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## REMOVAL OF CHALLENGING ARTICULAR FRAGMENTS

Probably the most revolutionary breakthrough in equine orthopaedic surgery in the past decades was the introduction of arthroscopy by McIlwraith and Fessler. Arthroscopy offers huge advantages over the classical approach by arthrotomy and has replaced arthrotomy in almost all cases where joint surgery is indicated. However, some exceptions remain where technical limitations prohibit the use of arthroscopy. Since the use of arthroscopic techniques in the horse these techniques keep on developing with a series of publications and hopefully with many to follow since there still are many challenges and room for continuous improvement and to be made new possibilities to be explored.

The first challenge is case selection and to decide whether specific articular fragments need removal. Thereby clinical signs, age and intended use of the horse, fragment size and location are all important to consider. When removal is indicated it is important to decide whether fragments can be removed by arthroscopic approach or a minimal arthrotomy is needed. Furthermore it is important to decide whether fragment removal is indicated or if it is better to reduce and fixate in order to restore anatomic integrity which is one of our main goals in order to optimise return to function. Proper tissue handling and tissue preservation needs to be one of our major concerns to get optimal results. Optimal functional result and quick return to movement are key.

Development of diagnostic imaging techniques has been of major importance in the advancement of equine orthopedics and surgery. They are key to preoperative diagnostics and case selection. But also integrating them at time of surgery helps to improve tissue preservation and work as minimally invasive as possible. Especially ultrasonographic techniques and 3D imaging techniques like CT and MRI are nowadays integral part of equine diagnostics and surgery.

### Fragment location

We recently published on a direct approach for arthroscopic removal of osteochondral fragments in the dorsal pouch of the proximal intertarsal joint (PIT). These

fragments originate mostly from a distant OCD site and settle in the PIT through the communication between talocrural and PIT joint and can be visualised radiographically on LM and oblique tarsal views. We have observed significant synovitis, and adhesion formation and therefore it is in our opinion an indication for PIT fragment removal at time of surgery of the primary OCD lesion. In 11 horses all fragments were removed successfully. No complications were observed and long term results were good on the 9 horses on which follow up was present. In traumatic cases of PIT fragments that are partly extraarticular the challenge is whether this can be performed arthroscopically. Use of ultrasound preop and at time of surgery can be of great assistance. Many other locations can be challenging like lateral malleolar fragments which are imbedded in soft tissue, palmar or plantar fragments in the pastern joint, palmar fragments in the coffin joint. A large variety on different locations and joints and approaches have been described. Decision making needs to be based on the optimal possibilities for each individual case.

### Fixation or removal

Anatomic reconstruction and restoring integrity of joint surfaces and/or soft tissue structures is important to obtain most optimal functional result possible. So when anatomic reduction and fixation is possible this needs to be considered. Optimal anatomic reduction is thereby key since a resulting step at the level of the joint surface can be a worse functionally then removal of a large fragment or a conservative approach.

### Fragment size

We recently published an article on arthroscopic removal of large the extensor process fragments (27-38% of articular surface) in 18 Friesian horses and described the longterm clinical outcome and radiological follow up. These type of fragments are very large and arthroscopic removal is a long tedious surgery but in my opinion still of benefit to the patient compared to an open invasive approach with limited visualisation. On 17 of 18 horses follow up was available. Preop lameness ranged from 1-8/10. On postop follow up 3/17 horses had residual lameness and 14/17 (82%) were lamefree at intended use. Significant remodelling of the extensor process was visualised on radiological follow up. It was concluded that arthroscopic removal of large extensor process fragments

in Friesian horses is a good treatment option with a good long-term outcome. Also in other joints fragment size can be challenging like large osteochondral fragments and flaps in the femoropatellar joint, especially when free floating. Different techniques and approaches can be used. Long instruments are very efficient to reach into the suprapatellar pouch preventing a more invasive proximal approach through the quadriceps. Moving large fragments to the medial aspect of the joint followed by removal of the fragment from a medial portal after debridement of the primary fragment bed can make it easier to retrieve and remove the fragment from the joint.

### **Use of imaging techniques**

Radiology remains the main imaging modality to visualise articular fragments. Multiple projections including possible skyline views are thereby essential. Other imaging modalities have developed rapidly and are key to a thorough orthopedic workup. Ultrasonography can be very useful and sensitive pre as well as intraoperative. Some fragmentation missed on radiographs can be visualised ultrasonographically. Furthermore the relation of fragmentation to the surrounding soft tissue and possible soft tissue lesions can be essential for preoperative planning and indicative for prognosis and communication of expectation to the owner. Recent development of 3 dimensional techniques in equine orthopedics can be helpful in imaging lesions and fragments which cannot be visualised adequately by other means. Several cases of abaxial fragmentation in the coffin joint could be diagnosed using MRI scans on the standing horse. Following visualisation of these fragments they could be removed successfully using an arthroscopic approach.

### **Arthroscopy versus arthrotomy**

Arthroscopy must not be a goal on itself and has to be of benefit to the patient. When a fragment continues extraarticular, is too large or located such that it cannot be visualised or handled adequately by arthroscopic technique it can be beneficial and more efficient, to plan a (mini)arthrotomy. Minimal invasive surgery performed with inadequate visualisation or inadequate instrumentation can be detrimental to joint tissues. Case selection and turning to plan B when plan A does not work remain essential. But still when surgery can be performed arthroscopically this is always first choice and arthroscopy can be used very effectively as a diagnostic and guiding

technique in complicated cases where different techniques are combined and arthrotomy can be performed as minimal invasive as possible.

### **Conclusions**

Good case selection, systematic preoperative planning and efficient use of different imaging modalities are key in order to obtain optimal functional results in articular surgery for the individual equine patient.