Occurrence of osteochondrosis of the scapulohumeral joint in a 6-month-old filly: a case report

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Abstract

Osteochondrosis of the scapulohumeral joint is one of the most frequent diseases of this joint, which can cause marked discomfort, decreased athletic use, economic losses and restrictions in equine breeding. This report discusses the clinical case of a 6-month-old warmblood filly with osteochondrosis of the scapulohumeral joint. Contraction of the deep digital flexor tendon and flexural deformity on the right front limb was the primary diagnosis established by the equine practitioner. The filly was referred to the Equine clinic of the University of Veterinary Medicine and Pharmacy (UVMP) in Košice for desmotomy of the accessory ligament of the deep digital flexor tendon. The final, primary diagnosis obtained by a complex diagnostic approach was osteochondrosis of the scapulohumeral joint. Presence of multiple pathologies on the right front limb was detected, but the main source of painful clinical manifestation was the condition of the scapulohumeral joint. This report describes an uncommon, rarely diagnosed pathological condition, which can lead to unfavourable prognosis. Osteochondrosis of the scapulohumeral joint was the reason for humane euthanasia of the filly in this case. The clinical case was completed by postmortem findings.

Horse, shoulder joint, radiography, sonography, pathological diagnostics

Together with physeal dysplasia, malformation of cuboidal bones, and angular and flexion deformities, osteochondrosis falls under the syndrome of developmental orthopaedic diseases (Jenner et al. 2008). It is most often diagnosed in weanlings and yearlings (6–12 months), but its occurrence has also been recorded in individuals younger than 5 months and older than 8 years (Nyack et al. 1981; Dyson 1986; Nixon 1990; Kay 2006; Jenner et al. 2008). The typical character of lameness originating from osteochondral lesions of the scapulohumeral joint is fairly well documented in the literature, however, establishing a final diagnosis can still present a complex issue. Early diagnosis of this problem is a key criterion for successful therapy and favourable prognosis.

Tarsocrural, femoropatellar, metacarpophalangeal/metatarsophalangeal joints, followed by scapulohumeral, coxofemoral and intervertebral joints are predilection sites of osteochondrosis in horses sorted by the most frequently occurring (Jenner et al. 2008; Van Weeren 2019). Osteochondrosis is considered a multifactorial disease, which is a result of the influence of nutrition, overload, overweight, fast growth rate, hormonal imbalance and, last but not least, genetics, which has been identified as a key factor in recent years (Van Weeren 2019).

Affected horses are mostly characterized by intermittent lameness, which may develop into significant consistent lameness with shortening of the cranial phase of the stride. A painful response can be induced by passive manipulation at flexion, extension and abduction of the shoulder joint (Jenner et al. 2008; Van Weeren 2019; Hubert 2020). Myopaenia and club foot conformation of the affected limb can be also detected. Obvious swelling in the area of the affected shoulder joint can be found in some cases, as well as effusion of the shoulder joint (Kay 2006; Hubert 2020).

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Changes on the X-rays are characteristically localized on the caudal articular surfaces of the humeral head and the glenoid cavity of the scapula. These osteochondral lesions are represented by irregularities on the articular surfaces, changes in bone density characterized by sclerotization of the subchondral bone or, conversely, as radiolucent areas, and osteophytes or subchondral bone cyst like lesions can also be detected (Jenner et al. 2008; Van Weeren 2019; Hubert 2020). Subchondral bone cyst like lesions are not frequent, but these occur as lesions with or without communication into the joint. Cyst like lesions with intra-articular communication are often the cause of significant lameness (Kay 2006).

Diagnostic intra-articular analgesia can have fundamental importance in determining the final diagnosis, especially in cases with multiple abnormalities. A positive response can range from slight improvement to complete resolution of lameness (Doyle and White 2000).

Ultrasonography examination is a simple and quickly performed diagnostic method, but due to the anatomical alignment of a shoulder joint, this technique is limited. Use of ultrasonography can be crucial for lesions that cannot be visualized on a radiograph, such as changes in the synovial membrane or articular cartilage (Doyle and White 2000; Van Weeren 2019).

Scintigraphy is a sensitive method for localizing the origin of lameness. However, this technique is hardly applicable in young growing horses due to the increased capture of the radiopharmaceutical solution in the physis. It is also ineffective in cases of chronic osteochondral lesions, especially if there is presence of osteosclerosis or reduced activity of osteoblasts (Doyle and White 2000).

Use of arthroscopy for determining the final diagnosis of diseases of the scapulohumeral joint has also been described and is used for assessment and management of the lesions (Doyle and White 2000; McIlwraith 2013; Hubert 2020).

Therapy of osteochondrosis of the scapulohumeral joint can be divided into conservative and surgical. Conservative therapy consists of a rest regime in the box, which can be supplemented by the intra-articular application of therapeutics such as hyaluronan, polysulphated glycosaminoglycans, and corticosteroids (Jenner et al. 2008; McIlwraith 2013; Van Weeren 2019; Hubert 2020). Closer investigation of intra-articular use of therapeutics such as platelet rich plasma or mesenchymal stem cells could be beneficial. This method usually does not result in a satisfactory outcome, and is not associated with an athletic career. Research on the effectiveness of surgical therapy has yielded more satisfactory results, but the percentage of this method failing is still high, especially in racehorses, and the prognosis remains unfavourable (Jenner et al. 2008; McIlwraith 2013; Van Weeren 2019; Hubert 2020).

Case description

History

The patient was a dark brown 6-month-old filly of the Hanoverian horse, originating from Slovakia. The filly was diagnosed with a flexural deformity of the right front limb in the field, and was referred to the Equine Clinic of the University of Veterinary Medicine and Pharmacy (UVMP) for desmotomy of the accessory ligament of the deep digital flexor tendon. The owner reported a sudden onset of significant lameness on the right front limb. Occasionally decreased extension in the fetlock joint on the affected front limb was also observed. The foal was kept on pasture with the mare 24/7, and the mare had not been used in sports for unspecified reasons.

Clinical findings

The clinical examinations consist of a physical and a dynamic one. The filly had a symmetrical square body frame, posture was regular in the sagittal plane with increased

laxity of the left front limb and a straight posture of the right front limb (Plate I, Fig. 1). In the frontal plane, posture was regular, and in the horizontal plane, external rotation of the front limbs was present. The right front limb was often relaxed at rest, and had a straighter posture compared to the contralateral limb, which had more laxity due to overload. Intermittent decrease in extension of the fetlock joint on the right front limb, external rotation of entire limb, swelling of the shoulder joint (Plate II, Fig. 2), minimal filling of the fetlock joint and occasional failure to fully step on the heels were noted. The hoof angles of the right front limb were increased, with club foot conformation, a naturally concave solar surface, and bruising was also present on the top of the toe with sensitivity to palpation (Plate II, Fig. 3). The dynamic examination revealed primary right front limb lameness of the grade 3/5 AAEP (American Association of Equine Practitioners) in walk, 4/5 AAEP in trot, with compensatory lameness on the contralateral pelvic limb. Lameness occurred in the stance phase as well as in the swing phase with shortening of the cranial and caudal phases of the stride. Weightbearing and flexion test on the right front limb was positive.

Imaging consisted of radiography and ultrasonography examinations. The digit of the left front extremity showed increased laxity. The digit of the right front limb had a straight posture, with hoof-pastern axis broken palmary, and the palmar angle was 22 degrees (Plate II, Fig. 4). X-ray examination of the fetlock joint on the right front limb showed mild osteoproliferative changes in the area of the metacarpal physis and contact lytic lesions on the apices of the proximal sesamoid bones (Plate III, Fig. 5). An X-ray examination of the carpal and elbow joints of the right front limb was also performed but without findings. Finally, an X-ray examination of the scapulohumeral joint of the right front limb using an oblique craniomedial-caudolateral projection was performed, which revealed severe lytic and mild osteoproliferative changes on the caudal part of the articular surface of the humeral head and the glenoid cavity of the scapulae, with sclerotization of the subchondral bone and presence of osteolytic lesions (Plate III, Fig. 6). Control X-rays of the left shoulder joint were without pathological findings.

Ultrasonography examination of the scapulohumeral joint of the right front limb was performed using a caudo-lateral approach, and confirmed the correctness of the X-ray findings. This examination reflected irregularities on the caudal articular edges of the humeral head and the glenoid, thickening of the synovial membrane of the scapulohumeral joint, and a synovial effusion (Plate IV, Fig. 7). This finding was compared with the finding of the shoulder joint on the contralateral limb, which was without abnormalities (Plate IV, Fig. 8).

During hospitalization, diagnostic perineural analgesia was also performed on multiple levels on the right front limb. A middle digital nerve block, an abaxial sesamoid nerve block, and a distal metacarpal nerve block were performed, but all these nerve blocks were negative. These findings were of crucial importance in determining the primary diagnosis, as several pathologies were present on the affected limb.

Diagnosis

Based on the above-mentioned diagnostic procedures, it was concluded that the primary pathological process which caused considerable discomfort to the patient was osteochondrosis of the scapulohumeral joint on the right front limb. Straight conformation of this limb was secondary in an attempt to control pain in the shoulder joint. Likewise, a club foot conformation is characteristic of chronic, painful pathological processes in the shoulder joint and occurs as secondary to them. The finding of mild metacarpal physitis can be associated with a period of rapid growth in foals.

Therapy

Upon arrival at the UVMF Equine Clinic, based on the localization of a painful bruise on top of the toe, the hoof was taped using polyurethane (Superfast), creating

a gradual expansion in thickness towards the heels. This treatment was performed in order to protect the excessively bruised top of the toe, and by lifting the heels, the deep digital flexor tendon was released. Better extension in the fetlock joint was also established and thus temporarily ensured greater comfort for the patient. During hospitalization, polyurethane layer was modified according to needs of the filly. After establishing the final diagnosis and upon consultation with the owner, euthanasia of the patient was elected due to unclear and unfavourable prognosis and the potential financial burden of the therapeutic procedures available. Autopsy was performed with the owner's consent.

Postmortem findings

Postmortem examination of the shoulder joint confirmed the seriousness of the established diagnosis. The finding was significantly destroyed articular cartilage of the caudal half of the humeral head and the glenoid with presence of lytic changes on subchondral bone (Plate V, Figs 9, 10).

Discussion

Osteochondrosis of the scapulohumeral joint is one of the most serious forms of osteochondrosis occurring in horses. Osteochondral lesions mostly occur on the caudal parts of the articular surfaces in the shoulder joint, and their occurrence corresponds to the places of the highest load in the joint, the places of contact during the stance phase (Jenner et al. 2008; Van Weeren 2019). There are two theories as to the underlying cause of cyst like lesions in the scapulohumeral joint. The first one is the classic theory of the formation of osteochondrosis as a result of disruption in the natural process of enchondral ossification, and the second is based on the effect of trauma as an initial element (Kay 2006). Glenoid cavity is more predisposed to the formation of cyst like lesions because, unlike the head of the humerus, its entire articular surface is in contact, and there is a greater concentration of pressure (Bertone et al. 1987). The incidence of secondary osteoarthritis of the shoulder joint due to the occurrence of osteochondrosis arises much faster than in other joints, and therefore this type of osteochondrosis often has a dubious or poor prognosis (Doyle and White 2000).

The importance of a comprehensive diagnosis of orthopaedic problems in horses is proved by the clinical case presented in this article. Pathological conditions in the shoulder joint, including osteochondrosis, can falsely indicate the occurrence of a problem in the distal part of the limb by their clinical manifestation, and can confuse even an experienced practitioner. Typical symptoms of osteochondrosis in the shoulder joint mentioned by several authors include significant lameness, straightened conformation of the digit, unilateral presence of club foot conformation, decreased extension in the fetlock joint, and presence of bruising on top of the toe (Doyle and White 2000; Kay 2006; Jenner et al. 2008; McIlwraith 2013; Van Weeren 2019).

X-ray findings can range from vague, early changes to serious lesions with unfavourable prognosis. In a study of 15 cases, Doyle and White (2000) described the occurrence of mild lesions represented by sclerosis, focal lysis, cyst like lesions on the glenoid and irregularities on the humeral head. In their study, they also described the use of scintigraphy as a diagnostic method. The limitation of this technique is the necessity of blood flow through the examined area and activity of osteoblasts. In a retrospective study of 32 horses, incidence of osteochondral fragmentation, osteophytes, cyst like lesions, sclerosis, and subchondral bone lysis was recorded radiographically, and the lesions were graded according to severity as very severe, severe, moderate, and mild (Jenner et al. 2008). In the same study, authors pointed out the fact that 50% of cases were affected by bilateral lesions. In addition to the fact that lesions can occur

unilaterally or bilaterally, they can affect only the humeral head, or conversely, only the glenoid cavity, or they can occur simultaneously on both articular surfaces (Bertone et al. 1987). The fact that X-rays findings do not correlate with arthroscopic findings is of fundamental importance, and therefore the best evaluation of pathological states in the scapulohumeral joint can be achieved by the arthroscopic approach (Bertone et al. 1987; Doyle and White 2000; McIlwraith 2013). In their study of 15 cases, Doyle and White (2000) also described that lesions found during arthroscopy can affect only the head of humerus, or conversely, only the glenoid, or they can occur simultaneously on both articular surfaces. These findings include changes in articular cartilage grooves, cyst like lesions, articular cartilage fibrillation, articular cartilage fragmentation, and nondislocated humeral head fractures.

The available therapies and their effectiveness are limited for this type of disease. There are several studies focusing on effectiveness of therapies of shoulder osteochondrosis. Options for conservative therapy include rest in the box, intra-articular application of corticoids and biotherapeutics. In general, conservative therapy is not considered as effective, and early diagnosis is a prerequisite for its eventual success (Doyle and White 2000; Kay 2006; Jenner et al. 2008; McIlwraith 2013; Van Weeren 2019). Surgical therapy has shown greater clinical success but it also has limitations. Bertone et al. (1987) treated 11 horses with lesions in 13 scapulohumeral joints by full-thickness curettage of cartilage defects to bleeding subchondral bone through an arthroscopic approach after radiographic diagnosis; partial defects were left untreated. Nine out of 11 horses were sound and five out of nine showed athletic soundness in 5–20 months after treatment. The complications were represented by formation of subchondral bone cysts and degenerative joint disease after surgery. In the study of 15 cases of humeral osteochondrosis, the same surgical treatment was performed, but in one horse it was impossible to treat the entire lesion due to its size. Of these 15 horses of miscellaneous breeds, 12 horses reached the intended use and 1 horse had to be euthanized (Doyle and White 2000). In a retrospective study of 32 horses, consisting mainly of English Thoroughbreds under 2 years of age, the chosen therapy depended on intended use. Surgical treatment was performed also in cases with failed conservative therapy. Arthroscopic debridement of lesions down to bleeding subchondral bone was performed. The overall success rate was 25%; with 15.4% success rate for racehorses and 67% for sports horses. Eight horses were euthanized due to occurrence of very severe lesions (Jenner et al. 2008). In an article comparing conservative and surgical therapy, conservative therapy was labelled as unsuccessful, except for cases with early diagnosis of the problem. The general success rate of the surgical treatment was 50%, and it could be successful even in the presence of serious lesions. In the cases of racehorses with an unfavourable prognosis, both conservative and surgical therapy were equally ineffective (McIlwraith 2013).

In summary, this case of osteochondrosis of the scapulohumeral joint in a 6-month-old warm-blooded filly confirmed the importance of using available diagnostic methods for establishing a complex diagnosis, especially when multiple pathologies occur. Primary diagnosis was osteochondrosis of the scapulohumeral joint on right front limb. This osteochondrosis was presented by osteoproliferative, osteolytic, and deformative changes affecting the humeral head and glenoid cavity of the scapulae. The initial, wrongly established diagnosis of flexural deformity and club foot conformation represented only a secondary problem. Metacarpal physitis was the result of multiple factors including breed, increased growth rate, season, and age. The results of the diagnostic methods used were positively correlated with the available literature. Due to the severity of the lesions, humane euthanasia was performed. Improving and finding new effective therapeutic procedures should be the subject of future research in this area.

Conclusion

Osteochondrosis of the scapulohumeral joint in horses is one of the uncommon pathological conditions that can be encountered in equine practice. The X-ray manifestation of lesions on joint surfaces of the glenoid cavity and the humeral head can range from mild, easily overlooked lesions to very serious ones. The X-ray findings must also be assessed in connection with clinical manifestation of the patient. Age, intended use, and early diagnosis of the problem are key criteria for choosing the therapeutic method, and prognosis must be made according to these criteria. Surgical therapy can be effective even in cases with occurrence of serious lesions (McIlwraith 2013).

Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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Fig. 1. Straight conformation of the right front limb without heel bending.

Fig. 2. The red circle indicates the presence of a painful bruise on the toe of the right front limb.

Fig. 3. Marked swelling in the area of the shoulder joint of the right front limb.

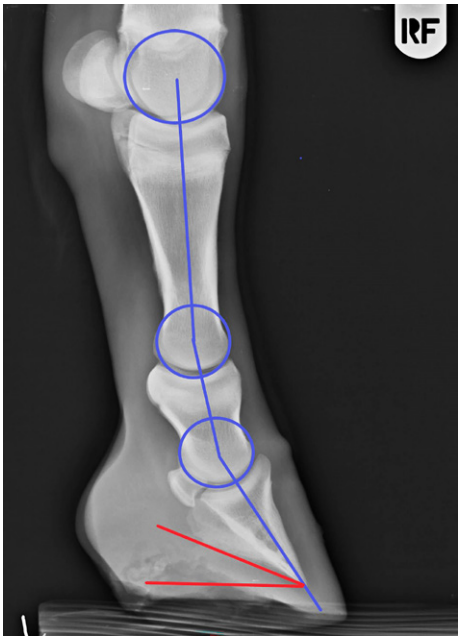

Fig. 4. X-ray of the right front limb showing the upright axis of the digit (blue lines) and the enlarged palmar angle (red lines).

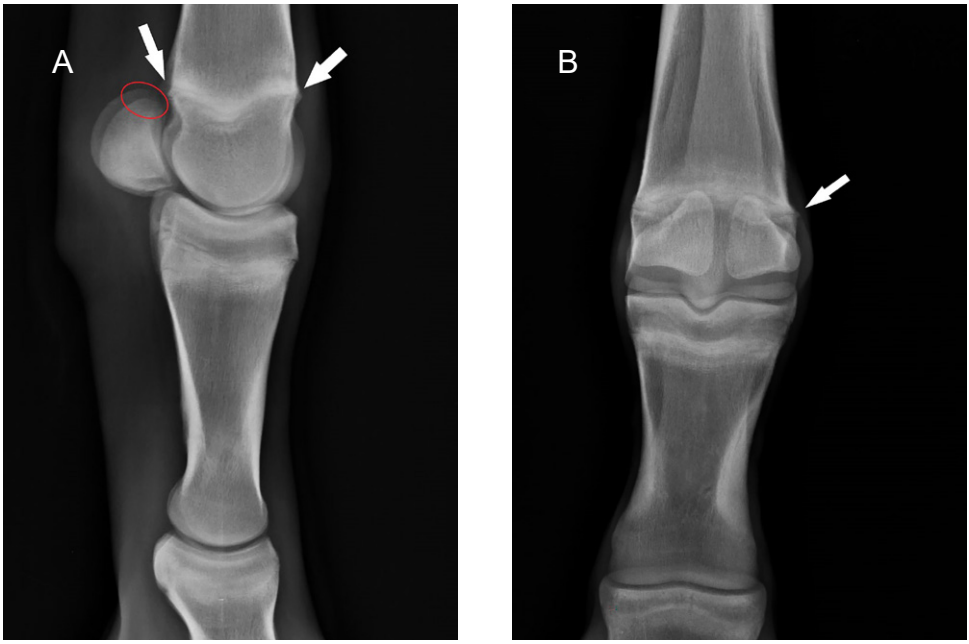

Fig. 5 (A, B). X-rays of the fetlock joint of the right front limb. White arrows indicate physitis of the cannon bone, and red circle indicates contact lesions on the apices of the proximal sesamoid bones.

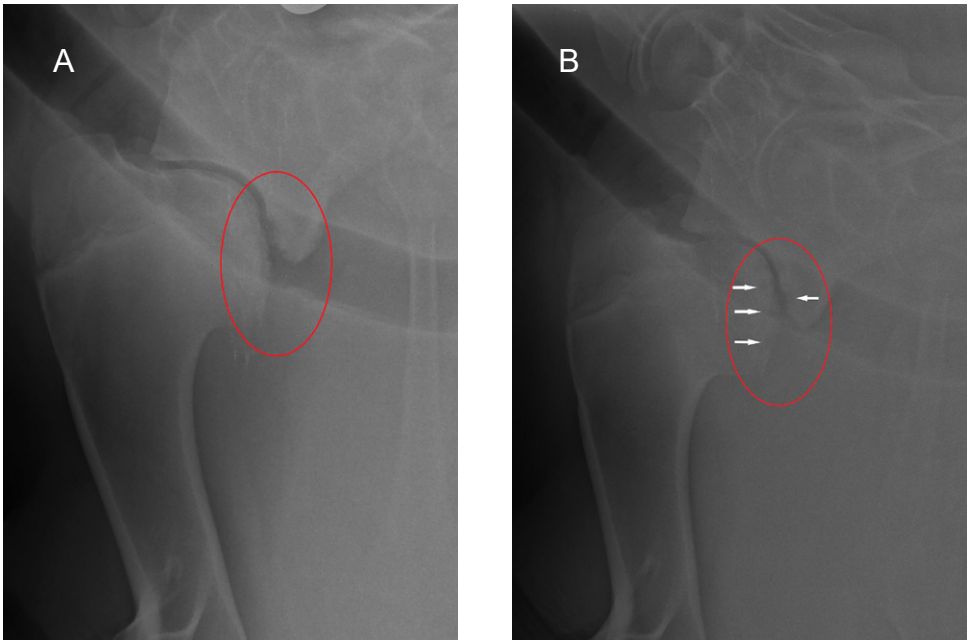

Fig. 6 (A, B). X-rays of the scapulohumeral joint of the right front limb. The red circle marks the area of the articular cartilages on the caput humeri and glenoid, which are affected by lytic and osteoproliferative lesions of osteochondrosis. White arrows indicate osteolytic lesions.

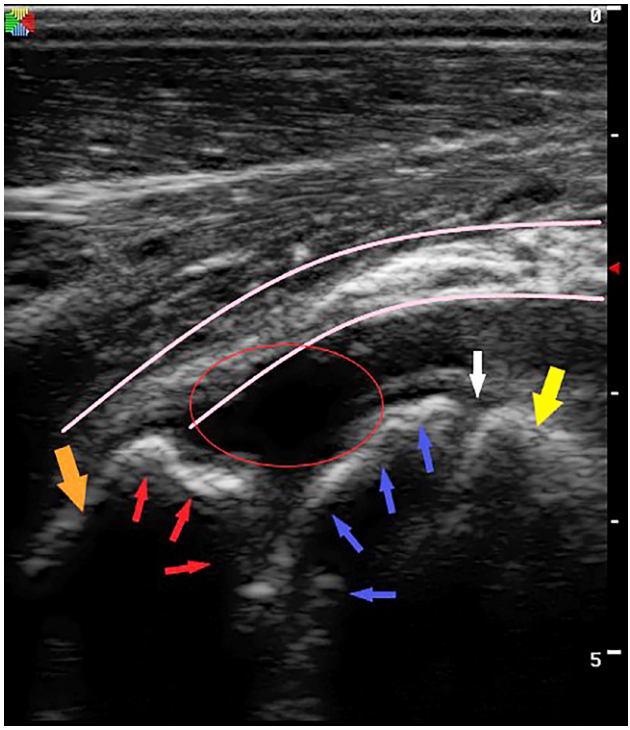

Fig. 7. Ultrasonography examination of the scapulohumeral joint of the right front limb. The orange arrow indicates the caudal edge of the glenoid, the yellow arrow indicates the caudal edge of the humeral head. A thickened synovial membrane is shown between the pink lines. The white arrow indicates the physis of the humeral head, the blue arrows indicate lesions on the humeral head, and the red arrows indicate lesions on the glenoid cavity. The red circle indicates an increase in synovial fluid.

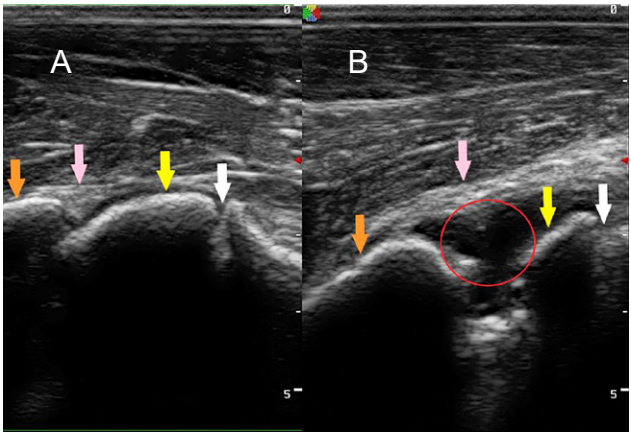

Fig. 8 (A, B). Sonographic comparison of the scapulohumeral joint of the left front limb (A) and the right front limb (B). Orange arrows indicate the caudal edge of the glenoid, yellow arrows indicate the caudal edge of the humeral head, pink arrows indicate the synovial membrane, white arrows indicate the physis of the humeral head, and the red circle indicates the increased synovial fluid of the joint.

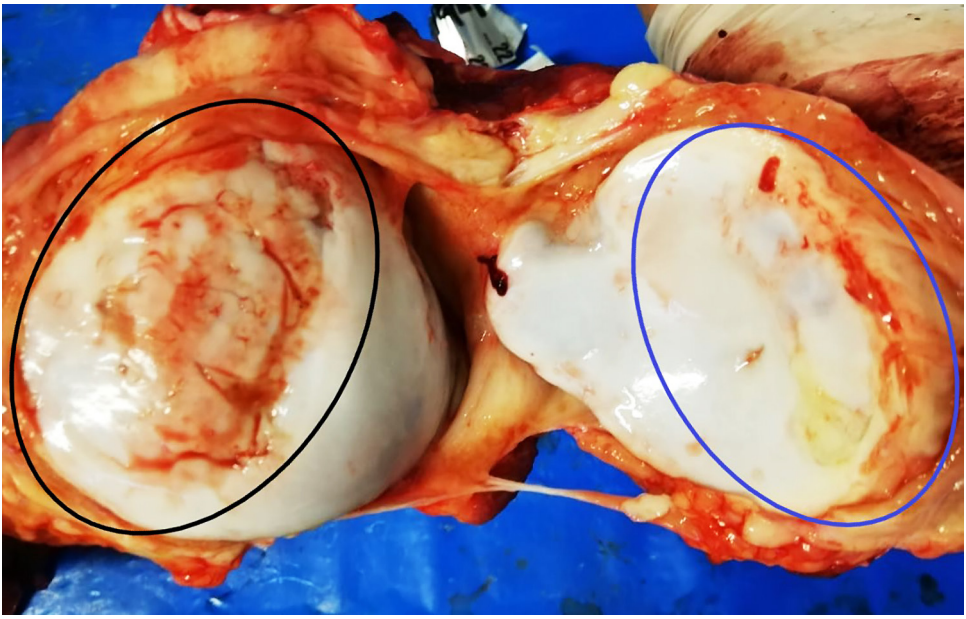

Fig. 9. Humeral head (left) and glenoid cavity (right). Osteochondral lesions on the humeral head are marked with a black circle and osteochondral lesions on the glenoid are marked with a blue circle.

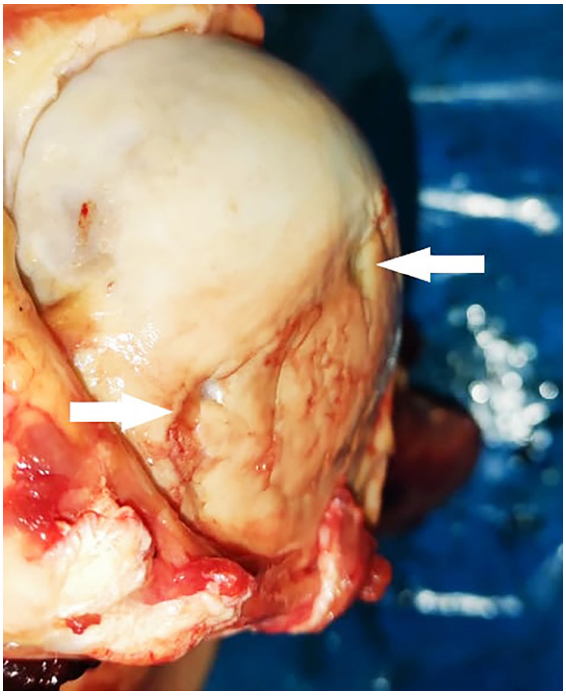

Fig. 10. An oblique view of the humeral head. White arrows indicate osteolytic lesions.