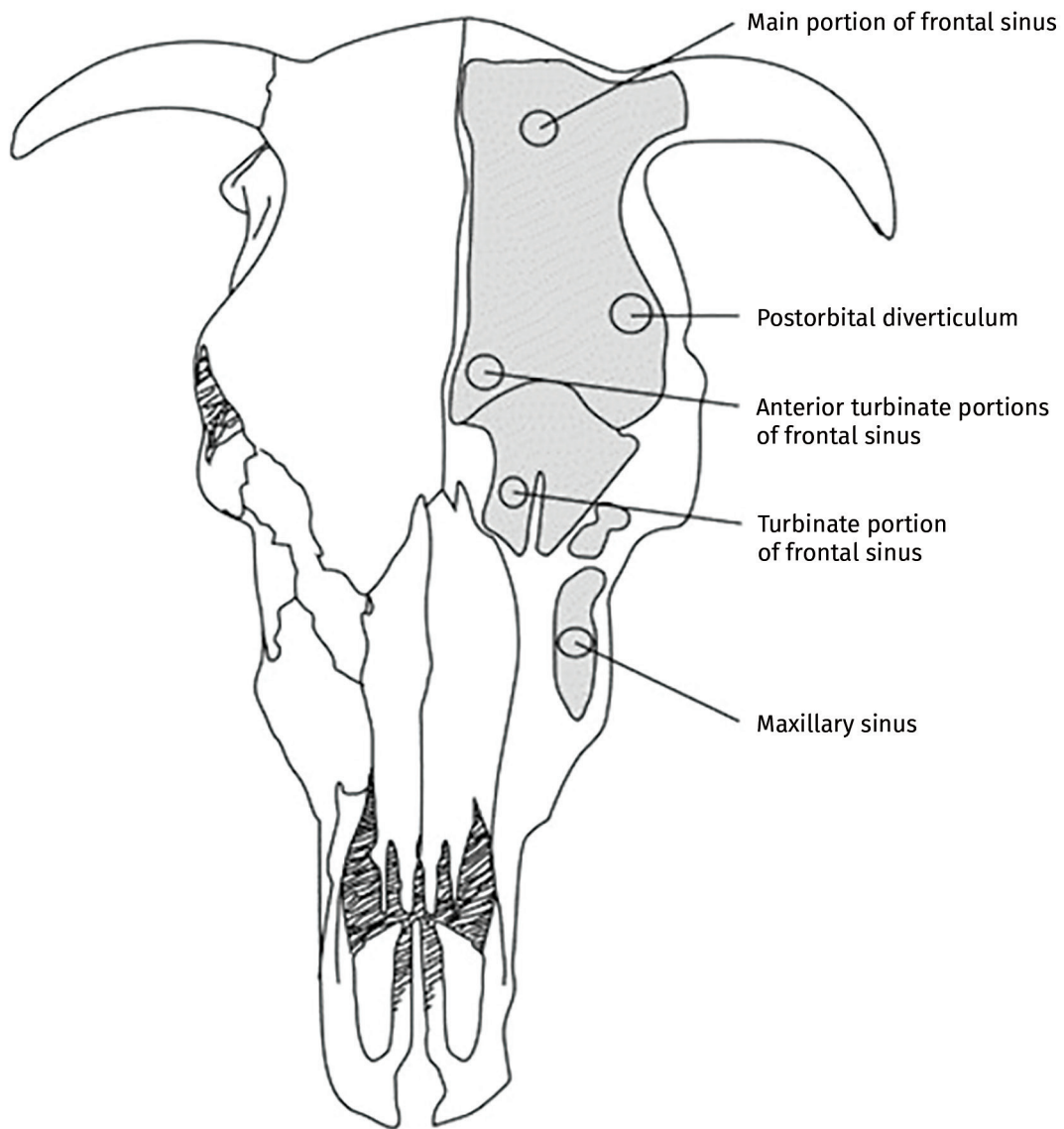
Trephination

The patient's head should be appropriately restrained in a hydraulic chute or manual head catch. A halter or hydraulic sweep should be used to further restrain the head to minimize movement during the procedure. The trephine site should be clipped allowing for at least a 2-inch circumferential margin around the proposed site. A rough preparation of the site should be performed with chlorhexidine scrub followed with alcohol. Ensure that these solutions do not contact the eyes as this will result in severe chemical keratitis. A judicious amount of lidocaine should be placed subcutaneously at the trephination site followed by a more thorough cleansing of the site with scrub and alcohol. Using a scalpel blade, a full thickness circular area of skin should be removed corresponding to the size of the trephine extending to the periosteum of the frontal bone. The trephine should then be used in a clockwise rotation to remove a section of bone allowing access into the sinus. At this time, a sample of the fluid within the sinus should be aseptically collected and submitted for culture and sensitivity. The sinus may now be lavaged and/or investigated further using flexible endoscopy if necessary. Lavage fluid should be at minimum room temperature, but preferably warm. Sterile saline can be used through a fluid pump for high-pressure, high-volume lavage. If finances are limited, a very dilute betadine solution can be substituted using clean water. Three-to-five liters of fluid are recommended. Notably, in one study, 5% diluted povidone-iodine solution was shown to have better outcomes than using saline alone.¹ A successful lavage will result in debris being floated out of the sinus through the trephine hole and fluid should be also be observed flowing from the ipsilateral nostril. If fluid is not observed at the nostril, this indicates the sinus drainage fenestrations are no longer patent and may result in a longer course of therapy and cost of resolution.

Aftercare

The trephine sites should be left open to heal by second intention. Covering the trephination sites is recommended to keep debris and further contaminants from entering the sinus. A stent bandage using #2 polymerized caprolactam (Braunamid; Braun) (or other non-absorbable suture material) is easily made by placing 2 loose interrupted sutures through the skin perpendicular to the surgical site, one above and one below the incision. A 12-inch segment of umbilical tape should be passed through each suture. A roll of 4x4 gauze sponges or a 4-inch roll gauze can then be placed over the incision and secured in place by the umbilical tape. The bandage may then be removed and replaced for subsequent sinus lavage procedures or alternatively left in place until the incision has closed. Post-operative care should also include the use of anti-inflammatory medications such as meloxicam (0.5-1.0 mg/kg PO SID – EOD) or flunixin meglumine (1.1 – 2.2 mg/kg IV as needed) and antimicrobial administration according to culture and sensitivity results.

Figure 1: Frontal sinus trephination sites.



Location of the paranasal sinuses and their associated trephination sites. Taken from: Gaughn EM, Provo-Klimek J, and Ducharme NG. Surgery of the Bovine Respiratory and Cardiovascular Systems. In: Fubini S, Ducharme N, editors. *Farm Animal Surgery* St. Louis: Saunders; 2004. p. 148

Figure 2: Trephination supplies

- Clippers with a #40 blade
- Lidocaine
- Chlorhexidine scrub and alcohol for site prep
- Sterile galt or michele trephine
- Sterile surgical gloves
- #10 or #15 scalpel blade and handle
- Gauze sponges
- Culturette or sterile syringe
- #2 Braunamid suture
- 1/2" umbilical tape

Conflict of interest

The author declares no conflict of interest.

References

da Silva L, Neto A, Campos S. Evaluation of four different treatment protocols to sinusitis after plastic dehorning in cattle. *Acta Sci Vet* 2010; 38:25-30

