

Tissue Engineering in Craniomaxillofacial Surgery

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Clinically, autologous, allogenic and alloplastic materials for bone reconstructions in the craniomaxillofacial area have specific drawbacks necessitating the search for new (bio-) materials. Already today, cultivated skin and mucosa grafts are already in clinical routine use in head and neck reconstruction with good success.

Keywords

Tissue Engineering, Bone, Dental Implants, Maxillary Sinus Augmentation, Sinus Lift, Stem Cells.

In a clinical pilot study 45 sinusfloor augmentations in 32 patients were carried out at the department of Oral & Maxillofacial Surgery using a bone matrix derived from mandibular periosteum cells on a polymerefleece. In our hands there were 28 augmentations uneventful, in 17 procedures complications occurred. Other clinicians and private users had 64 procedures in 41 patients.

The results suggest that periosteum-derived osteoblasts on a suitable matrix form lamellar bone within 4 months after transplantation, thus providing a reliable basis for implant insertion. Nevertheless, in clinical investigation and radiological proof, grafting of tissue engineered bone gives overall results that are still not meeting the gold-standard of conventional bone grafts. They are an alternative especially in patients with simultaneous implant insertions.

Current research aims at investigating the influence of stem cells on biomaterials. In animal experiments stem cell application in combination with a bio material (Bio Oss) show lamellar bone formation and bone invasion into the micropores. Further evaluation of data is necessary to determine the possible future role of stem cells in augmentation procedures. Also methods of bioplotting of combined autologous/alloplastic materials are under investigation.