

O26.7 BETAMETHASONE AFFECTS THE LEVELS OF MACROPHAGE RECRUITMENT AND NGF P75 IMMUNOREACTION DURING NERVE RECOVERY AFTER INJURY (EXPERIMENTAL STUDY ON RAT'S SCIATIC NERVE)

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Purpose: This study was designed to further explain our previous findings of beneficial effects of perioperatively administered betamethasone on decreasing the incidence of neurosensory disturbance after sagittal split osteotomy and improving functional recovery after crush injury to the rat sciatic nerve. For this purpose the pattern of macrophage recruitment and NGF p75 expression was analyzed. A sciatic nerve crush injury was inflicted on all the animals by tying the nerve against a glass rod for 30 seconds. Evaluations of the effect of betamethasone treatment were done double blinded 2, 7 and 17 days after the injury. Antibodies against macrophage marker (ED1) and p75 and immunohistochemical methods were utilized. We found an initial and significant decrease in the number of the recruited macrophages at examination after two days ($p=0.001$) in the group treated with steroid compared to the control group. By 7 days there was a significantly higher number of macrophages in the steroid than in the non-steroid group ($p=0.001$). On the other hand there was no significant difference between the two groups ($p=0.3$) concerning p75 IR, although there was tendency for higher level in the steroid group. At 17 days, there was a significantly lower number ($p=0.008$) of macrophages in the steroid group compared to the non-steroid group while the level of p75 in the steroid group remained not significantly higher than in the control group. We conclude that the beneficial effect of perioperative administration of a moderate dose of betamethasone on nerve recovery is highly reflected in the recruitment of macrophages but only to a small extent.

O26.8 IN-PATIENT VERSUS IN-VITRO DEGRADATION OF P(L/DL)LA AND PLGA

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Poly (70L-lactide-co-30DL-lactide) (P(L/DL)LA) and poly (85L-lactide-co-15glycolide) copolymer (PLGA) in-patient degradation kinetic (after orthognathic surgery) were compared to each other and in-vitro values, whether they degrade reliably and comparable to the in-vitro decomposition. Five patients from a total orthognathic surgery collective of 20 with 85:15 PLGA osteosyntheses and 15 patients of 60 with 70:30 P(L/DL)LA osteosyntheses agreed to an explantation at a secondary operation (dental implant insertion, septorhinoplasty). Ten females, 10 males, aged 33 (26 to 55) years, had explantations after 3, 6, 9, 12, 18 and 24 months. Identical resorbables, were immersed in-vitro at 37°C in physiological buffer solution and compared at identical intervals. Continuous hydrolysis decreased molecular weight from 45,000 Mw initial average for P(L/DL)LA to 25,000 in-patient /21,000 Mw in-vitro after 6 months, 8,000Mw after 18 months, at 24 months merely sporadic granular residuals were encountered in-situ, decomposing on finger's touch, too small for molecular weight assessment. PLGA decreased from initial 44,600 to 22,000 Mw after 3 months in-patient and in-vitro, to 11,000 in-patient/1,300 Mw in-vitro at 6 months, after 12 months sporadic granular residuals were found in-situ which powdered upon fingers touch, too small for molecular weight assessment. Glass transition temperature decreased from ~60 to 50°C throughout 18 months. Crystallinity of the explanted material was $\leq 4\%$ in P(L/DL)LA, 16% in PLGA at 6, and 30% at 12 months. Both copolymers reliably decomposed in-patients after orthognathic surgery procedures, slower than in-vitro ($p<0.005$), 85:15 PLGA with 12 months, 70:30 P(L/DL)LA with 24 months average ($p<0.005$). Crystallinity accused of causing foreign body reactions was minor and did not inhibit decomposition.

O26.9 LONG TERM STABILITY OF RESORBABLE SCREWS IN MANDIBULAR ADVANCEMENT SURGERY

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To examine the long term stability of bi- cortical resorbable screws for the fixation of the mandible after surgery and to compare that to the stability provided by titanium screws. Two groups of patients (20 per group, matched for age and gender) underwent identical mandibular advancement surgery, in one group titanium screws were used for fixation, and in the other Lactosorb™ screws were used. Lateral cephalograms were taken prior to, within the fortnight following, and approximately a year after the surgery. These x-rays were then digitized and the horizontal distance of the B point from a vertical line perpendicular to the Sella-Nasion (SN) line and the SNB angle was calculated. Analysis proceeded by way of an independent samples T-test. Initial analysis indicated that of the group in which the resorbable screws were used, after one year the movement was 1.2mm. In the titanium screw group, the movement after 1 year was 5.2mm. Similarly, for the SNB measurement, the change for the resorbable group after 1 year it was less than one degree and for the titanium group, the angle change after a year was less than one degree. ANOVA analysis confirmed there were no significant differences within the groups on any of the independent variables. Independent samples T-tests indicated that there were no differences between the titanium screws and the resorbable screws when considering the change in the SNB angle ($t_{1,4} = -0.505$, p ns) or when considering the distance ($t_{1,4} = 1.12$, p ns). The findings indicate that in terms of stability, resorbable screws are as effective as titanium screws for the fixation of the mandible.

O26.10 CLINICAL ASSESSMENT OF COMBINED OPERATIVE PROCEDURE (SSRO+IVRO) IN MANDIBULAR ASYMMETRY

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To evaluate the availability of combined operative procedure (SSRO+IVRO) in comparison with bilateral sagittal split ramus osteotomy (BSSRO) in mandibular asymmetry. Eleven consecutive patients who underwent BSSRO (Group A) and thirteen who underwent combined operative procedure (SSRO+IVRO) (Group B), had axial cephalograms (standardized submentovertex radiographs) made before surgery, immediately after surgery, 3 months and more than 6 months postoperatively. Constructed lines and formed angles in the transverse plane such as condylar angulation (CA) were measured and changes of TMD were examined as well. Analysis of the data showed that skeletal stability and improvement of TMD in both groups. Degree of TMD markedly reduced and displacement of condyle position on the deviated side was small in combined operative procedure (SSRO+IVRO) (Group B). Combined operative procedure (SSRO+IVRO) was clinically accepted and significantly effective to reduce TMD in the case of mandibular asymmetry.

References

- [1] Ellis E.: Condylar positioning devices for orthognathic surgery: are they necessary? *J. Oral Maxillofac. Surg.* 52:536-552, 1994.

O27. Distraction Osteogenesis II

O27.1 MODERN 3D DISTRACTION OSTEOGENESIS – NEW SOPHISTICATED OPERATION FACILITIES DUE TO PRECISE CUTTING GEOMETRIES AND VIRTUAL PLANNING

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For osteotomy in the maxillofacial region in order to perform distraction osteogenesis a tool, which can applicate fine geometric cuts without

causing bone defects and without effecting harm to underlying soft tissue structures like the alveolar nerve or sinoid mucosa is desirable. Precondition for this modern type of surgery is an elaborated 3D planning (e.g. rapid prototyping model). In 5 patients complex multistep distraction with sophisticated cutting geometry were planned and performed using the piezo-ultrasound-device. The used distraction devices were internal distractors with flexible wave (Fa. Medartis) or multidirectional devices (Fa. Martin). The 3D planning took place by means of rapid prototyping models on the base of spiral-computer-tomography data. Follow up controls were done by surface scanning and conventional x-rays. The activation of the device was done by the patients themselves after an initial interval of 2 to 4 days. It was possible to realize complex bone transport e.g. to reconstruct the caput mandibulae. In all cases the three-dimensional planned movements could be reached. Nerv structures were preserved while applying fine and differentiated cutting geometry. All patients could be fully rehabilitated without bone transplantation. In two cases more steps as originally intended became necessary. With the modern possibilities of performing 3D planning and application of complex bone cutting the distraction osteogenesis can replace bone transplantation in special cases. Because of the facility of constructing also very fine 3D structures like the tm-joint it is in selected cases significant superior to bone transplantation because of the gentle adaption of soft tissue and the minor collateral damage in this complex anatomical region.

027.2 APPLICATION OF 3D PROTOTYPE IN MAXILLOFACIAL DISTRACTION OSTEOGENESIS

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To analyze the value of 3D prototype in maxillofacial distraction osteogenesis. 12 patients with severe maxillofacial deformities were selected at an average of 16.8 years old in age. A 3D rapid prototype was made preoperatively for each patient for the analysis of the jaw deformities, custom-made of distractor and simulation of distraction osteogenesis. Distractions were successfully performed in all patients with an average jaw lengthening of 18.5 mm (15–23 mm). Clinical examination, x-ray and CT examination showed a satisfactory result as designed preoperatively. 3D rapid prototype could provide an ideal platform to set-up a treatment plan. A customized distraction could be successfully performed including osteotomy design, custom-made of distractor, installation.

027.3 THE PLATE GUIDED TRANSPORT DISTRACTION OF MANDIBULAR CONTINUITY DEFECTS

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Reconstruction of mandibular discontinuity defects challenges many difficulties that enforce surgical team to establish the efficient therapy. A variety of techniques have been developed for reconstruction of craniofacial skeleton, but the each technique has some disadvantages [1,2]. We searched out the efficacy of reconstruction plate guided distraction osteogenesis after ablative surgery of mandibular benign tumors and secondary osseous revisions in trauma cases. 2.7 mm ThreadLock Reconstruction System (KLS Martin) was used to maintain the mandibular anatomy and function after hemimandibulectomies. A plate-guided distractor with multiple swivel joint at the posterior slope of the distractor was adapted to both to osteotomized mandibular segment and ThreadLock reconstruction plate [3]. Distraction is continued along the osteotomized segment as the desired lengthening is achieved. After consolidation period, second stage surgery was performed to remove the intraoral device. Mandibular resections, that were performed due to odontogenic tumors and osteomyelitis were reconstructed with 2.7 mm ThreadLock reconstruction plates (KLS Martin, Germany). Mandibular curvilinear anatomy was obtained by reconstruction plate guided distraction device (KLS Martin) allowing 3-dimensional vector control. Bone transport from anterior to posterior and anterior based distraction on the transport segment was made by an intraoral uni-directional distraction. Successful distraction of transported segments was performed at the end of each procedure. Reconstruction plate guided transport distraction of mandibular defects should be considered as an alternative treatment after resective surgery of mandibular lesions. This procedure obviates the need for a donor side and it is associated with a minimal morbidity.

References

- [1] Kuriakose MA, Shnyder Y, DeLacure MD. Reconstruction of segmental mandibular defects by distraction osteogenesis for mandibular reconstruction. *Head Neck*. 2003;25(10):816–824.
- [2] Takahashi T, Fukuda M, Aiba T, Funaki K, Ohnuki T, Kondoh T. Distraction osteogenesis for reconstruction after mandibular segmental resection. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2002;93(1):21–26.
- [3] Herford AS. Use of a plate-guided distraction device for transport distraction osteogenesis of the mandible. *J Oral Maxillofac Surg*. 2004;62(4):412–420.

027.4 A PRELIMINARY CLINICAL STUDY OF TRIFOCAL DISTRACTION OSTEOGENESIS FOR RECONSTRUCTION OF SEGMENTAL MANDIBULAR DEFECTS

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The purpose of this study was to investigate the reconstruction of mandibular segmental defects, we applied trifocal distraction osteogenesis in a patient with mandibular ameloblastoma and examined the regenerating bone during stages of distraction osteogenesis. We also investigated the feasibility of dental implants after reconstruction of mandibular defects. We applied internal trifocal distractor to reconstruct the mandibular segmental defects of a young female patient who was diagnosed the illness as mandibular ameloblastoma at the same stage after the tumor was resected. Two bone transport disk which was about 1.5 cm in width and 3 cm in high was made at the each end of the mandibular defect by osteotomy. The attachment of the soft tissue to bone transport disk must be protected carefully in the whole course of operation. After 8 days of latency period, trifocal DO was started at a rate of 0.25 mm four times per day at each transport disk. Distraction was continued for 19 days. After this period, the distractor was left in place for 16 weeks for consolidation to occur. After consolidation period, two implant body was placed in new bone. According to the distraction design, the mandibular defect was successful reconstructed for 40 mm in length in 19 days without any complication. Distraction was well tolerated by the patient. The regenerated segment was comparable in diameter with the transport disk. Although new bone formation was not radiologically evident in the first 8 weeks, new bone formation could easily be palpated. The histologic examination of the regenerated bone connected to the transport disk confirmed the presence of new bone deposit along the mandibular defect. X-ray showed the distractor fixed firmly and both the distal and near transport reached their targets simultaneously. At 16 weeks the entire regenerate showed near normal calcification and density. With satisfactory profile, the left denture had a good occlusion and 3.5 cm size of mouth opening. With enough new bone, the implant body achieved initial stability. With the lengthened soft tissue, mandibular segmental defect can be reconstructed by trifocal distraction osteogenesis. The optimal time for trifocal distraction osteogenesis in the reconstruction of mandibular defect is at the same stage of tumor resection.

027.5 THE USES OF DISTRACTION OSTEOGENESIS ON MANDIBULAR RECONSTRUCTIVE SURGERY

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The uses of free bone grafts present high rate of complications on large defects, the microvascular bone graft is a complex procedure requiring two or three teams and high cost on the treatment. Even the microvascular grafts present poor results on the shaping of the anterior mandible, increasing the occurrence of complications when osteotomies must be performed in order to achieve the mandible contour. The aim of these study is to present the preliminary results of a series of ten patients with mandible discontinuity defects, reconstructed by internal distraction osteogenesis devices. The patients selected for this study showed an average age of 29 years old, being six male and four female presenting mandible defects larger than 40 mm which were selected and submitted to distraction osteogenesis. The defects were caused by trauma sequel (3 patients) and ablative surgery (7 patients). Three patients presented an infection on the affected area and one of them had showed osteoradionecrosis five years before the distraction procedure. The defects size ranged from 40 mm to 130 mm. On two patients the ablative surgery