Exercise Affects Proximal Sesamoid Bone Pathology in Thoroughbred Racehorses

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Proximal sesamoid bone fracture is a common fatal injury among Thoroughbred racehorses. A focal region of bone loss and high microcrack density occur before proximal sesamoid bone fracture. Bone loss and microdamage are related to horse training history. Authors' addresses: Department of Mechanical Engineering (Shaffer), Department of Radiological and Surgical Sciences, School of Veterinary Medicine (Stover), Department of Biomedical Engineering (Fyhrie), Department of Orthopedics, School of Medicine (Fyhrie), University of California-Davis, One Shields Avenue, Davis, CA 95616; e-mail: skshaffer@ucdavis.edu. *Corresponding and presenting author. © 2021 AAEP.

1. Introduction

A radiolucent subchondral bone lesion (SBL) often precedes proximal sesamoid bone (PSB) mid-body fracture. The relationships between horse exercise history, focal bone loss, and microcracks were examined for racehorses that did (case) or did not (control) suffer biaxial PSB fracture.

2. Materials and Methods

Bone volume fraction and microcrack density (Cr.Dn) were quantified using microcomputed tomography and undecalcified histology, and compared among 10 fractured medial-PSBs from case horses (FX-PSB), 10 intact medial-PSBs from the opposite forelimb of case horses (CLI-PSB), and 10 intact medial-PSBs from control horses without PSB fracture (CTRL-PSB) using ANOVA. Relationships with lifetime galloping exercise history variables were assessed using regression ($\alpha \leq 0.05$).

3. Results

SBLs were more prevalent in FX-PSBs (9) and CLI-PSBs (7) than CTRL-PSBs (0). Bone volume fraction was 8% and 6% lower in FX-PSBs than in CTRL-PSBs and CLI-PSBs, respectively. Cr.Dn was 187% higher in CLI-PSBs than in CTRL-PSBs and 260% higher in FX-PSBs than in CTRL-PSBs. Higher exercise frequency was associated with more bone loss and microcrack formation, especially in the most recent 10 months.

4. Discussion

Bilateral, osteopenic, microdamaged SBLs were observed in most case horses. The relationship between SBL tissue properties and horse exercise is consistent with damaged-induced bone remodeling. Horse training history is associated with fracture risk.
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Declaration of Ethics
The Authors have adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest
The Authors have no conflicts of interest.