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Benefits of Ilizarov automated bone distraction for nerves and articular cartilage in experimental leg lengthening

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1. What did this study explore?

This study explored motor response amplitudes in leg muscles and histologic changes of nerves and articular cartilage during canine leg lengthening with two different methods for bone distraction – manual with low frequency (1 mm/4 times a day) and automatic with high frequency (1 mm/60 times a day).

2. How did the authors perform all experiments?

Comparison was performed in a controlled manner, using an equivalent technique of osteoclasia and osteosynthesis, the same *t*-points of research in experimental groups and using samples of nerves and cartilage from contralateral limbs and from intact animals.

3. How did the authors process all experimental data?

Systematic random sampling protocols were used for histomorphometric analysis of nerves and cartilage samples. Every measurement was repeated a minimum three times. Statistical treatment of numerical data was performed in software package.

4. How did the authors deal with the pre-study hypothesis?

The pre-study hypothesis stated that automatic distraction is safer for nerves and articular cartilage structure. By estimation and measuring multiple parameters of tissue organization and comparing it with corresponding characteristics of tissue samples from intact animals the authors were able to support the hypothesis.

5. What are the novel findings of this study?

In group with automatic distraction the subperineurial edema and fibrosis were not evident, per cents of degenerated nerve fibers were smaller and morphometric parameters of myelin nerve fibers were better than in group with manual distraction at all time points of experiment. Quantitative parameters of articular cartilage (thickness, volumetric densities of chondrocytes, percentages of isogenic clusters and empty cellular lacunas, contents of sulfur and calcium) were badly changed in group with manual distraction and less changed in group with automatic distraction.