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Surgery of the Equine Foot

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By nature of its design and function, the equine foot is subject to a multitude of disorders resulting in lameness. Several of these problems are most effectively managed by surgical intervention to achieve a favorable outcome. Categorically these disorders may be classified by etiology and include sepsis, trauma, degeneration, tumors or neoplasia.

The most common reason for surgical intervention is sequestration of the distal phalanx associated with sepsis, trauma or both. Abscessation of sensitive tissue of the hoof capsule with invasion of bone is a common contributing factor to sequestration. Sequestration may also occur as a result of direct trauma or from a penetrating object resulting in either bone or vascular damage. In most instances, sepsis occurs.

The primary complaint is lameness associated with the foot, and clinical signs include heat, increased digital pulse, and focal sensitivity to hoof testers over the involved area. Lameness and gait alterations are dependent on location of the lesion: if the abscess/sequestrum is at the toe, the horse has an exaggerated heel contact; whereas, if the involved region is in the heels, the horse will land toe first.

Diagnosis of sequestrum is made by the presence of reddened inflamed granulation tissue at the site of an opened abscess, and by the presence of sequestrum on radiographs. Radiographic changes may take days or even weeks to become evident, and is only recognized after demineralization occurs. Surgery may be performed standing or recumbent. If performed standing, local anesthesia, sedation, and tourniquet are necessary. Exposure is made with a hoof knife, scalpel blade and rongeurs. After removal, the bed of the sequestrum is smoothed by curettage, and the region is copiously lavaged.

Regional perfusion with antimicrobials is a useful adjunct to surgery where bone or joint is involved. Medical maggots may also be employed to aid with debridement of necrotic tissue if the clinician is unsure of the degree of dissection required. Their disadvantage is the extra expense involved compared to debridement if surgery is already being performed. Postoperative management entails daily soaks and bandage changes until keratinization occurs in addition to a course of systemic broad spectrum antimicrobial agents.

Puncture wounds to the foot may result in septic osteitis or sequestration of P3 depending on the location of the injury. The end result may be septic tendinitis of the deep digital flexor tendon, septic navicular bursitis or osteomyelitis, or septic arthritis of the coffin joint. Any of these are considered emergency situations and require debridement and/or flushing of the involved tissue. Radiographs should be taken with the object in place if possible, but if not, a probe may be placed in the tract, or radiographic contrast may be utilized to determine the extent of the puncture. Early intervention and appropriate flushing is paramount to success. Wounds involving the central portion of the frog have historically been managed by aggressive surgery with a “street nail” procedure. The convalescence and morbidity associated with this procedure are unacceptable to allow its use in an acute wound. These injuries are far more effectively managed by high use of irrigation and
general curettage of the tract. Post operative heel elevation is beneficial for providing relief of pain by relieving tension on the deep digital flexor tendon and navicular bone interface.

Invasive soft tissue masses of the foot are recognized, with the most common being keratomas. These tumor like masses originate at the area of the white line and are locally invasive, often resulting in pressure necrosis. These masses are customarily isolated and typically have a smooth surface. Radiographically, there is frequently a smooth area of lysis within the coffin bone. Some form of hoof wall alteration or disrupted hoof growth resulting from the presence of the keratoma commonly occurs as well. Treatment involves surgical resection and application of a sterile pack after debridement. The prognosis is good depending on the extent of involvement.

Quittor is a chronic condition of sepsis and necrosis affecting the collateral cartilage of the coffin bone. Surgical debridement until fresh cartilage is revealed and stabilization with a cast affords the most consistent successful outcome. Alternatively, medical maggots may be utilized to aid with cleanup of necrotic tissue.

Hoof wall injuries such as lacerations or avulsions of the wall may require some form of surgical intervention. Although suturing or lacing of avulsion injuries has been advocated over the years, it is a rare case that benefits from this. The most productive means of managing avulsion injuries is to remove the separated wall and allow room for fresh wall to develop. Further debridement may be necessary during hoof re-growth if the new wall encounters exuberant granulation tissue. If greater than 25 to 30% of the wall is removed, the remaining wall may require stabilization with a foot cast; otherwise, a bandage for support and hygiene will suffice.

Fracture repair for type III sagittal fractures of the coffin bone may be performed with lag screw fixation. The technique is largely an exercise in radiography while the horse is standing. Two round head markers (#6 bird shot) are placed on either side of the hoof wall, approximately 1 cm distal to the coronary band. Radiographs confirm proper placement so that drawing a line between the markers will cross the coffin bone 0.5 to 1 cm distal to the center of rotation of the coffin joint. Holes are drilled at the site of the markers to seat a c-clamp. The drilling process may be accomplished either standing with local anesthesia or recumbent under general anesthesia. The hoof undergoes sterile preparation, and a 4.5 mm drill is advanced to the level of the fracture line. The hole is completed with a 3.2 mm drill bit. A 4.5 self tapping screw is placed and tightened with position of the screw being confirmed radiographically. The hole is packed with sterile gauze to cover the screw head, and the bandage is changed every 3 days for a month. Alternatively, a foot cast may be applied, which will allow further stabilization of the wall and a quicker return to soundness.

Navicular bone fractures may also be repaired; however, use of a C-arm is required to accomplish proper screw placement. The surgery is performed in a similar manner to the repair described for type III sagittal fractures of the coffin bone. There is a 4-5 mm straight core through the navicular bone through which a screw can be placed. This core region decreases proximally, resulting in the area being limited to 3.5 mm in most horses. If this is not achieved, there is risk of disrupting the flexor or articular surfaces of the bone. Excellent radiographs with well placed markers must be taken for accurate screw placement. This may require extensive sequential radiographs to be taken. A C-arm intensifier confirms the position of drill holes radiographically intra-operatively. Post
operative care is similar to lag fixation of coffin bone fracture repair.

Other coffin bone fractures that may be addressed surgically are extensor process fractures. If displaced, these fragments may be removed arthroscopically, and depending on the site and extent of damage, surgical removal carries a favorable prognosis.

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