

Anterior Cruciate Ligament Rupture in a Korean Native Cattle

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Abstract : A 9-year-old Korean native cattle was referred with chief complaint of left hind limb lameness during 2 months. He could not bear a weight on the left hind limb. On palpation, the stifle joint was swollen and mild fever was felt. In X-ray images, increased joint fluid, subchondral bone erosions, osteophyte formation along the trochlear ridge, and changes in the shape of the infrapatellar fat pad were shown. Cranial displacement of the tibia and intercondylar eminence could be seen. Based on the history, physical examination and radiographic findings, the bull was diagnosed as anterior cruciate ligament rupture. Because he could not participate in further bullfighting competition anymore, we indicated the slaughter as soon as possible.

Key words : Anterior cruciate ligament rupture, Korean native cattle, bull fighting, trauma.

Introduction

The anterior cruciate ligament (ACL) plays key role for maintaining the mechanical stability of the stifle joint. ACL frequently could be ruptured by injury. In cattle, rupture of ACL often reveals pain, debilitating and the increase the risk of osteoarthritis. If ruptured ACL is not reconstructed to the normal structure or function of the knee, it often develops knee weakness and osteoarthritis (8).

ACL rupture should be suspected in cattle having history of sudden severe lameness, especially in bulls after fighting or mating. These ACL injuries are commonly complete ruptures, and result in stifle instability and secondary articular change such as osteoarthritis (2). When ACL is ruptured, considerable amount of effusion are filled in the stifle joint, and clicking or clunking sound could be audible. When progressive arthritis occurs, synovial sac becomes thick. Diagnosis of ACL is made through the palpation of the thickened joint capsule, ultrasonographs and lateral radiographs. Practically, ACL rupture in cattle is mainly diagnosed with clinical history and physical examination. Although routine diagnostic methods in stifle joint disease include arthrocentesis and anterior drawer test in veterinary medicine, arthrocentesis is rarely used in cattle because it has risk of introducing infection into the joint, and the anterior drawer test is technically difficult to perform in cattle, moreover, it should be particularly careful when cattle have severe pain (10).

Although ACL ruptures have been frequently reported in human beings, small animals and industrial animals, in our best knowledge, there was no case report that was diagnosed

as the ACL in Korean native bullfighting cattle. Bullfighting cattle has relatively higher value than beef cattle, therefore precise diagnosis is necessary. We here report a case of ACL rupture that presents on the left hind limb of a 9-year-old male Korean native bullfighting cattle.

Case

A 9-year-old male Korean native cattle weighting about 800 kg was referred to the Veterinary Medical Teaching Hospital, Kyungpook National University with chief complaint of left hind limb lameness during 2 months. The bull was knocked down two times in the bull fighting competition in Cheongdo Bullfighting Festival about three months before. Soon after injury, phenylbutazone (Butazolidin[®]; 5 mg/kg IV) has been administrated to him every other day continuously. Grossly, he could not bear a weight on left hind limb and lameness was found (Fig 1). On palpation, stifle joint was

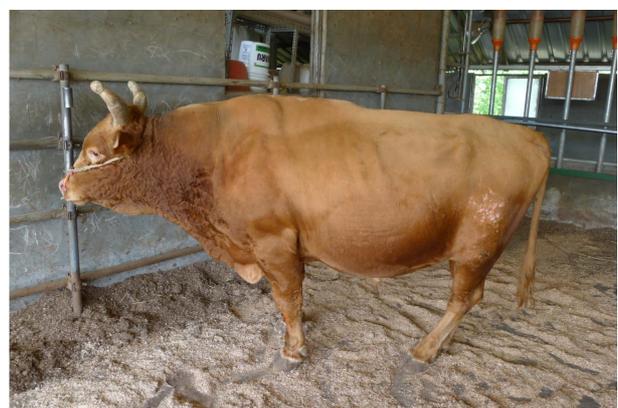


Fig. 1. Severe hind limb lameness in a Korean native cattle with anterior cruciate ligament rupture.

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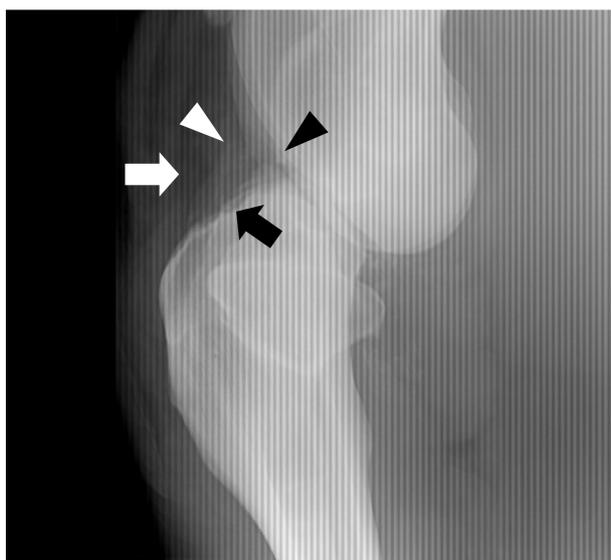


Fig. 2. The lateral X-ray image. Changes in the shape of the infrapatellar fat pad (white arrow). Subchondral bone erosions (black arrow). Osteophyte formation along the trochlear ridge (black arrow head). Increased synovial fluid (white arrow head).

swollen and mild fever was felt. He showed severe pain at the injured limb on physical examination and, because of hostile attitude, the anterior drawer test could not be performed.

Different diagnosis included subchondral bone cyst, degenerative joint disease, collateral ligament injury and ruptured ACL. For definite diagnosis, lateromedial stifle radiograph was obtained with portable X-ray device (PXP-40HF; poskom, Korea) (Fig 2). On the X-ray image, increased joint fluid, subchondral bone erosions, osteophyte formation along the trochlear ridge, changes in the shape of the infrapatellar fat pad were shown. Cranial displacement of tibia could be seen and intercondylar eminence was observed in the cranial portion of femoral trochlea.

Based on the history, physical examination and radiographic findings, ACL rupture was diagnosed.

Discussion

Stifle lameness is a frequent disease in cattle. In previous report, abnormalities associated with stifle lameness included subchondral bone cyst, joint instability, degenerative joint disease, sepsis, femorotibial luxation, fracture, collateral ligament injury and ACL rupture. The percentage of ACL was about 20%. According to the diagnosis, treatments for the each disease are different (2). Therefore, correct diagnosis is required (2).

Diagnosis of hindlimb lameness is through physical examination, aspiration of joint cavity, radiography, and ultrasonography (2,5). On physical examination the left limb of the bull was considerably swollen and he presented severe pain when the left hind limb was palpated. The aspiration of joint was not performed because, previously mentioned, it has the risk

of introducing infection into the joint (10).

According to the previous reports, the early stages of injury and inflammation of the soft tissue could not be precisely distinguished through the radiography. Although, ultrasonography was suggested to be provided better soft tissue visualization than radiography (7,9), it seems to be impractical in cattle. When ACL is ruptured, the ultrasonographic image of ACL is difficult to be obtained because it could be acquired by specific technique such as flexion of the hind limb, but it could produce severe pain to live cattle and the risk of accident to veterinarians (5,9). In this case, we tried to take ultrasonographic image but failed, because the cattle had severe pain and behaved aggressively. Therefore, a lateral radiographic image was just taken. Underlying degenerative joint disease could not be identified but it was ruled out as primary reason of lameness because sudden onset of the symptom and radiographic findings.

In small animals, a lot of surgical techniques to repair ACL rupture are developed. Two main categories are extracapsular reconstruction technique and intracapsular reconstruction technique. Extracapsular reconstruction techniques include imbrication technique, fibular head advancement technique, tibial plateau leveling osteotomy, tibial wedge osteotomy and tibial tuberosity advancement. Intracapsular reconstruction techniques are using autologous tissue graft as an alternative of cruciate ligament. The goal of both techniques is reconstruction of passive constraint of stifle joint (3).

In cattle, it is difficult to find articles or case reports using extracapsular surgical reconstruction techniques. Intracapsular reconstruction is practiced by graft through autoplasmic or alloplastic implants such as patella ligament, fascia and bone patellar tendon-bone (4,6,11).

Considered surgical method in this case was fascia graft, however, client denied surgical attempt with three reasons. First, the success rate of fascia graft is tend to be decreased in heavy weighting cattle (1). Second, he may be unsuitable to participate in bullfighting competition any more, even if surgery is successful. Third, the bull has little genetic value because he was not a breeding bull. Therefore, we indicated the slaughter as soon as possible.

In conclusion, ACL rupture could produce progressive osteoarthritis and persist weakness associated directly with economics and animal welfare in cattle. Early diagnosis and prognosis estimating should be performed through the clinical history, physical examination and radiography.

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Reference

1. Crawford WH. Intra-articular replacement of bovine cranial cruciate ligaments with an autogenous fascial graft. *Vet Surg*

- 1990; 19: 380-388.
2. Ducharme NG, Stanton ME and Ducharme GR. Stifle lameness in cattle at two veterinary teaching hospitals: A retrospective study of forty-two cases. *Can Vet J* 1985; 26: 212-217.
 3. Fossum TW. Diseases of the joints. In: Small animal surgery. 3rd Ed. Missouri: Mosby Elsevier. 2007: 1260-1262.
 4. Hamilton GF, Nelson AW. The fate of autoplasmic and alloplastic implants in the bovine stifle joint. *Can Vet J* 1970; 11: 209-214.
 5. Kofler J. Ultrasonographic examination of the stifle region in cattle-normal appearance. *Vet J* 1999; 158: 21-32.
 6. Moss EW, McCurnin DM, Ferguson TH. Experimental cranial cruciate replacement in cattle using a patellar ligament graft. *Can Vet J* 1988; 29: 157-162.
 7. Nelson DR, Huhn JC, Kneller SK. Peripheral detachment of the medial meniscus with injury to the medial collateral ligament in 50 cattle. *Vet Rec* 1990; 127: 59-60.
 8. Pascher A, Steinert AF, Palmer GD, Betz O, Gouze JN, Gouze E, Pilapil C, Ghivizzani SC, Evans CH, Murray MM. Enhanced repair of the anterior cruciate ligament by in situ gene transfer: evaluation in an *in vitro* model. *Mol Ther* 2004; 10: 327-336.
 9. Penninck DG, Nyland TG, O'Brien TR, Wheat JD, Berry CR. Ultrasonography of the equine stifle. *Vet Rad* 1990; 31: 293-298.
 10. Philip RS, Colin DP, Alastair IM. Musculoskeletal disease. In: Cattle Medicine, London: Manson Publishing Ltd 2011: 187-188.
 11. Willis-Owen CA, Hearn TC, Keene GC, Costi JJ. Biomechanical testing of implant free wedge shaped bone block fixation for bone patellar tendon bone anterior cruciate ligament reconstruction in a bovine model. *J Orthop Surg Res* 5: 66.

한우 싸움소에서 발생한 전십자인대 파열

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요 약: 9살 된 한우 싸움소가 왼쪽 뒷다리 파행 때문에 경북대학교 수의과대학 부속동물병원에 진료가 의뢰되었다. 환축은 좌측다리에 체중을 신지 못하고 있었으며 파행이 발견되었다. 촉진하였을 때, 무릎관절은 부어 있었고 미열이 느껴졌다. 방사선 사진에서, 관절액의 증가, 연골하골의 미란, 도르레 용기선의 골편 형성, 무릎인대하 지방체의 변화를 보였으며, 정강뼈와 용기사이용기의 앞쪽 변위를 볼 수 있었다. 병력, 신체검사에 기초하여 전십자인대 파열을 잠정 진단하였으며 방사선 사진으로 확진하였다. 대상 환축은 심한 통증을 호소하면서 정상 보행이 불가능한 상태일 뿐 아니라 투우로서 효용성을 상실하고 현실적으로 치료가 불가능하여 신속히 도태 처분하였다.

주요어 : 전십자인대 파열, 한우, 소싸움, 외상