Treatment of tibial shaft fractures in sheep using interlocking nails, Schanz screws and type I external fixators

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Abstract

This paper presents the results of a study of the treatment of transverse tibial shaft fractures in six sheep with the use of interlocking nails and type I external fixators. During surgery, tibial osteotomy was performed to induce an experimental fracture which was stabilized using a type I external fixator. Osteosynthesis was monitored for nine weeks by performing clinical tests, observing the degree of lameness and subjecting the patients to weekly radiological examinations. After nine weeks, the animals were euthanized, and samples of bone callus were sampled for histopathological analyses. Weight bearing on the fractured limb began on day 2 to 4 after treatment. Limb function was fully restored around five weeks after surgery. Radiograms taken during the observation period revealed gradual hyperplasia and progressing mineralization of bone callus at different stages of healing. The histopathological picture of the bone callus was characteristic of the phase of bone turnover and remodeling.

Key words: interlocking nail, bone, fracture, sheep

Introduction

Interlocking nail osteosynthesis is the leading method in the treatment of tibial fractures in humans (Krettek 1997, Folwarczny 2001). This technique is increasingly used in veterinary medicine, but new solutions are required to account for the differences in handling animal subjects. New generations of veterinary interlocking nails are developed to support such applications (Patii 2008, Piórek 2012). One of the latest solutions features a hybrid fixator which combines an interlocking nail with an external fixator system. This construct has been subjected to a series of in vitro biomechanical tests (Bemarde 2001, Radke 2006, Goett 2007), but in vivo studies are scarce (Moses 2002). The aim of this study was to evaluate the effectiveness of transverse tibial shaft fracture treatment in sheep with the use of interlocking nails and Schanz screws incorporated into a type I external fixator.

Materials and Methods

Experimental animals

The experiment was performed on six female hybrid Merino sheep, aged around 1.5 years, with body weight of 40 kg (+/- 5 kg). The animals were classified for the study based on radiograms of the left tibial...