Abstract

Masters of Engineering Degree (Mechanical)

Project Title:

The development of subchondral bone lesions of medial femoral condyle in horses

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Abstract:

Subchondral cystic lesions (SCLs) found on the medial femoral condyle (MFC) are a common problem in horses. However, the mechanism of the growth of SCLs is still debated.

Proposed mechanisms for development of SCLs include osteochondrosis and trauma. Osteochondrosis claimed that the degenerate and necrotic parts of the cartilage led to formation of cartilage flaps and eventually to loss bodies. Small pieces of subchondral bone could be ripped off when a cartilage flap was formed. Trauma claimed that damage to the articular cartilage alone or articular cartilage plus subchondral bone resulted in the formation of subchondral cystic lesions.

In this article, a finite element method was used to evaluate these two proposed mechanism, and try to determine the etiology of SCLs at MFC of horses. A three-dimensional laminated FEA model of MFC joint was built to study the von Mises stress, minimum principal strain, strain energy density in relation to cartilage and cortical bone destructions.

Our study supports that the osteochondrosis mechanism and trauma mechanism both influence the development of SCLs on MFC. The lesions at cartilage are dominated by osteochondrosis; the lesions at cortical bone are dominated by trauma.

Report Approved By:

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