ARTHROSCOPICALLY ASSISTED TREATMENT OF EQUINE SUBCHONDRAL CYSTIC LESIONS IN THE MEDIAL FEMORAL CONDYLE

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Introduction

Subchondral cystic lesions (SCLs) of the medial femoral condyle (MFC) are a common reason for mild to moderate equine hind limb lameness (Jeffcott et al. 1983). Stromberg (1979) and McIlwraith (1986) associated SCLs with osteochondrosis, which explains the pathology especially in cases of SCLs (unilateral and bilateral) in young horses. Ray et al. (1996) proved that linear full-thickness cartilage defects do not cause SCLs in the medial femoral condyle, but laminar full-thickness cartilage defects do. That indicates that not only ischemia and malnutrition caused by malfunctions in the process of ossification but also traumatic loss of integrity of the subchondral bone leads to SCLs.

There is scientific consensus that SCLs have a better prognosis when diagnosed in young horses. There is also a better outcome when they are of smaller size (Stewart et al. 1982).

Several techniques for the treatment of SCLs of the MFC such as debridement of the SCLs (White et al. 1988), debridement followed by drilling (Kold et al. 1983), debridement followed by packing of the cavern (Kold et al. 1983), intralesional corticosteroid injection (Wallis et al. 2008) and positioning a transcondylar screw (Santschi et al. 2015) have been described. The outcome, however, is similar in all techniques: the arthroscopic debridement has a positive outcome in 74% of cases, the injection technique has 77% cases with a significant improvement, and the transcondylar screw technique eliminates lameness in 75% of the cases.

Material and methods

The following novel surgical technique might potentially serve as an alternative treatment option for SCLs of the MFC. The results presented are preliminary results.

Case selection: The horses included had shown lameness for a minimum duration of 3 months. Only horses with at least grade II SCLs according to Contino et al. (2012) were included in the study. The degree of lameness was at least 4/10. The origin of the lameness was localized to the medial femorotibial joint by diagnostic local anaesthesia. No other potential sources of pain (such as for example meniscal tears, osteoarthritis etc.) were detected.

For the surgery, the horse was placed in dorsal recumbency. The leg was aseptically prepared and draped. The stifle was flexed at an angle of approximately 90°. The arthroscope was inserted via the lateral approach (Lewis 1987). This allowed a good view of the affected cartilage side and an excellent instrumental port (Figure 1). The characteristic appearance of the cartilage overlaying the SCLs is shown in Figure 1, 2 and 3. The instrumental port is supposed to be perpendicular to the defect and is determined by needle placement (Figure 4).

Figure 1

Figure 2

Figure 3

Figure 4

A stab incision was made and the overlaying damaged cartilage was debrided (Figure 5) in a routine manner as described by Howard et. al. (1995). After that, a 3.2mm drill was used to drill into and through the SCL. A drill guide was used to prevent soft tissue damage of the skin or the joint capsule. The drill angle was approximately 25° towards the proximo-lateral aspect of the femur (Figure 6 + 7). That angle provides the best handling of the drill bit within the SCL.

Figure 5

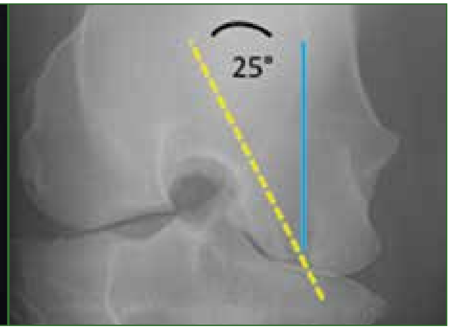

Figure 6

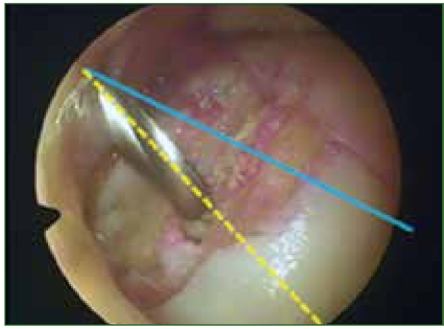

Figure 7

Figure 8

The depth of the drill hole through the cyst was chosen to be 2.5-3 times the depth of the cyst, but at least 4cm. That provided a good stability of the implant. After drilling, the drill hole was tapped (Figure 8). A 5.5mm drill was carefully used as a countersink to provide a seat for the screw head only in the subchondral bone.

The length of the screw (diameter 4.5mm) was precisely determined to such an extent that the head of the screw lay 2mm underneath the level of the subchondral bone (Figure 9 + 10). That was essential to avoid damage caused by the screw in the weightbearing area of the tibial cartilage. After the screw was tightened the joint was lavaged with 5L of sterile saline to remove debris and potential inflammatory mediators from the inside of the SCL. The skin was closed in a routine manner.

Figure 9

Figure 10

Figure 11

So far, three stifle joints have been operated using the described technique. In all three horses, the lameness improved significantly, enabling them to return to the intended use. A radiological follow-up was performed in each horse. It seems that the bone density increased within the SCL one year postoperatively (Figure 11). One joint was arthroscopically re-examined after one year. It showed a stable layer of fibrous cartilage over the head of the screw (Figure 12).

Figure 12

Discussion

There is evidence that within the cavern of SCLs filled with fibrous tissue and cystic fluid, the concentration of Prostaglandin E2 (PGE2), nitric oxide (NO), matrix metalloproteinases (MMPs), IL-1ß and IL-6 is upregulated (von Rechenberg 2000 and 2001). By positioning an intraarticular corticalis screw sagittal to the SCL alignment, the SCL is completely filled with metal as an osteoinductive material. The fibrous tissue that potentially produces the inflammatory agents might be repressed by the screw. Interestingly, we showed that even with a steel screw it is possible that a solid layer of cartilage (most probably fibrous cartilage) is growing over the screw head within the defect in the weight-bearing area of the MFC. That was not expectable, since often steel prevents cells from binding to its surface. Maybe the 2mm gap between the screw head and the subchondral bone provided enough space for connective tissue to stick to the margins of the countersunk bone.

This novel surgical technique of an intraarticular screw might have the potential to be of benefit for horses with an SCL of the MFC. It is possible to place the screw arthroscopically and in this small case series all horses treated returned to the previous level of work. An increased number of cases and further scientific work is needed to draw further conclusions.

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EQUINE ARTHROSCOPY: PREVENTIVE, CURATIVE OR COSMETIC?

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Equine arthroscopy is approaching its fourth decade and a third generation of equine surgeons, probably largely unaware of the previous arthrotomy techniques, is now enjoying its great advantages. From the mid-80s (the first edition of the McIlwraith book – now a collector's item – dated 1984) it had quickly spread throughout the world and – in junction with a lot of new knowledge about diagnosis and therapy of joint disease – became the most significant progress in equine orthopaedics.

From the beginning, arthroscopy was characterised by its double role as diagnostic and therapeutic tool, particularly in the evaluation of cartilage and soft tissue structures which are hard to visualize radiographically. Today, the diagnostic value of arthroscopy is still high despite the increasing role of other non-invasive methods like ultrasonography and MRI.

Our experience with equine arthroscopy started 30 years ago and mostly involved the Standardbred trotter. In association with a growing knowledge of developmental skeletal problems and juvenile orthopaedic injuries, arthroscopy quickly became the right instrument to treat and possibly prevent joint disease in the equine athlete.

Debate about the role of arthroscopy to "prevent" and/or "cure" has been passionate and in these years, research and retrospective studies offered various answers to most of the questions. Literature about equine arthroscopy is particularly rich and nearly impossible to review in a limited space, anyway we can quickly summarize the main concerns raised especially in early years in the following points:

- When found radiographically in absence of clinical signs, do joint lesions (in most of the cases osteochondral fragments) really need to be treated surgically?
- Does it make sense to treat yearlings and young horses for lesions found in survey radiographs?
- Is the surgical management of joint lesions by arthroscopy the right "cure"?
- May early arthroscopic treatment really prevent the onset of clinical signs and represent the best investment into the future athlete by breeders and horse owners?
- What about the so-called "cosmetic" surgery, especially when it means clearing joints of osteochondral fragments before pre-purchase examination?

Most of the questions relate to the definition of osteochondral fragments as "incidental findings". It is not possible to define general rules and case by case must be weighted, considering age of the horse, discipline, clinical signs when present and economic factors. The concept of "clinical sign" in a yearling or young horse not yet submitted to significant exercise is vague: joint effusion is well visible in tibiotarsal and femoropatellar joints, but nearly absent or hard to detect in femorotibial and fetlock joints. And frequently, the mere presence of joint effusion in absence of lameness is underestimated.