COMPUTER-GENERATED PATIENT MATCHED IMPLANTS FOR CRANIOFACIAL RECONSTRUCTION

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Aim: To determine the effectiveness and safety of using custom computer-generated alloplastic (HTR) implants for the reconstruction of large defects of the upper cranio-facial skeleton.
Materials and Methods: A total of 14 patients, who had large ($>50\,cm^2$) pre-existing defects of the cranium and cranio-orbital region or were planned for large resections due to non-malignant bone disease, were surgically reconstructed. Pre-operatively a three-dimensional (3D) computed tomographic scan was obtained from which an anatomically exact 3D cranio-facial model (Walter Lorenz Surgical, Jacksonville, FL, USA) was made. The defect in the model was then used to create an alloplastic (HTR polymer) implant for reconstruction of the amount of bony resection performed on the model and the implant subsequently fabricated. The implant was surgically secured into position with either metal or resorbable fixation. In five cases where the frontal sinus was in proximity to the implant, the frontal sinus was either cranialized and covered with a pre-cranial flap or obliterated with hydroxyapatite cement. In three cases that had been previously irradiated with poor quality overlying soft tissue, a microsurgical muscle flap was initially placed.
Results: All implants easily fitted into the bone defects and only four (28%) required some minor adjustments to complete the fit. All patients healed uneventfully and with a *minimum* of 3-year follow-up in all cases, excellent contours have been maintained and all patients have remained infection-free.
Conclusions: In large cranial defects, custom implants fabricated from porous, hydrophilic HTR polymer provide an exact anatomic fit and a solid contour reconstruction. This reconstruction method is rapid, exact, and significantly reduces operative time.

BIORESORBABLE SYSTEMS OF BONE FIXATION IN CRANIOMAXILLOFACIAL SURGERY

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Aims: We present our experience in cranio-maxillofacial surgery with bioresorbable materials.
Methods: Between 1997 and 1999, 67 patients underwent craniofacial surgical procedures. The bone fixation system was reabsorbable in all cases. Lactosorb® implants (1.5 mm) were used in most patients; Biosorb® system, 1.5 mm, was used in four cases.

The diseases were: craniofacial dysostosis (12), anterior plagiocephaly (11), trigonocephaly (10), scaphocephaly (10), multiple cranial synostosis (4), macrocephaly (1), orbital hypertelorism (3), ethmoid-sphenoid encephalocele (3), skull base tumours (7), frontal orbital fracture (5), Orbit anophthalmia (1).

The most common surgical procedures were: bilateral fronto-orbital advances, and holocranial and orbital reshaping.

The follow-up was between 9 and 36 months, mean 18 months.

IS RESORBABLE OSTEOSYNTHESIS MATERIAL 'STATE OF THE ART' IN PAEDIATRIC CRANIO-FACIAL SURGERY?

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Background: Titanium osteosynthesis material used in calvarial reconstructions in infant craniosynostosis patients had to be removed in many cases in our centre because of pseudo-migration, screws penetrating the dura and the suspicion of growth impairment. During 1988 and 1991 we used a resorbable osteosynthesis material made of PLA/PDS with good results in comparison with conventional metallic implants. The resorption time of the material was 2 years and longer. Because of the longer operation times with resorbable materials we switched again to titanium implants. Since 1998 we have used self-reinforced Poly-DL-lactide co-polymers and self-reinforced PLA/PGA osteosynthesis material on a routine basis in paediatric cranio-facial surgery on 21 patients. The resorbable material was not only placed outside but also intra-cranially for special reconstructions. We use our newly developed pistol/tack device, with which screws are replaced by tacks.
Results: During the observation time we have not seen one single complication such as incompatibility of the material, infections, displacements etc. The stability of the self-reinforced osteosynthesis material was comparable to titanium material. Resorbable screws need tapping, which takes more time than titanium implants. The pistol/tack device, developed in Zurich, avoids tapping and is even faster than the self-cutting titanium screws. The pistol/tack device will be the system of the future not only in paediatric cranio-facial surgery but also in other cranio-maxillofacial surgery operations. The clinically estimated resorption time of self-reinforced PDLLA was between 1 and 2 years, and the self-reinforced PLA/PGA less than 1 year.
Conclusion: On the basis of our results and clinical experiences resorbable osteosynthesis materials of the kind described have now to be considered state of the art in paediatric craniofacial surgery.

RIGID FIXATION FOR CRANIOFACIAL DEFORMITIES – TITANIUM VS. BIODEGRADABLE PLATES AND SCREWS

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Results: Solid bone formation was observed at the site of distraction. Soft and hard tissue formation resulted in complete healing across the distraction gap. This was seen macroscopically as well as microscopically. A cephalometric analysis was performed.
Conclusion: A completely new concept was used to accommodate an intra-oral distractor in the midface. This will help to distract the maxilla in children and adults with midfacial hypoplasia, using small intra-oral distractors. The maxillary movement in the sagittal, horizontal, and vertical planes can be predicted.

PAEDIATRIC MIDFACE DISTRACTION – TO PUSH OR TO PULL

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Introduction: Distraction osteogenesis (DOG) is an accepted technique in cranio-maxillofacial surgery. Greater advancement and improved stability is possible, particularly in children with syndromic craniosynostosis.
Aims: We present the evolution of DOG in two suprargional craniofacial centres, over a 3-year period.
Methods: A total of 14 children with midface retrusion have been retrospectively assessed after high-level midface advancement using a variety of distractors. Three internal and one external devices have been evaluated. Sleep studies, plain radiographs, CT, MR and clinical photography have been used to assess advancement and stability.
Results: Internal distraction alone, with single-point fixation produced the least consistent results. Multi-point fixation and pulling the face forward with an external distractor confers greatest stability, as demonstrated with our last seven cases.
Conclusions: A steep learning curve exists with DOG and we continue to refine our techniques. The ideal distractor has yet to be designed.

MIDFACE ADVANCEMENT BY OSTEOGENESIS USING OUR NEW ENORAL DISTRACTION DEVICE

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Introduction: Mandibular distraction has been carried out in our department since 1991. For this purpose we developed an extra-oral and an enoral distractor, especially to be used in infants and children. This made miniaturization of the enoral mandibular distractor necessary. For distraction of the midface we used in the beginning an extra-oral traction device and now have a newly developed enoral distractor available.
Method: The enoral midface distractor is designed for Le Fort I osteotomies, Le Fort II osteotomies as well as the extended Le Fort I osteotomy including the infra-orbital rim (Kufner procedure).
Results: A total of 10 patients with syndromes and severe hypolasia of the midface and Class III occlusions within the deciduous or mixed dentition were treated with this new distraction device. The distractor worked very well in these conditions in spite of the fact that no total mobilizatio the maxilla was performed. In two patients the upper and the lower jaw were simultaneously distracted. In first series of midface distraction no complications were s

INTERNAL CRANIOFACIAL DISTRACTION DEVICES WITH A NOVEL DETACHABLE FLEXIB ACTIVATING CABLE

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Aim: To determine the clinical utility of a detach activating cable that permits activation of internally ba bone distraction devices for cranio-maxillofacial surger
Materials and methods: Eighteen children who requ bone lengthening of the cranium (2), midface (2), mandible (14) due to congenital craniofacial syndro were treated with internal distraction devices. The sc holes on the devices were intra-operatively cut and cust fashioned to the bone site. After application and sc fixation, a flexible activation cable was attached and eit exited through skin or mucosa at various angles from distraction device, dependent upon the most favourable with the least conspicuous external scar or where it was e for the parents to activate. After the distraction complete, the external cable was detached in a sh outpatient operative procedure and the internal device th served the role of a rigid internal fixation device during consolidation phase.
Results: All patients were adequately distracted with complications. The activating cables were easily attac and subsequently removed. No infections or adverse s scars resulted.
Conclusions: The use of a flexible detachable activat cable for internal distraction devices shortens the pe operative time that the patient must endure an exter protruding material. This technical adaptation is improvement over other conventional devices in which s external activation rods remain until distraction a consolidation is complete.

DISTRACTION OSTEOGENESIS IN EARLY CHILDHOOD IN CASES OF SYNDROMAL DISEA

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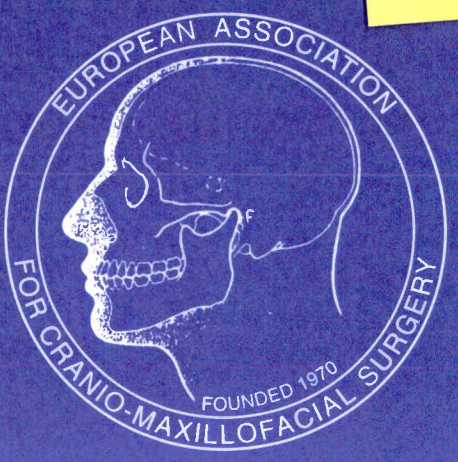
Aims: To prove that osteodistraction with intra- a extraoral devices is an appropriate treatment option only in still growing, but even in the youngest individu suffering from severe facial dysplasia and functior lifethreatening limitations like airway obstruction.
Methods: Five selected cases are presented here. Amc them were two 6 and 7-month-old babies with Nage disease and Goldenhar syndrome respectively suffer from severe airway obstruction. The latter was tracheo mized. The other three patients were a 10-year old boy w Pierre-Robin sequence and two 7- and 14-year old girls w

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