Thesis

Department and Clinic of Equine Medicine

University of Veterinary Medicine Budapest

Controlling Effusion Following Arthroscopic Removal of Tarsocrural Joint OCD's

Jack Dolan

GGS7NB

Supervisor:

Prof. Dr. Gábor Bodó, PhD, DSc, Dipl. ECVS

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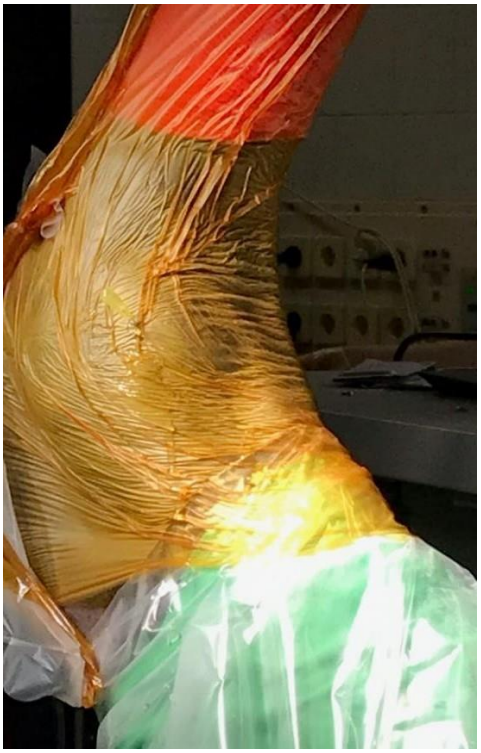
Contents

Terminology	Abbreviations
Equine Osteochondrosis	OC
Osteochondritis dissecans	OCD
Distal intermediate ridge of the tibia	DIRT
Tarsocrural Joint	TCJ
Proximal Intertarsal	PIT
Distal Intertarsal	DIT
Tarsometatarsal	TMT
Tarsocalcaneal	TCa
Dorsoplantar	DP
Lateromedial	LM
Dorsolatero-plantaromedial	DL-PlMO
Dorsomedial-Plantarolateral	DM-PlLO
Intra-venous	IV
Intra-articular	IA

Introduction

Equine Osteochondrosis (OC) is described as focal failures of endochondral ossification that normally occurs in distinct predilection sites (Douglas, 2011). Development of osteochondrosis is restricted to the period of endochondral ossification. This means that although lesions may not be diagnosed till the animal is fully mature, the lesion itself was formed when the horse was young and immature when endochondral ossification was happening. (Van Weeran, 2018). Osteochondritis dissecans (OCD) is the most commonly occurring form of osteochondrosis which usually needs surgical intervention (Kadic et al, 2019). OCD lesions are of multifocal origin and many different issues including biomechanical issues, failure in vascularization, nutritional imbalances, and genetic predispositions have all been linked to being potential causes of these lesions (Kadic et al, 2019).

Typical cases of OCD lesions have various clinical signs, which often vary depending on the location of the lesions. These clinical signs include pain, lameness, and loss of performance. The most common clinical sign of an OCD lesion is non-painful distension/effusion of a joint often known as ‘bog spavin’ (O’Meara, 2012).



(Figure 1: An example of bog Spavin of a tarsocrural joint about to undergo arthroscopic surgery for the removal of a DIRT OCD lesion (Dr. Bodó Gabor, 2022))

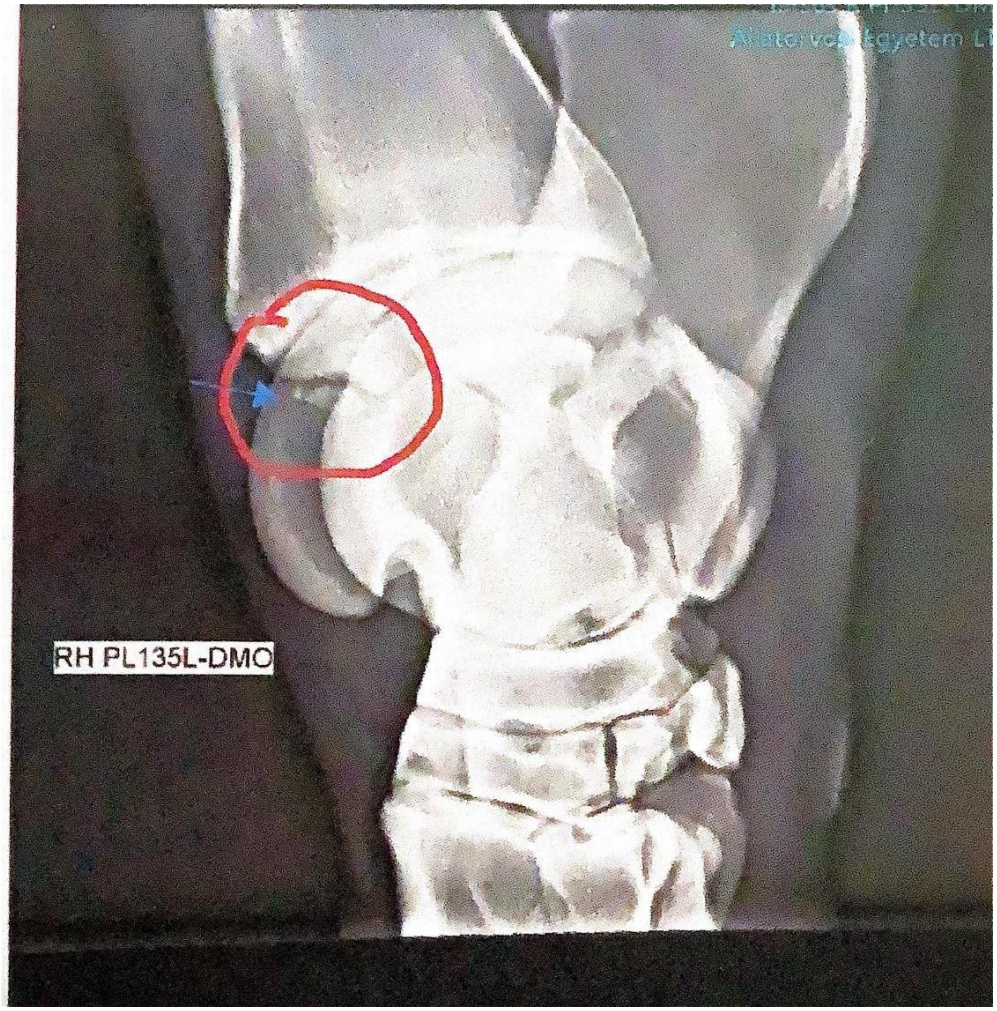
OC typically affects growing cartilage in predisposed joints, the most commonly affected joints are the tarsus, stifle, the metacarpophalangeal/metatarsophalangeal joints and the facet joints of the cervical vertebrae (Van Weeran, 2018). OC has also been shown to infrequently affect other diarthrodial joints (Kadic et al, 2019). The tarsus is the most affected joint and includes multiple different predilection sites where OC arises. The most common lesions being the distal intermediate ridge of the tibia (DIRT), followed by the lateral trochlear ridge, and finally the medial malleolus of the talus (Kadic et al, 2019).

Anatomy of Tarsocrural joint

The anatomy of the tarsus is very complex, it includes 5 joints and several bones including the tibia, talus, calcaneus, the central tarsal bone, the fused first and second, the third and fourth tarsal bones and the three metatarsal bones. These bones combined form three rows to make up the tarsus joint. The proximal row contains the talus and the calcaneus bones, the middle row consists of the central tarsal bone, and the distal row encompasses the tarsal bones one to four (Budras et. al, 2011). These bones form five joints; the tarsocrural joint (TCJ), proximal intertarsal joint (PIT), distal intertarsal joint (DIT), tarsometatarsal joint (TMT), and the tarsocalcaneal (TCa) joint (Lischer & Auer, 2018). The joint of most importance in this study is the TCJ as this is the joint with the most movement and where the OCD lesions diagnosed for this study were located. OCD lesions in the TCJ occur mainly in the non-weight bearing surfaces of the joint, compared to subchondral bone cysts which occur on the more weight bearing surface of the bone. (Olstad et al, 2015)

The tarsus is held together by soft tissue attachments including ligaments such as the collateral, intertarsal, and the plantar tarsal ligaments (Lischer & Auer, 2018). The musculature of the dorsal aspect of the tarsus includes the long digital extensor, the lateral digital extensor tendon, the peroneus tertius muscle, and the tendon of the tibialis cranialis. On the plantar aspect of the tarsus the musculature includes the superficial digital flexor, the gastrocnemius tendon, the tibialis caudalis, the lateral digital flexor, and the medial digital flexor (Lischer & Auer 2018). The important blood vessels that

surround the tarsus are the saphenous vein, the dorsal pedal artery, and the dorsal branch of the dorsal pedal artery. These blood vessels can often cause problems when trying to insert the arthroscopic sleeves into the dorsal aspect of the TCJ (Espinoza-Mur, et al. 2018).



(Figure 2: A planterolateral-dorsomedial oblique radiograph of a tarsocrural joint that has a diagnosed DIRT OCD lesion (Ullo Equine Clinic of the University of Veterinary Medicine Budapest, 2022)).

Endochondral Ossification

Endochondral ossification is a process where growing cartilage is converted into bone to form the developing skeleton of the horse (Semevolos, 2017). The course of endochondral ossification takes place at three main sites: the physis, the epiphysis and in the cuboidal bones of the carpus and the tarsus (Douglas, 2011). During the maturation of the epiphyseal and metaphyseal growth plates, OC can cause disruptions in endochondral ossification (Laverty & Girard 2013). This occurs due to the absence of penetrating

capillaries in the hypertrophic growth plate, leading to a breakdown in endochondral ossification. This results in retention of a thickened layer of cartilage (Bourebaba, et al, 2019)

Hereditability

There are many different causes of OCDs in horses one of the most prevalent is hereditability or genetic predisposition (Hilla & Distl, 2014). Major differences have been observed in the hereditability of OC, this can be seen as different joints been more commonly affected in specific breeds. In terms of the TCJ, the hereditability is the highest with an average value of around 0.30 but as low as 0.04 in cold breeds and as high as 0.52 in standardbred trotters (Van Weeran, 2018). There are widespread reports attributing large breed horses, that have rapid growth weights, to having a predisposition to OCD lesions (Naccache et al, 2018). In a Swedish study carried out on 77 standardbred foals they found a positive correlation between diagnosed TCJ OCD lesions and body weight at birth, body weight during the growing period, average daily weight gain, and skeletal frame size (Douglas, 2011). According to recent studies searching for markers related with OC they have found important quantitative trait loci on several equine chromosomes in the Hanoverian breed (Lampe et al, 2009). In German sport horses and Swedish standardbreds, they were able to greatly reduce the percentage of OCD lesions by strict selective breeding of their horses by the respective breeding associations (personal communication Dr Bodó 10/10/2022).

Environmental Factors

Although genetics plays a significant role in the cause of OCDs, it is still clear that environmental factors contribute more to the manifestations of OCDs than genetics (Van Weeran, 2018). The two most important environmental factors are nutrition and biomechanical loading (Canonici et al, 1996). When it comes to nutrition, high nutrient intake is the most frequent cause of OCDs. When speaking about nutrition as a cause of OCDs, one French study reported that feeding 129% of the national research council (NRC) to 12 foals resulted in all 12 foals being diagnosed with dyschondroplasia (Douglas, 2011). Excessive digestible energy leading to insulin resistance is known as the main source of OC in terms of nutritional factors (Ahmadi et al. 2021). However, there are numerous other nutritional factors involved in the development of

OC in young horses. These factors consist of; excess crude protein, imbalances of calcium and phosphorus, excess zinc/cadmium, and copper deficiencies (Jeffcott, 1997).

As previously mentioned, biomechanical loading also plays a vital role in the development of OC in young horses (Ekman & Carlson, 1998) Although loading of joints helps to condition the musculoskeletal system against injuries, it can also cause chronic degenerative joint issues in the horse later in life (Van Weeran, 2018). Biomechanical loading can include factors such as exercise regime, terrain, and the horse's own confirmation. These can all play a vital role in the development of OC in horses (Van Weeran, 2018). There are many permutations to consider when trying to pin-point the cause of OC. One study attempted to use different exercise plans, of varying difficulty, on foals aged from 3 months to 24 months to determine if there would be an increase in OCD lesions in the group that were on the low exercise plan. Both groups were kept in stables with 2-4 hours out onpasture daily. In addition to this, the low exercise group, called group one, got 15-45 minutes of walking per day while the normal exercise group, group two, received 15-45 minutes of walking or trotting and 8-20 gallop sprints of 10-20 seconds in duration. From the results, it was clear there was a big difference in the incidence of OCD lesions in both groups; 3 out of 50 (6%) foals of the normal exercise group developed lesions, while 13 out of 66 (20%) foals from the low energy group had been radiologically diagnosed with OCDs. This reaffirmed that a controlled normal exercise regime can have a positive effect on the prevention of OC in young horses (Douglas,2011).

Performance after Surgery

One of the major aspects of completing the surgery, is whether the horse will be able to return to full work and compete at the same level as it did before the procedure. G.E. Laws carried out a study in 1993 which attempted to determine whether conservative treatment or surgery of OCD lesions was a more favourable treatment. In order to carry this out, Law's team compared the performance of the patients with healthy control horses of similar profiles to see how they performed after treatment. In the study

they found that horses that received surgical treatment had a better outcome than those which were conservatively treated, this was further supported as more horses from the surgical group raced after surgery with similar results to that of the horses from the control group (Laws,1993).

Aims

The aim for this study was to determine whether treatment with arthroscopic surgery on OCD lesions in the TCJ would have a positive impact on decreasing joint effusion. Several factors that might affect the outcome of the surgery, such as the treatment of the joint post operatively and the size and location of the lesion, were considered. Other factors such as age, breed, and sex were also measured when formulating our results on whether the surgery was successful or not.

Methods & Materials

Participation Criteria:

In order to find the appropriate candidates that met the necessary criteria for this study, we went through the universities database looking for horses that presented to the clinic for arthroscopic removal of OCD lesions in the TCJ. We took the history of the appropriate candidates that met the requirements of our study. The data we recorded was of important parameters including age, sex, breed, pre-operative effusion, and any radiographical changes seen from x-rays taken. The typical x-ray set included dorsoplantar (DP), lateromedial (LM), dorsolateral-plantaromedial (DL-PlMO), and dorsomedial-plantarolateral (DM-PlLO) oblique views of the TCJ. The best view for the visualization of the most common TCJ lesion, the DIRT lesion, was the dorsomedial-plantarolateral (DM-PlLO) oblique view. What led to the initial diagnosis of the OCD was also noted, for example was it a chance discovery in a pre-purchase examination or did the horse present to clinic with clinical signs of an OCD lesion. Once this history was gathered the candidates were separated into groups beginning with foals and unbroken yearlings not in work, 2-year-olds in work to 4-year-olds, and then finally 5-year-olds and above. The groups were then subdivided depending on the predilection site of the OCD lesion.

Surgery

From the cases presented for the study, they all received surgical treatment for the diagnosed OCD lesions present in the TCJ in the form of arthroscopic surgery. The surgeries were performed by three different surgeons over a period of one and a half years at the Ullo equine clinic of the University of veterinary medicine Budapest.

About one hour before induction takes place preoperative medication is given this includes antibiotics in the form of Shotopen® (0.1ml/kg bwt, benzylpenicillin procaine and benzathine benzylpenicillin) was given along with phenylbutazone (2.2ml/kg bwt). Premedication of xylazine (1.1 ml/kg bwt) and butorphanol (0.1ml/kg bwt) was used followed by induction using ketamine (3.3mg/kg) and midazolam (0.05mg/kg) while induction was

maintained by isoflurane during the surgery itself. Induction took place in a purpose-built room with non-slip floors and padded walls for the protection of the horse during this time. Three to four people were on hand to help during the induction phase to make sure the process went smoothly and there were no unnecessary injuries caused. Upon the completion of the induction phase the horse's hooves were cleaned out with a hoof pick and protective covers were placed over the hooves. Hobbles were then placed above the hooves around the pastern joint region and was connected to a hoist. The hoist was used to lift the horse from the induction room and allow for smooth transfer to the surgical table.

(Figure 3: Horse after induction on the hoist being moved to the surgery room (Ullo equine clinic of University of Veterinary Medicine Budapest, 2022)).

The horse was intubated before being hoisted to allow the administration of inhalational anaesthetics and to provide oxygen for the horse during the surgery. The instrumentation and techniques used for arthroscopic surgery performed on these horses has been described by McIlwraith (1991). These included a 4 mm diameter arthroscope with 30° forward oblique viewing angle manufactured by Storz®, a conical obturator sleeve, an egress cannula,

a curette, a Ferris-smith rougers, a Storz® arthroshaver, and a fluid roller pump. These surgeries were performed under general anaesthesia in dorsal recumbency.

(Figure 4: horse in dorsal recumbency with protective covers on hooves (University of veterinary Medicine Budapest Equine Clinic Ullo, 2022)).

The horse was placed in dorsal recumbency with the affected hind limb(s) extended fully. This is beneficial compared to laying the horse in lateral recumbency, as it minimizes the chance of losing a chip fragment off the primary lesion compared to when the horse is in lateral recumbency as the chip might fall to an area that isn't easily accessed by the arthroscope or the instruments (McIlwraith et al, 2015). Before surgery began, the affected TCJ was clipped and aseptically prepared in accordance with Equine Surgery Book (Verwilghen, 2018). Firstly, the site was washed with antiseptic chlorhexidine solution and water to wash any dirt from the surgical site. The antiseptic soap was applied and scrubbed on the surgical site three times while washing off with water in between each time it was applied. The chlorhexidine was then removed, and the use of alcohol based disinfectant Bradoderm® was applied and cleaned off with swabs three more times in a method of starting from the incision site and working outwards to the boarder

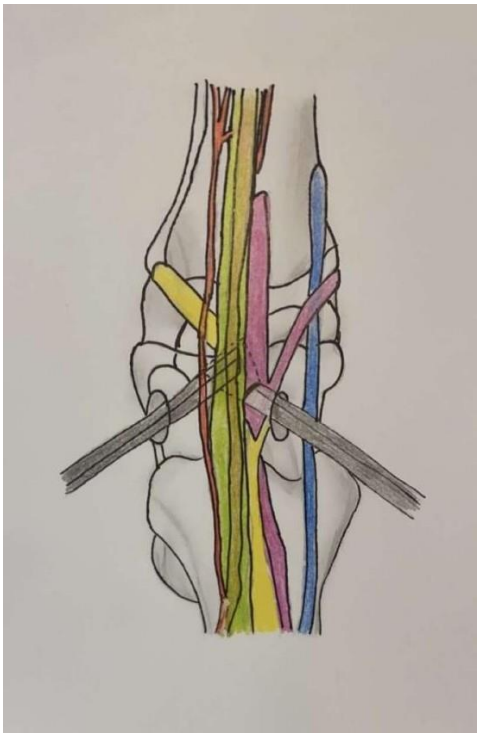
of the clipped area. The last cleaning with the alcohol-based disinfectant was done sterilely with the use of sterile swabs and a sterile haemostat holding the swab in place (Technique used in the Ullo Equine Clinic).

(Figure 5: TCJ clipped and ready to be prepared for surgery (Ullo equine clinic of the University of Veterinary Medicine Budapest))

An impermeable drape was then placed around the surgical site, followed by an iodophor-impregnated adhesive incise drape being placed directly over the incision site (Verwilghen, 2018). After the surgical preparation is finished, the hock is flexed to 110 degrees.

(Figure 6: Horse in Dorsal recumbency with leg flexed to 110 degrees to allow full access to the joint with the arthroscopic sleeve. (Dr. Toth Peter, 2022)).

The most common approach for arthroscopic surgery of the TCJ is the dorsal approach. Although the use of the plantar aspect is also recommended. (McIlwraith et al, 2015).



(Figure 7: A hand drawing of a tarsocrural joint been accessed with the dorsomedial approach for arthroscopic surgery. The blue being the saphenous vein and the red being the dorsal pedal artery).

To access the joint, it was distended with physiological saline solution through an eighteen-gauge 1.5 inch needle between the medial malleolus and the distal tubercle of the talus, the arthroscopic portal was made laterally next to the saphenous vein (Espinosa-Mur et al, 2018). Once the arthroscopic sleeve and the conical obturator are inserted into the joint they pass over the top of the trochlear ridge and beneath the extensor tendons (McIlwraith et al, 2015). From the insertion of the arthroscopic sleeve the most important parts of the surgery are recorded such as the overview, lesion removal, and the site following debridment. Joint distension was maintained by using a roller pump and fluids. Upon locating the OCD lesion in the TCJ it was debrided with the use of an egress cannula to evaluate the degree of attachment of the lesion to the joint. Upon evaluation a Ferris-smith rougers are used to remove the OCD fragment(s) from the joint.

(Figure 8: OCD lesion in a TCJ located at the distal intermediate ridge of the tibia (Dr Bodó Gabor, 2022)).

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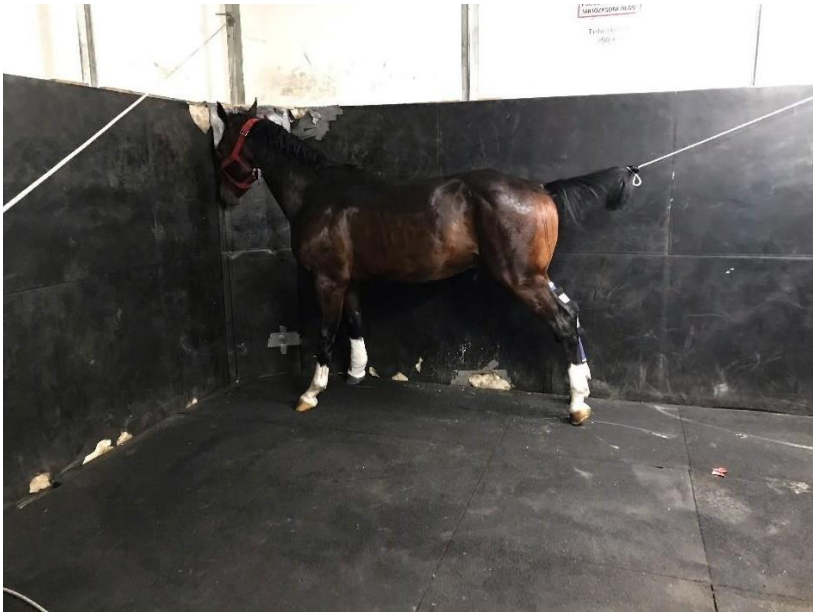
Following the removal of the OCD fragments, the lesion bed was curetted with a sharp spoon or the Storz ® arthroshaver until healthy subchondral bone was reached this is done due to reports from W. McIlwraith that debridement of the lesion site is also beneficial for decreasing post-operative effusion (Personal communication with Dr. Bodo and W. McIlwarith 3/10/2022). Any problems encountered during the arthroscopy were noted (McIlwraith et al,

1991). The portal sites were sutured with one or two simple interrupted sutures and stayed in place for 10-14 post-op.

Postoperative care

Before the horse was taken to recover from anaesthesia a sterile padded bandage was applied. The bandage included sterile gauze covering the surgical site, a 'Snögg® Polsterplast' gluing the gauze to the skin around the portals to prevent any contamination if slippages of the bandage occur, and a well-padded bandage that started above the fetlock and finished above the hock. Upon the placement of the bandage over the sutures the horse was then hoisted to the recovery room. If the horse was above two years of age, rope assisted recovery was done and if the horse was younger than two years recovery without ropes was often used. The recovery room had a non-slip dry floor and padded walls to prevent the horse from injuring itself when getting up from recovery. For the first twenty to thirty minutes, the horse's head and neck was held down by the attending helping personnel in lateral recumbency until the horse was strong enough to get up and stay standing with very little ataxia. Once the horse was attempting to stand up the ropes that were tied to the tail and to the head collar were attended by two people and pulled on to help with the stability of the horse. This was necessary to enable the horse to stand safer without falling over and causing injuries. A protective brace was also placed over the bandage for added protection during recovery in case the horse hit its hock while getting up. The bandage was changed every 2-3 days post-surgery until suture removal after 14 days (McIlwraith et al, 1991).

(Figure 9: Protective brace that was placed over the TCJ before the horse was taken to the recovery room (Ullo equine clinic of the University of veterinary medicine Budapest,2022))



(Figure 10: Rope assisted recovery of a horse who received a TCJ arthroscopy (Ullo equine clinic of the University of veterinary medicine Budapest, 2022))

For the first two weeks post-operation the horse remained on box rest ensuring the bandage stayed clean and dry during this time. After this period the horse was slowly reintroduced to work, starting with some hand walking

for 5-10 minutes twice daily with this time increasing as the weeks went on. From week 6-8 the horse can return to a slow build up to full work, for example a riding horse can start to be ridden again in this period. Post operatively the horse should receive 2.2 mg/kg phenylbutazone orally for the first 3-4 days. After the horse was discharged, it was recommended to owners to have their referring veterinarian give intra-venous (IV) hyaluronic acid 4 times in the first 3 weeks. If there is still remaining joint effusion present at 4-5 weeks post-operation, triamcinolone acetate (Kenalog® 40mg/ml) can be advised to be injected intra-articular (IA) into the operated TCJ with a dosage of 15-20 mg/joint. The triamcinolone acetate (Kenalog®) can be injected into the TCJ in two pouches the less popular lateroplantar pouch that is located between the calcaneus and the lateral malleolus of the tibia, or the more frequently used dorsomedial approach located just beside the saphenous vein. (Bassage & Ross, 2011)

Follow up survey and analysis

After the post operative recovery period was complete, the horse was allowed to go back into full work in its given discipline. A follow up questionnaire was then carried out with the horse's owner, trainer, and/or referring vet to gain knowledge on how the horse has recovered from the surgery. The questionnaire was used to decide whether the surgery helped in terms of reducing joint effusion or not.

Post Operative Questionnaire

Horse:_____ Age:____
Client:_____

How Long Since Surgery?_____

Is The Horse Back In Full Work?_____

Was The Horse Treated Post-Op?

_____

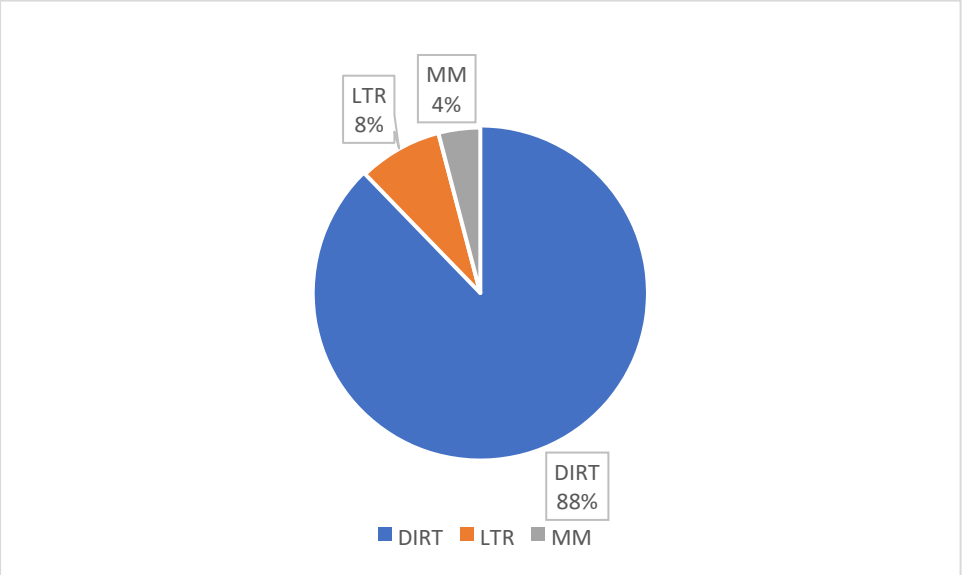
Is there any swelling/effusion post surgery?

a) No effusion _____
b) Less than before surgery _____
c) The same as before surgery _____
d) More than before surgery _____

(Figure 11: The questionnaire filled out by clients post operatively about their horse).

Results

Forty-nine OCD lesions were diagnosed with the DIRT lesion being the most common occurring forty-three times (88%), followed by the lateral trochlear ridge of the talus being affected four times (8%), and finally the medial malleolus of the talus being affected least frequently with only two (4%) joints being affected.

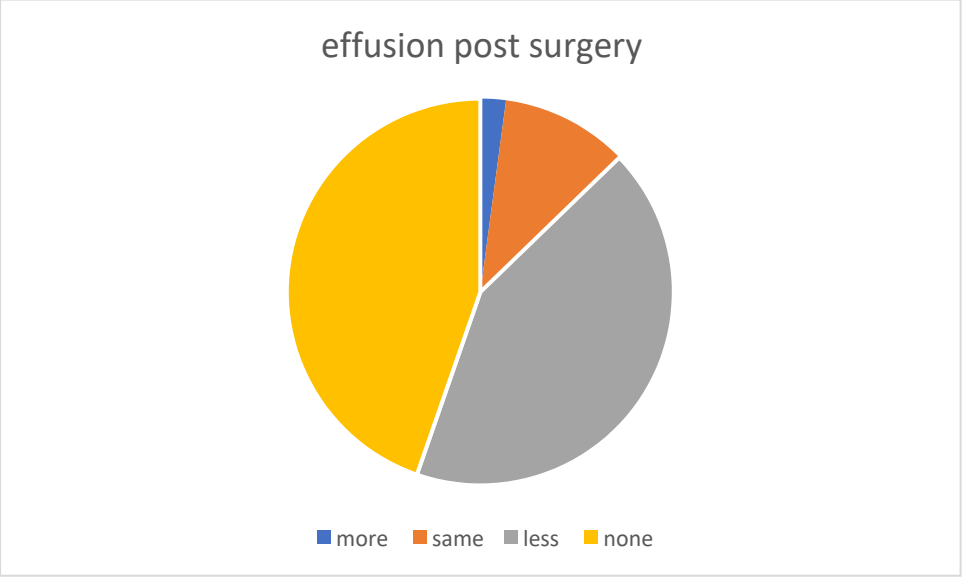


(Figure 12: Proportion of each type of tarsocrural joint OCD lesion that was diagnosed)

Upon completing the telephone questionnaire in figure 11, we were able to interpret the data to see if performing the surgery was successful at reducing joint effusion. Of the thirty-three horses that presented for arthroscopy surgery twenty-six (79%) have successfully returned to full work, twenty-four (73%) horses received post operative treatment with IV hyaluronic acid while twenty-two of the twenty-four (92%) in addition to the IV hyaluronic acid also received IA treatment with triamcinolone acetate (Kenalog®, 40mg/ml).

(Figure 13: Example of tarsocrural joint effusion in one of the patients in the study (Dr. Bodo Gabor, 2022))

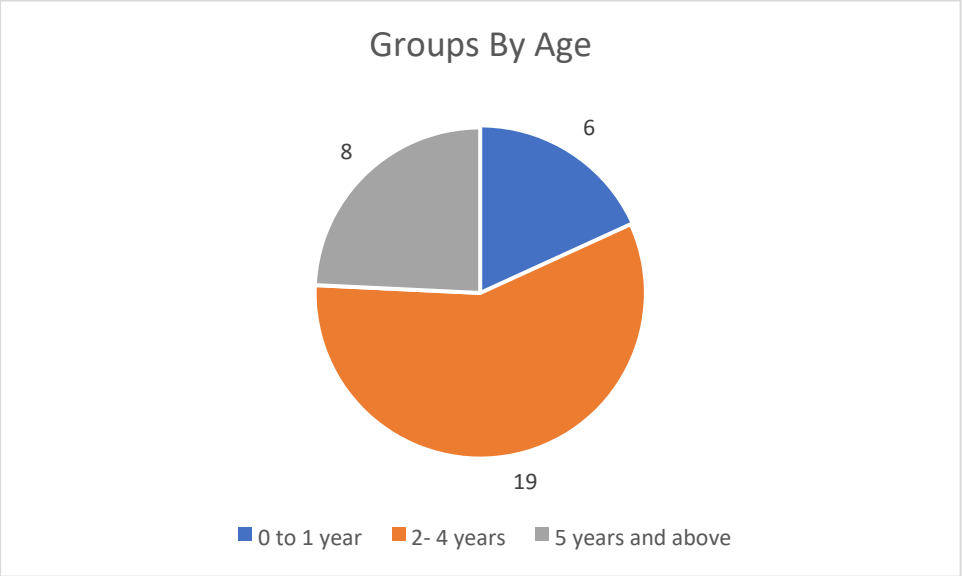
Overall, the results were quite positive, fifteen (45%) of the thirty-three patients now have no joint effusion at all, while thirteen (39%) reported less effusion than before the surgery took place. However, four (12%) of the horses still have the same level of effusion post-surgery, and only one horse had increased effusion than the pre-operative level. Of the thirty-three patients, there were fourteen (42%) bilateral cases, and of the forty-seven joints that underwent surgery forty-one (87%) were seen to have had a reduced amount of effusion than before the surgery.



(Figure 14: A breakdown of the effusion post-surgery in each joint)

Breaking the data down further to consider the horses age, the patients are split into three groups:

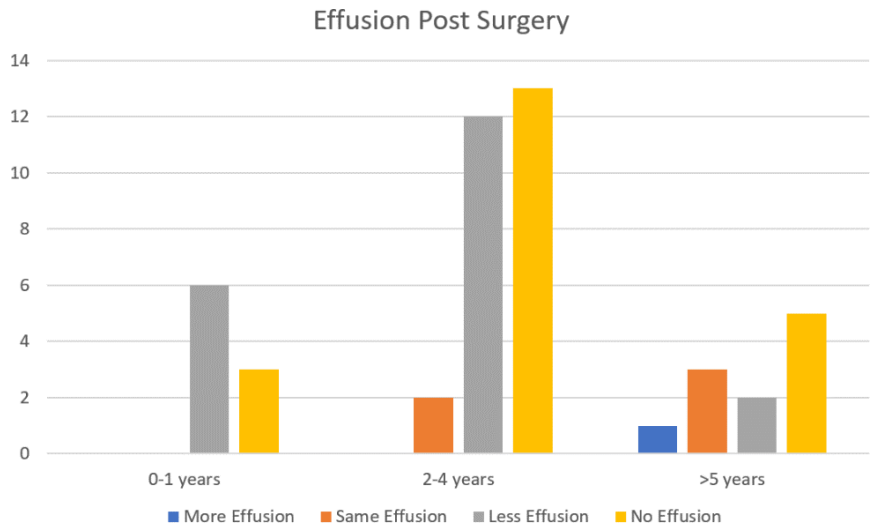
- Foals and yearlings
- Two-year-olds to four-year-olds
- five-year-olds and above.



(Figure 15: Breakdown of the amount of horses in each of the three groups)

It was of interest to determine does age have any effect on post operative effusion and should these lesions be scanned for earlier on in life. From the first group of young unbroken horses there were six patients and nine joints included. Of these six, only one received treatment with both IV hyaluronic acid and IA triamcinolone acetate (Kenalog® 40mg/ml), four out of the six are now in full work and all candidates saw an improvement in effusion with three (33%) reporting no effusion at all and six (67%) reporting the effusion to be less than before surgery. From the second group of young broken horses aging from two to four years there were nineteen patients and twenty-seven joints involved. Fifteen (79%) of the nineteen were treated, while eighteen (95%) have now returned to full work. Overall, the results obtained are positive as only two (7%) of the twenty-seven joints didn't have any improvement after the surgery. In twelve (44%) of the joints there was less effusion observed and in the other thirteen (48%) joints no effusion was reported post-surgery. In the final group of older horses aged over five years there were eight horses presented to the clinic with eleven joints affected. All eight (100%) horses were treated post operatively while four (50%) of the

eight have returned to work. From the eleven joints, five (45%) now have no effusion, two (18%) have less effusion than before surgery, three (27%) of the joints still maintain the same effusion as before surgery while one (10%) joint was seen to have increased joint effusion after the surgery.



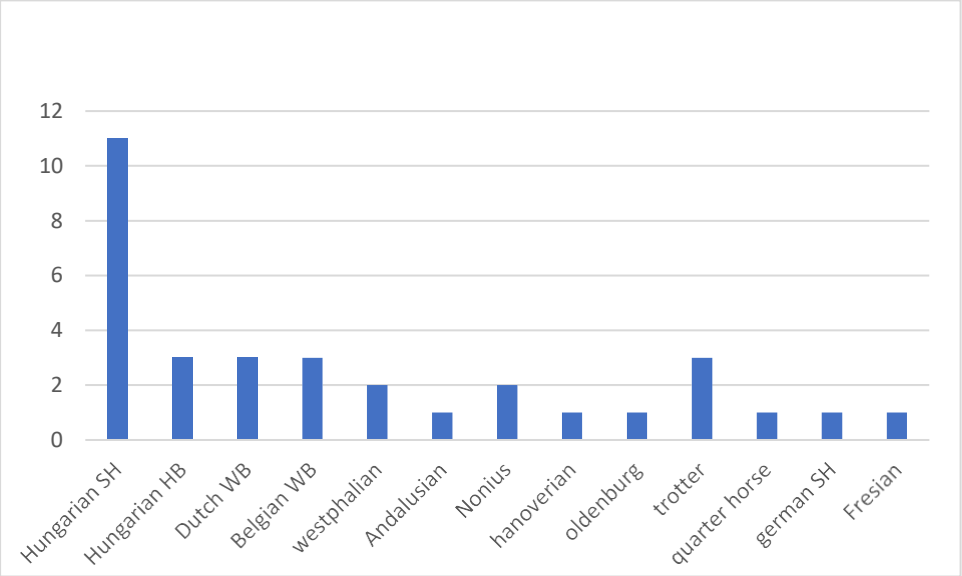
(Figure 16: Graph showing the breakdown of effusion of each age group after surgery.)

Sex of the horses was another important parameter. This study included fifteen (45%) stallions, eleven (33%) mares and seven (21%) geldings. Arthroscopic surgery was successful on improving rate of effusion on stallions in all except two (10%) joints, with eight (40%) joints seeing less effusion than before and ten (50%) seeing no post-surgery effusion at all. Mares had one case where post operative effusion was worse than before surgery and one where the level of effusion was the same as before, while having nine (64%) joints with a lesser level of effusion than before and three (21%) seeing no effusion at all after the surgery was performed. Geldings had two (15%) cases with the same level of effusion, three (23%) with reduced effusion and eight (62%) cases presented with no post-operative effusion at all when examined.

The overall median age of the patients was two years. However, each sex had a different median value. The median age of the stallions was two years, the median age of the mares was three years, and the median age of the geldings was four years. The mean age of the patients was 3.3 years. However,

similarly to the median, the mean value varied between the sexes. The mean age of the stallions was 2.4 years, the mean of the mares was 3.6 years, and the mean of the geldings was 5.4 years. The shortest time period as to which the questionnaire from figure 11 was carried out was 1 month and 1 week after surgery while the longest time after surgery that the questionnaire was carried out was 19 months post-surgery. The median average of time after surgery for when the questionnaire was carried out was 7.5 months. The mean average time after surgery that the questionnaire was carried out was 8.5 months.

Thirteen breeds were involved in the study with the Hungarian sport horse making up the majority of the patients, with eleven (33%). Some of the other breeds that made up the study have breed predisposition for OCD lesions such as the standardbred trotters, German sport horses, and Hanoverians which there is thought to be a known quantitative trait locus on the chromosomes of these horses (Lampe et al, 2009).



(Figure 17: Breakdown of the different breeds that presented with OCD lesions)

(Figure 18: A photo taken post-operatively from the same TCJ as in figure 13 showing improvement after arthroscopic surgery and treatment with IV hyaluronic acid and IA triamcinolone acetate (Dr. Bodo Gabor, 2022))

Based on evidence from figure 13 and figure 18, it is clear that both the arthroscopic surgery and the post-operative treatment made a significant impact on the amount of effusion in the TCJ. The horse in these figures presented with two lesions in the left TCJ one at the lateral trochlear ridge of the talus and at the medial malleolus of the talus. The patient was treated post-surgery with IV hyaluronic acid and IA triamcinolone acetate (Kenalog®, 40mg/ml) and the effusion greatly improved.

Discussion

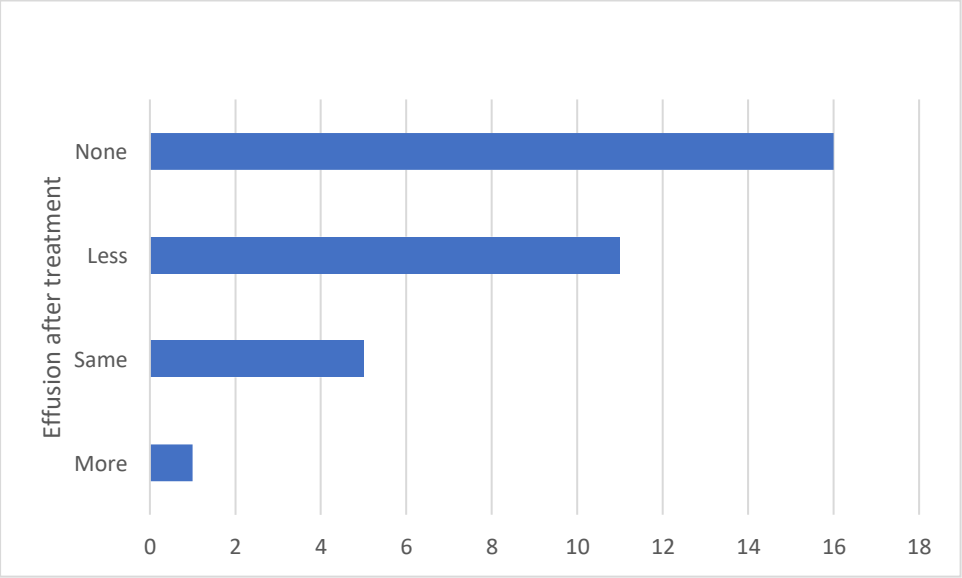
As seen in the results it is clear to see that performing an arthroscopic surgery in TCJ OCD lesions is most definitely beneficial. Of the joints in question forty-one (87%) out of the forty-seven joints saw an improvement in effusion after surgery. There was a high incidence rate of bilateral lesions in the results with (42%) of the cases being bilateral in nature. The most common lesion diagnosed was the DIRT lesion with (88%) of the cases having this lesion. Both the DIRT lesion and the bilateral nature of the OCDs was concurrent with the average compared to the literature that we reviewed for this study.

Age played a significant role in controlling effusion post operatively as only horses aged four and over saw no improvement in effusion after surgery. This would lead us to believe early diagnosis and screening for OCD lesions is beneficial both to the longevity of the horse as well as the owner who might try and sell or compete the horse. Of the thirty-three horses in the study nineteen (58%) were three years or under at the time of the surgery this was on par with other studies that have been carried out. All nineteen saw improvement in their joint effusion with 50% having completely no post-operative effusion, while 50% saw less effusion than before the surgery took place. A possible reason for the majority of the cases being below the age of 3 years could be due to many factors including horses requiring control radiograph examinations as part of a pre-purchase examination. The horse might have begun training and poor performance might have been noticed and radiographs could have been taken, or maybe a young horse not in work presented with joint effusion which would have been a clinical sign for screening of an OCD lesion. Irrespective of the reason that the lesion was diagnosed its clear to see that it was beneficial to have screened for it as well as perform the arthroscopic surgery as there was a positive result in 100% of the cases in terms of level of effusion after the surgery. From analysing figure 16 we can see that horses of younger ages respond better to the arthroscopic surgery in respect to joint effusion, this was also seen in all of the studies that we reviewed. This would further confirm the point that it would be beneficial for owners to screen for these types of lesions earlier in the life of the horse instead of leaving it to a chance discovery.

The median age of the patients was 2 years while the mean was 3.3 years. There is a significant difference in these averages due to some older outliers in the group. The median is a more suitable way to measure the true average of the population as it is not affected by extreme values, whereas the mean is affected by outliers and therefore is not suitable for skewed data. Geldings were the oldest sex in the group with a median average of four years, the possible reason for this is that most horses aren't castrated before the age of two so naturally their population will be older than that of stallions or mares that were presented to the clinic.

Breed specification was also an important point when determining the occurrence of OCD lesions and the level of effusion of each breed, the Hungarian Sport horse made up the majority of the cases with 33%, followed by Hungarian half breds, Dutch warmbloods, Belgian warmbloods, and standardbred trotters. These breeds accounted for 9% of the cases respectively. From the studies we reviewed standardbred trotters and thoroughbreds were the only breeds that were looked at for comparison of pre and post-operative effusion.

One of the parameters we used for success of surgery was if the horse returned to work after the surgery or not. We described the work of each horse as either competing at the same level or higher than before surgery or fulfilling the expectations of the owner as to the job they were used for. These expectations included a hobby horse been able to be ridden again by the owner or a sport horse competing in the same class as before they presented for the surgery. Seven (21%) of the horses have not returned to work at the time of the questionnaire being carried out. One of the mares is now a broodmare and therefore didn't return to her pre-operative work, however, it can still be said that she is now still fulfilling the role that the owner had wanted for the mare.



(Figure 19: Level of effusion in joints treated with IV hyaluronic acid and IA triamcinolone acetate)

In figure 19 we can see the results of the effusion after additional treatment following arthroscopic surgery, of the thirty-three joints treated twenty-seven (82%) saw an improvement in effusion while five saw no improvement and one joint was seen to be worse than before surgery. In comparison to joints that didn't receive any post operative treatment either IV or IA saw improvement in all cases, with nine of the fourteen joints having less effusion and five having no effusion. Some of the reasons why the results from the joints that received post-surgery treatment were worse than the joints that didn't receive any treatment, was because the horses that only had remaining effusion five/six weeks post-surgery were indicated to receive IA triamcinolone acetate (Kenalog®, 40mg/ml), so only horses treated would have had remaining effusion at that time. Another reason would be that of the horses that received treatment but didn't improve were all above the age of three, again confirming it is quite difficult to treat effusion in older horses compared to younger horses as reparative changes of the joint capsule causing irreversible elongation of the joint capsule over time may make it near impossible to reduce effusion in older horses. A further reason why post-operative effusion remained in some cases could be due to the fact that not all of the TCJ was visualized during surgery, it has been recommended by (McIlwraith et al, 2015) that the entirety of the TCJ should be examined during arthroscopic surgery, this would mean that the joint should be also

accessed from the plantar recess as well as the dorsomedial recess to make sure there is no abnormalities that might also be the reason for the post-surgery effusion occurring. Entering the plantar recess of the TCJ is not a common practice at the moment in the Ullo equine clinic of the university of veterinary medicine Budapest.

Some of our limitations in the study were that we had three different surgeons that performed the arthroscopic surgeries for this study. Each surgeon had different levels of experience in that surgery as well as they might have debrided the lesion bed to varying degrees. If we would have only had one surgeon to perform all of the procedures, then we would be able to have a more definitive outcome of reasons why post operative effusion still occurred after the surgery.

Another limitation was that we didn't perform the questionnaire with the owners at the same time in each case, this allowed for varying results in terms of effusion as some cases were still in the post operative treatment period so we could still see a change in effusion. If we could it would have been beneficial to complete the questionnaire with all the owners four months after the surgery took place as it is unlikely the effusion will worsen after this period of time. We have 7 patients that fall into the category of having their questionnaire carried out before the recommend four-month period so it cannot be disregarded that our results may worsen in time, but of them 7 horses 5 fall into the category of two years or younger so in theory from our results their effusion shouldn't worsen but it cannot be discounted that it won't.

From the literature that we studied comparison of pre-operative joint effusion and postoperative effusion was only recorded in standardbred trotters and thoroughbreds this was a limitation for us as we only had sufficient data on Hungarian sport horse breeds, so we were unable to make a comparison between those studies and our results on those breeds in the reviewed papers. Compared the some of the literature reviwed our sample size was small this was a limitation as outliers had more of an effect on the data than in some of the literature that we studied.

In conclusion our study showed us that arthroscopic surgery can reduce effusion in 87% of TCJ OCD cases postoperatively, however we must inform owners especially in older horses, that despite surgical removal of osteochondral fragments and debridement of the bony basis effusion can still remain to a certain level.

Abstract

Osteochondrosis (OC) is a general term used to describe an abnormality in the growth and maturation of joint cartilage. It is one of the most important and most common developmental orthopaedic disorder affecting joints in horses. One of the most affected joints is the tarsocrural joint which has several predilection sites, the most common being the distal intermediate ridge of the tibia (DIRT), followed by the lateral trochlear ridge and the medial malleolus of the talus. Common signs of an osteochondritis dissecans (OCD) lesion in a tarsocrural joint include non-painful joint effusion without lameness. The typical radiograph series for diagnosing an OCD lesion of the tarsocrural joint include DPl, LM, DL-PlMO, DM-PlLO and views. The best view for visualisation of DIRT lesions is a DM-PlLO oblique view.

33 horses over a period of one and a half years were presented to the clinic for tarsocrural joint OCD arthroscopy. From the 33 horses, 47 joints were affected, and 49 OCD lesions were diagnosed and treated. 43 distal intermediate ridge of the tibia lesions, 4 lateral trochlear ridge of the talus lesions and 2 medial malleoli of the talus lesions were diagnosed in horses varying in age from 10 months to 12 years. The study included 13 different breeds, with the Hungarian sport horse the most common. During the study we considered factors such as the age, sex, breed, site of lesion, comparison of preoperative and postoperative effusion. Any medications given to attempt to reduce the effusion post-operatively were also noted. Post operative rehab included box rest for 2 weeks until suture removal followed by hand-walking twice a day from week 2 till week 6-8 followed by a slow return to full work. During this period the referring vet was asked to administer IV hyaluronic acid and IA triamcinolone acetate to help reduce remaining effusion if the owner could afford it. A telephone questionnaire with the owner or referring vet was used to evaluate postoperative status of the patients.

Of the 33 operated horses 26 (79%) have returned to full work. 24 (73%) received post operative treatment in the form of iv hyaluronic acid and 22 of which also received intra-articular triamcinolone acetate in addition to the hyaluronic acid. Fifteen (45%) of the patients had no effusion post-surgery, 13 (39%) reported lower levels of effusion postoperatively, 4 (12%) still had

the same level of effusion as before surgery, and 1 horse was reported to have an increased level of effusion than before surgery.

In summary we can conclude that tarsocrural joint arthroscopy had a positive impact on postoperative effusion as well as for continuing performance.

Összefoglaló

Az osteochondrosis (OC) az ízületi porc fejlődésének zavarával járó, lovakban igen fontos és gyakori megbetegedés. Egyik jellemző előfordulási helye a tarsocruralis ízület, amelyen belül több predilekciós pont is elkülöníthető. Ezek közül leggyakrabban a tibia distalis középső taraján (distal intermediate ridge of the tibia - DIRT) alakulnak ki elváltozások, gyakorisági sorrendben ezt követik a talus trochlea lateralis taraján, illetve a tibia medialis malleolus-án megfigyelhető léziók. A tarsocruralis ízületben előforduló osteochondrosis dissecans (OCD) legjellemzőbb klinikai tünete az ízületi kiteltség, sántaság megjelenése nélkül. Ezen léziók diagnosztizálása rutin radiológiai vizsgálattal történik, melynek során DPl, LM, DLPlMO és DMPlLO felvételek készítése ajánlott. A distalis tibia-n (DIRT) megjelenő elváltozások vizualizálásra a DMPlLO irányú felvétel a legalkalmasabb.

A vizsgálat fél éves időtartama alatt 33 ló érkezett az ÁTE lógyógyászati Tanszék és Klinikájára tarsocruralis ízületi artroszkópiára, melyek kora 10 hónap és 12 év között változott. A leggyakrabban előforduló fajta a magyar sportló volt. A preoperatív vizsgálatok 47 tarsocruralis ízületben 49 OCD elváltozást diagnosztizáltak, melyek közül 43 a distalis tibia-t, 4 a talus trochlea lateralis taraját és 2 a tibia medialis malleolus-át érintette.

A kutatásban rögzítettük a résztvevő lovak korát, nemét, fajtáját, a lézió elhelyezkedését, és a pre-, illetve posztoperatív időszakban előforduló ízületi kiteltség mértékét.

Az utókezelés során 2 hét boxnyugalom, illetve 2 hét kontrollált mozgatást követően a műtéten átesett lovak a 6-8. posztoperatív héten tértek vissza a munkába. Ebben az időszakban a beküldő állatorvos az utókezelési útmutató alapján intraarticularis kortikoszteroid- (triamcinolon-acetát) és intravénás hyaluronsav-kezelést alkalmazott a posztoperatív ízületi kiteltség mérséklése céljából.

A lovak posztoperatív állapotának felmérésére telefonos utánkövetést alkalmaztunk a tulajdonos és a beküldő állatorvos megkérdezésével.

A 33 vizsgálat lóból 26 (79%) tért vissza a műtét előtti szintű használatba. 24 (73%) ló kapott intravénás hyaluronsav-kezelést a posztoperatív időszakban,

illetve ezek közül 22 esetében intraarticularis kortikoszteroid-kezelést is alkalmazott a beküldő állatorvos. Az utánkövetés során megkérdezettek 15 beteg (45%) esetében nem tapasztaltak ízületi kiteltséget a posztoperatív időszakban, míg 13 lónál (39%) kismértékű effúzió jelentkezett. Négy esetben (12%) a műtét előtt tapasztalt ízületi kiteltség nem változott a utánkövetés ideje alatt, míg egy ló esetében az effúzió mértéke növekedett az operációt követően.

A vizsgált minta eredményei alapján elmondható, hogy a tarsocruralis ízületben található OCD elváltozások gyógykezelésére alkalmazott artroszkópos műtéteknek pozitív hatása van a preoperatívan tapasztalt ízületi effúzió javulása, illetve a munkába való visszatérés és a későbbi sportteljesítmény szempontjából.

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