Current standards of treatment for subchondral cyst-like lesions

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Subchondral cystic lesions occur at many locations in the horse. The etiology is still thought to involve traumatic insult to either normal cartilage or cartilage predisposed to cyst formation by the development of osteochondrosis. Lesions classically develop in highly loaded regions of articulations, and almost all show an opening to the synovial cavity through a communicating channel of varying width. The width of the communicating channel often dictates the need for surgical debridement. The most common region for subchondral cystic lesions is the medial condyle of the femur, followed by the distal metacarpus/metatarsus, proximal radius, glenoid cavity, proximal tibia, distal radius and various locations throughout the phalanges. Treatment has involved either steroid injection into the cyst lining, with or without surgery, and arthroscopic extirpation, leaving the cyst cavity empty, and occasionally filling the cavity with bone, bone substitutes, or MSCs.

FEMORAL CONDYLE - SUBCHONDRAL CYSTIC LESIONS

Etiopathogenesis
The etiology of subchondral cystic lesions remains debatable. Early evidence supported the concept that this was a manifestation of osteochondrosis, however, experimental studies and the fact that mature horses can get subchondral cysts, lends credence to the suggestion that they may be traumatically induced. Material gathered from subchondral cysts and examined morphologically, suggests that a combination of abnormally thick regions of articular cartilage and overlying mechanical stress is the most likely inciting cause for subchondral cysts. The enlarging cyst cavity commences initially as an inflammatory response due to the synovial fluid being driven into the subchondral plate. Later high levels of inflammatory mediators and associated enzymes such as interleukin-1, nitric oxide, prostaglandins, cathepsins, and MMP-1 & -13, result in an expansile lesion.

Treatment
Treatment options include:
1. Joint medication and reduced exercise
2. Ultrasound guided steroid injection to cyst
3. Arthroscopically guided cyst steroid injection
4. Cyst debridement
5. Cyst debridement and grafting

Successful resolution of lameness, and rarely bony filling of the cyst, has been reported with injection of the cyst lining with triamcinolone or betamethasone. This is useful in yearlings and slightly more mature horses with no sign of arthritis. It should be reserved for immature horses with cysts. It generally fails to prevent arthritic complications long-term in mature horses. Ultrasound guided injection with steroids (triamcinolone 20 mg) combined with bone marrow aspirate is recommended. Surgical staging, debridement of any additional cartilage damage outside the cyst, and visual injection of the cyst lining is recommended by Colorado State University, based on available literature. Case selection for cyst injection versus more complex debridement and grafting requires consideration of cyst size, cyst canal width, age of horse, upright hindlimb stif/hock conformation, evidence of developing osteoarthritis (OA), and failed corticosteroid cases (Figure 1). For surgical extirpation of the cyst, the goal is to evacuate the contents of the cyst, including necrotic bony elements and extensive fibrous infiltrates. Debridement of the surrounding sclerotic rim down to normal healthy bone should provide an adequate stimulus for osteoblast migration into the organizing blood clot formed following debridement. The elimination of detritus leaching into the joint, and the increased vascularity to the cyst cavity, generally result in diminished symptoms within the first 2 months. Horses are operated in dorsal recumbency with the stif/neck partially flexed. The arthroscopic entry point is made lateral to the lateral patellar ligaments, or on occasion between the lateral and middle patellar ligaments. The cyst cavity is penetrated with a curette or rongeur and the content removed. The hyaline cartilage forming the edge of the cyst opening is preserved as much as possible. The entire cyst content is removed; motorized equipment is useful. Perforation (forage) of the sclerotic perime-
ter is now avoided. While not necessary in every case, large cysts and those in horses over 2 years old, need to be packed with cancellous bone, TCP, or hydroxyapatite (HA) bone substitute, to expedite osseous filling. Synthetic or cancellous bone graft packed into cystic defects in the femorotibial joint can be secured with autogenous or commercial (Sigma) fibrin glue. Autogenous cancellous bone goes through lytic revascularization and remodeling for several years, which makes TCP or HA more satisfactory. Cartilage repair over the synthetic bone filling can be accomplished with fibrin or Platelet Rich Plasma (PRP) containing autograft bone marrow derived cultured stem cells (Fig. 2). Bone Marrow Aspirate Concentrate (BMAC) is also increasingly used as a self clotting (contains fibrinogen) cell and growth factor rich autogenous material for cartilage repair.

Published results of surgery using arthroscopy for cyst debridement indicate from 56 to 74% of horses return to functional soundness.3,4 Older horses (>3 yrs) do poorly (35% sound) after debridement5, and should be grafted. Any horse with changes suggesting the start of OA should be grafted.6 Until longer-term results of steroid injection to cyst lining are available, it should be used in young horses and horses without evidence of OA. Surgical repair gives better assurance of bone filling and re-establishment of the subchondral bone plate, the latter of which is vital for soundness.

FETLOCK SUBCHONDRAL CYSTIC LESIONS

Cystic lesions with a focal, narrow communication to the synovial cavity can respond well to intraarticular hyaluronic acid (HA), and this is a useful initial treatment. Improvement in lameness following intraarticular HA injection is generally rapid, however, the bony filling of the cyst can be more delayed, and generally incomplete even in the long term. Cystic lesions with wide communication to the synovial cavity are surgical cases at the time of diagnosis. Results of debridement of subchondral cystic lesions of the fetlock in fifteen horses have been reported.7 Follow-up data from these cases indicate a reasonably good prognosis following surgical extirpation. Our experience following debridement alone for wide-mouthed cysts has been clinical improvement, but poor resolution of the cyst lucency. Improved radiographic resolution, particularly important for sales purposes, results from incorporation of compacted cancellous bone or TCP, and chondrocyte or MSC grafting, similar to the femoral condyle lesions.

CYSTIC LESIONS IN OTHER LOCATIONS

Subchondral cysts in the shoulder are often concurrent with humeral head OCD in weanlings and yearlings, and need surgery if any hope of an athletic career is expected. Singular cystic lesions with narrow opening to the joint may respond to intraarticular HA injection. Subchondral cystic lesions of the proximal radius, generally respond favorably to conservative therapy. These lesions are frequently associated with a narrow
communication to the joint cavity, and respond to intraarticular medication. Humeral condyle lesions in the elbow need arthroscopic debridement. Subchondral cystic lesions associated with the distal radius also heal well when treated conservatively. Cysts within the phalanges represent infrequent sites, but can be devastating. Those involving wide openings to the coffin or pastern joints can lead to on-going lameness and little hope of surgical access. Arthroscopic debridement of P3 cysts has resulted in good (10 of 11 cases) return to function. Direct curettage of P3 cysts through the hoof wall generally results in sepsis and failure.

REFERENCES