Retrograde Femoral Nailing Through an Open Physis Does Not Impair Growth in Pigs

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Introduction

The use of retrograde femoral intramedullary nails in children for deformity correction is controversial. It is unknown if the injury to the central part of the growth plate results in premature bony union, leading to limb deformities or discrepancies.

The aim of this study is to asses physeal healing and bone growth after insertion of a retrograde femoral nail in a skeletally immature experimental porcine model.

Methodology

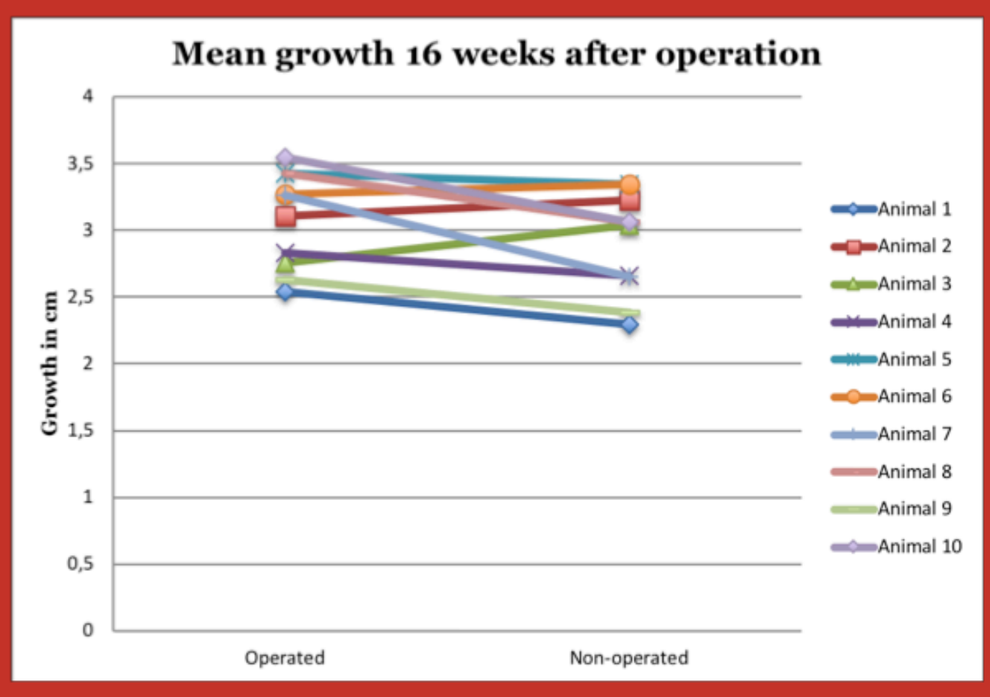
Eleven immature pigs were included in the study. One leg was randomised for operation with a retrograde femoral nail (diameter 10 mm), whilst the non-operated contralateral remained as control. All nails were inserted centrally in coronal and sagittal plane under fluorescence, and the nails spanned the physis. The nails were removed at 8 weeks. Both femora in all animals underwent MRI at baseline (pre-operatively), 8 weeks (after nail removal) and 16 weeks (before euthanasia). Femoral bone length was measured at 5 sites (anterior, posterior, central, lateral and medial) using 3d T1-weighted MRI. Growth was calculated after 8 weeks (growth with nail) and 16 weeks (growth without nail). Corresponding 95% confidence intervals were calculated. Operated side was compared to non-operated. One animal died at 8 weeks and was only subject to 8 week-analysis

Results

No differences in axial growth were observed between operated and non-operated sides.

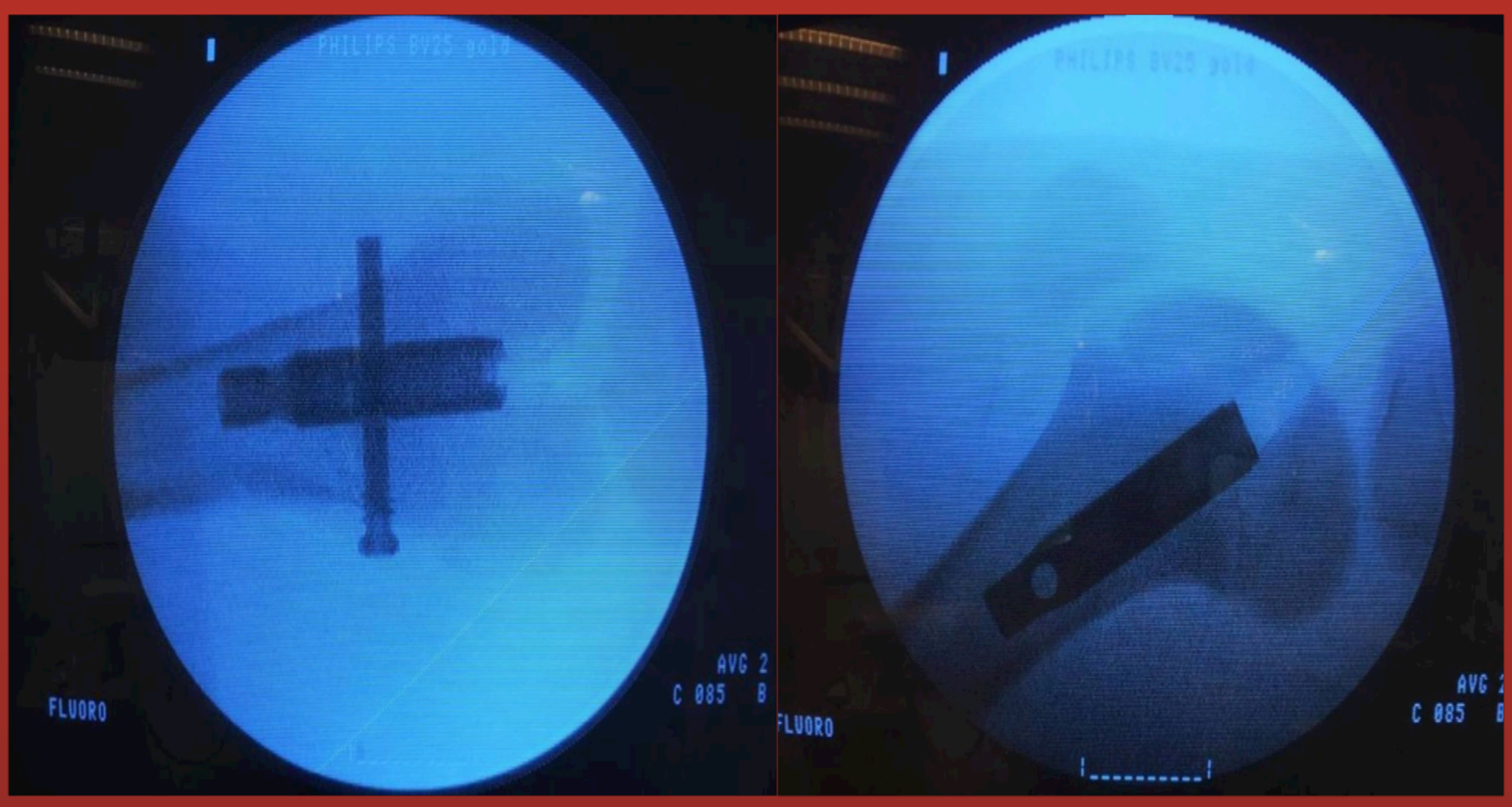
Mean growth difference was 0,61 mm [-0,78;2,01] whilst the nail was inserted into the bone and 0,72 mm [-1,04;1,65] after nail removal.

No signs of angular bone deformities were found when comparing operated side to non-operated side. No premature bony healing at the physis occurred. Histology confirmed fibrous healing.



Conclusion

The insertion of a retrograde femoral nail through the centre of an open physis might be a safe procedure with no growth arrest.



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