7. Summary

Histological evaluation of a biodegradable implant for spondylodesis in the cervical spine
(an experimental study in a sheep model)

The autologous tricortical iliac crest bone graft has been used as golden standard for the anterior decompression of the cervical spinal canal with the following fusion of the vertebral segment. But among other things the usage of this transplant is associated with a relevant removal morbidity. Other interponats, like metallic cages present several disadvantages as well. For instance they cause artefacts during CT and MRI examination and the side effects of the materials are unknown so far. In this regard bioresorbable cages would offer potential benefits. Because of their complete degradation, long term effects could be extensively excluded.

Therefore the goal of this in vivo study was to analyse the spondylodesis of the cervical vertebrae C 3 and C 4 using a 70/30-poly-(L, DL)-lactide-cage compared to the spondylodesis with the autologous tricortical iliac crest bone graft. For this purpose 32 sheep underwent discectomy of C 3 / C 4 and the cage device (groups I, III: n = 8) respectively the bone graft (groups II, IV: n = 8) were implanted and stabilized with a ventral plate. Euthanasia of the animals of group I and II occurred after twelve weeks and of group II and IV after 36 weeks. A semi quantitative histomorphological and histomorphometrical evaluation of the vertebral segment followed.

This study in the sheep revealed, that the tested 70/30-poly-(L, DL)-lactide-cage is in this composition not suitable for the spondylodesis of the cervical spine. The implant caused grade III osteolysis up to five mm and severe foreign body reactions. In addition to this it was not possible to prove a bony bridging between the vertebral bodies. The cage was not capable to maintain the position in the intervertebral space. In contrast it migrated towards ventral. After twelve weeks the device showed already a high deformation and bone formation lacked. In conclusion it can be stated that the 70/30-poly-(L, DL)-lactide-cage should not be used clinically as intervertebral implant for spondylodesis in the cervical spine.