

Steatosis in a Slaughtered Korean Native Cattle

Sun-Hee Do, Cha-Soo Lee, Won-Il Jeong, Jae-Yong Chung, Da-Hee Jeong, Dong-Hyung Noh, Mi-Young An, Young-Heun Jee*, Mi-Na Lee, Seung-Chun Park and Kyu-Shik Jeong¹

College of Veterinary Medicine, Kyungpook National University

*Department of Veterinary Medicine, Cheju National University

Abstract : Muscular lesion was detected in a 23-month-old castrated bull encountered at Kyungsan slaughter house. The lesion appeared as fat intervening muscle fibers. The affected animal had no clinical signs. On microscopic examination, there was replacement of many muscle fibers by normal fat cells. Numerous fat cells were located between muscle fibers. Remaining skeletal muscle cells were in degenerative process, and thus abnormal skeletal muscle cells had loose fibers while normal had intact ones. The advent of inflammatory cells is not at the lesion, which is unique view in steatosis.

Key words : Cattle, muscle fiber, fat cell, steatosis

Introduction

Many types of muscular disease in animals have been reported³⁻⁵. However, steatosis is relatively infrequent muscular abnormality in domestic animals and there has been rarely reported on steatosis in Korean native cattle.

Steatosis describes the replacement of muscle fibers by normally appearing fat cells in cattle, sheep, and pigs⁵. It is usually recognized at slaughter house as a fatty infiltration in skeletal muscle⁵. Loss of muscle fibers is accompanied by replacement with fat cell. The affected muscles appear white but have normal nervous system structure and function.

Therefore, the animal with it has no clinical signs⁶. Our case is that a 23-month-old castrated bull had no clinical signs but muscle fibers were replaced by fat cells. Herein, we report a case of steatosis in slaughtered Korean native cattle.

Case

The abnormal skeletal muscle (musculi femoris) with white color of bull was submitted from Kyungsan slaughter house for histopathological examination on May 2002. The lesion was incidentally found at slaughter. A 23-month-old castrated Korean native bull had no significant history of disease and no clinical signs. The lesion was not limited one area but several muscles such as musculi quadriceps, musculi quadratus, musculi biceps femoris, and musculi rectus femoris. For histopathological observation, muscle tissues were fixed in 10% neutral buffered formalin solution, processed routinely, and embedded in paraffin. Sections were cut to 4 μ m in thickness and stained with hematoxylin and eosin (H&E).

Grossly, affected muscles had extensive increases in intra-

muscular fat and pale streaks of swollen soft muscle fibers were observed (Fig 1). No other visible lesion was present in the affected muscles. On microscopic examination, there was replacement of many muscle fibers by normal fat cells (Fig 2). Numerous fat cells were located between muscle



Fig 1. Gross finding of musculi femoris with fatty infiltration from clinically normal Korean native cattle.

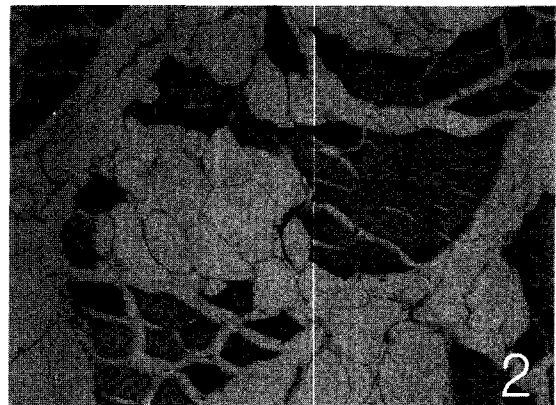


Fig 2. Muscular steatosis. Replacement of many muscle fibers by normal fat cells. H&E. $\times 13$.

¹Corresponding author.

E-mail : jeongks@knu.ac.kr

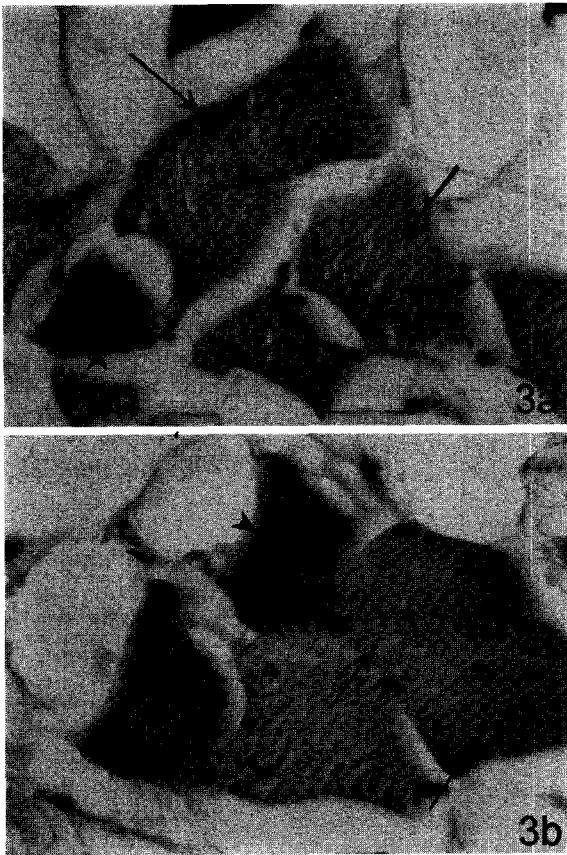


Fig 3. Muscular degeneration. a: Degenerating muscle cells (arrow) have loose fibers while normal (arrow head) have intact ones. b: Muscle cells are degenerating (arrow) and normal cells (arrow head). H&E. $\times 330$.

fibers. Remaining skeletal muscle cells were in degenerative process, and thus abnormal skeletal muscle cells had loose fibers while normal had intact ones (Fig 3). The advent of inflammatory cells is not at the lesion, which is unique view in steatosis.

Discussion

Steatosis is occasionally observed in the liver of animals fed experimentally manipulated diet, alcohol and certain drugs^{2,9}. Its mechanisms were elucidated. However, pathogenesis of steatosis in muscle is not clearly understood and it is also unclear that infiltration of fat cell is by an active or a passive process¹⁰. Hadlow suggested that it might be under genetic control⁶. Sometimes the steatosis affects several muscles of one limb, but more often it affects only one or several muscles in one region⁸. The condition is the result of an extensive increase in intramuscular fat particularly in the muscles of the loin and back in cattle, sheep, and pigs⁶. The affected muscles appear white and low quality of marbling. Steatosis appears in clinically healthy animals. This condition

is a problem only in a meat inspection because it is difficult to distinguish grossly steatosis from white muscle disease. As a differential diagnosis, white muscle disease (WMD) is known as nutritional muscular dystrophy or dystrophic myodegeneration and is a noninflammatory degenerative disease that affects the skeletal and cardiac muscle⁴. WMD is due to a deficiency of vitamin E and/or selenium and clinically the affected animals appear cardiovascular collapse, muscular weakness and stiffness, and aspiration pneumonia^{3,4}. WMD shows hyaline degeneration, lysis and fragmentation of skeletal muscle fiber at acute stage but regeneration, fibrosis and mineralization of muscle fibers at chronic stage⁴.

In our case, the gross examination and histopathological findings revealed that the lesion was replacement of muscle fibers by normal fat cells. Therefore the affected muscles appeared white grossly. And the boundary between normal and fatty infiltration area is not well defined.

Recently, several studies have performed survey of pedigree and DNA test of muscular tissue, blood or semen in abnormal cattle for surveillance of genetic diseases using reproduction data and kits^{1,7}. It has been reported from examining normal market pig carcasses that about 1 to 5% of pigs have small steatotic lesions⁸. Generally, steatosis incidentally found at slaughter, livestock owners discard the affected animals. From this point of view, it is said that steatosis has relevance to meat inspection and economic loss. Thus it is necessary to identify the cause of steatosis.

The cause of this case could not be determined. However, we speculated that steatosis might have been related with genetic problem since the bull was born from artificial insemination (AI). So it may be necessary to survey pedigree and to test DNA of semen before it is used in AI.

Conclusions

Muscular lesion was detected in a 23-month-old castrated bull encountered at Kyungsan slaughter house. The lesion appeared as fat intervening muscle fibers. The affected animal had no clinical signs. On histopathological examination, muscle fibers were replaced by normal fat cells. From the typical histopathological findings, we diagnosed this case as steatosis.

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도축한우에 있어서 근육지방증

도선희 · 이차수 · 정원일 · 정재용 · 정다희 · 노동형 · 안미영 · 지영훈* · 이미나 · 박승춘 · 정규식¹

경북대학교 수의과대학

*제주대학교 수의학과

요약 : 2002년 5월 도축중 발견된 거세수소의 근육 병변에 대한 검사 의뢰가 들어왔다. 이 병변의 육안적 소견은 광범위한 근육의 지방침윤이었고, 병리조직학적 검사에서 근섬유가 지방조직에 의해 대체된 것이 관찰되었으며, 기타 염증 소견은 관찰되지 않았다. 본 증례는 골격근의 광범위한 부분이 지방조직으로 대체된 지방증(steatosis)으로 진단되어 이에 보고하는 바이다.

주요어 : 한우, 근섬유, 지방세포, 지방증