Noninfectious Joint Disease in Cattle

Sylvain Nichols, DMV, MS[a,*], Hélène Lardé, Dr Med Vet, DES[b]

KEYWORDS

• Cattle • Osteochondrosis • Degenerative joint disease • Osteoarthritis • Surgery

KEY POINTS

- Osteochondrosis causes variable degrees of joint effusion and lameness. Arthroscopic debridement of the lesions provides the best long-term outcome.
- Articular fracture or joint instability following collateral ligament rupture causes severe joint effusion and lameness. Internal fixation combined with external coaptation is the treatment of choice.
- Degenerative joint disease in young animals has a guarded prognosis. Arthroscopy combined with medical therapy may slow down the disease process.
- Degenerative joint disease involving the distal interphalangeal joint has a good prognosis following joint resection.

INTRODUCTION

Noninfectious joint diseases are uncommonly diagnosed in cattle.[1] Typical clinical signs include joint effusion and various degree of lameness. Joint trauma can be diagnosed in cattle of all ages. However, osteochondrosis and degenerative joint disease (DJD) are usually recognized in young cattle.[1–9] This article discusses all the aforementioned disorders with regard to the causes, clinical and diagnostic features, treatments, and prognosis.

OSTEOCHONDROSIS

Osteochondrosis is a complex arthropathy that is rarely identified in cattle. The atlanto-occipital and the femoropatellar joints are the most commonly affected joints in feedlot cattle.[2]

Osteochondrosis usually refers to either osteochondritis dissecans (OCD) or subchondral bone cysts. However, these qualifications have been challenged. Because

[a] Department of Clinical Sciences, Faculty of Veterinary Medicine, Université de Montréal, 3200 Rue Sicotte, St-Hyacinthe, Quebec J2S 2M2, Canada; [b] Centre Hospitalier Universitaire Vétérinaire, Université de Montréal, 3200 Rue Sicotte, St-Hyacinthe, Quebec J2S 2M2, Canada
* Corresponding author.
E-mail address: sylvain.nichols@umontreal.ca

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there is no inflammation associated with OCD, the term osteochondritis is inappropriate and has been changed to osteochondrosis dissecans.[10] Two earlier stages of the disease have been recognized and named osteochondrosis latens and osteochondrosis manifesta.[10] Osteochondrosis latens is the first stage of the disease and is characterized by a focal area of necrotic cartilage within the epiphyseal cartilage. This lesion is only visible histologically. Osteochondrosis manifesta is the second stage of the disease, which is characterized by a focal failure of endochondral ossification caused by the necrotic cartilage. This lesion is visible macroscopically and radiographically and is similar to a subchondral bone cyst. Osteochondrosis dissecans is the final stage of the disease. A fissure originating from the necrotic cartilage extends to the articular cartilage, creating a cartilage flap or a loose body within the joint. This fissure is probably secondary to mild traumatic injury to the joint.

Causes and Pathophysiology

The causes and pathophysiology of osteochondrosis are complex. Studies often involve subjects with late clinical manifestations of the disease (osteochondrosis dissecans), with chronic remodeling of the joint already present. Among the many theories explaining this disorder, the one that currently answers most of the interrogations is the cartilage canal blood vessel necrosis theory.[10]

Cartilage canals are essential to nourish chondrocytes that are beyond the reach of synovial fluid nutrients. They are also essential to the formation and to the function of secondary ossification centers. Early in life, the blood supply to the canal comes from the perichondral vasculature. At some point, the blood supply shifts from the perichondral vessels to the metaphyseal vessels. At that moment, the fragile anastomoses created at the chondro-osseous junctions are more susceptible to trauma, which may damage the vessels and deprive the cartilage of its blood supply. The cartilage becomes necrotic and a lesion of osteochondrosis latens forms. Depending on the size of the lesion, it may resolve spontaneously and allow normal endochondral ossification, or it may remain and impede mineralization or vascularization. The lesion becomes radiographically visible and can be called osteochondrosis manifesta. At this stage, the lesion can still resolve, and the void created by the necrotic cartilage becomes granulation tissue and eventually bone; the same way a fracture heals. However, if the necrotic material cannot be removed or if the subchondral bone cannot heal properly, an osteochondrosis dissecans lesion appears following minor trauma to the unhealthy cartilage and subchondral bone (**Fig. 1**).

Risk Factors

For a long time, it was thought that fast-growing animals fed a high-energy diet were more likely to develop osteochondrosis.[3,6] This hypothesis was never confirmed and it is now thought that it might not be an important factor in the development of the disease. Being an intact male was also implicated.[6] Nowadays, with high-value females, males are not as overrepresented as they were in the past. In pigs and horses, osteochondrosis has a heritable component.[11,12] It was thought that the heritable component was at the level of the quality of the bone or cartilage. However, this theory does not explain why osteochondrosis is always diagnosed at the same location and rarely involves other articulations except for the contralateral joint. Therefore, the hereditable component seems to be more at the level of certain anatomic characteristics.[13] In pigs, the incidence of osteochondrosis can be decreased or increased significantly by selecting the breeding stock according to joint shape and conformation.[14]