

were performed. (B) 15 minipigs (age: 8 weeks) were operated in general anaesthesia. In five animals (group 1) unilateral fractures with dislocation of the condyle were created followed by osteosynthesis using standard mini-plates and screws. In five additional pigs (group 2) a unilateral fracture with dislocation of the condyle was created followed by repositioning the fragment only. In a sham-operated (control) group the condylar process was dissected unilaterally only. Postoperative follow up was 6 months. Then radiological (metrical) and histological studies of the jaws were carried out.

**Results:** (A) Histologically no particular growth centers were found in the foetal condyle but periosteal as well as desmoid growth. The mandibular relationships in growth between the ascending and the horizontal parts varied depending on foetal age. (B) In the experiments enchondral growth was seen in group 1 following fracture dislocation of the condyle and osteosynthesis, but no significant growth disturbances were found when compared with the control group (t-test,  $p < 0.05$ ). In the second group (fracture dislocation, without osteosynthesis) all animals had significant unilateral growth disturbances.

**Conclusions:** There is no evidence of growth disturbances following osteosynthesis of fracture dislocations of the condyle in juveniles. Simple conservative treatment of condylar fractures, however, resulted in growth disturbances.

#### O.444 Fixation with two plates in the condylar fractures

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**Objectives:** From data reported in literature it is evident that for mandibular condylar fractures there are many fixation techniques by means of many different kinds of osteosynthesis. Our experience leads us to prefer the positioning of two plates because our principal objective, besides the anatomically correct reduction of the fracture, is the stable maintenance of that reduction. The aim of our work is the demonstration by a biomechanical basis the utility of the double plate method.

**Methods:** Utilizing a three-dimensional model of the jaw, in finite elements (FEM), subjected to mastication muscular forces measured in MegaPascals (MPa), we simulated a fracture of the mandibular condylar region and repaired it by means of two different techniques: the first involving the application of a single element of union, the second two elements of union. The stability of the line fracture was compared in the two different kinds of technique utilized.

**Results:** The repair with two elements of union positioned along the isostatic strain lines of compression and tension presented a gap 11 times smaller than that with a single element of union.

**Conclusions:** The use of two plates correctly positioned for the fixation of mandibular condylar fractures represents in our opinion the best solution for the stability of osteosynthesis.

#### O.445 Functional endoscopic surgery and frontal sinus fractures

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**Objectives:** The purpose of our study was to assess the long term outcome of the use of the nasal endoscopy as a diagnostic and treatment tool as functional endoscopic sinus surgery (FESS) in the treatment protocol of frontal sinus fractures.

**Methods:** 11 patients, admitted between April 1999 and December 2000 at the University of Padova Medical Center with a diagnosis of frontal sinus fracture were included in our study. All patients underwent a preoperative nasal endoscopy for evaluation of the frontal recess. The postoperative follow-up included aesthetic, clinical and endoscopic evaluation. Between June 2007

and March 2008 all patients were recalled for a follow up visit. The follow up visit consisted of a medical history, a physical examination and a nasal endoscopy.

**Results:** At the follow up visit (which ranged from 7 to 8 years after the trauma). All patients were clinically symptom-free and endoscopy was negative in all cases. No patient complained of nasal symptoms related to the FESS procedure. The frontal recess was widely opened in all patients who had undergone FESS while in the remaining ones, the osteomeatal complex was open and properly functioning.

**Conclusion:** According to the current literature, the treatment protocol for frontal sinus fractures does not include FESS. Our results and the current literature on FESS for the treatment of frontal sinus pathology, suggest that nasal endoscopy should be an integral part in the preoperative evaluation and treatment of frontal sinus fractures.

#### O.446 In vitro evaluation of a biodegradable osteosynthesis plate

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**Introduction:** The Inion FreedomPlate, a Free-form osteosynthesis plate, is a biodegradable plate with just pilot holes for drilling which provides possibility to either create a countersunk for the screw heads on the plate as in conventional fixation or cut off the screw head along the surface of the plate.

**Aim of the study:** The aim of the study was to determine the fixation properties of the Inion FreedomPlate fixed with conventional countersunk screws and fixed with screws without screw heads, during the hydrolytic in vitro degradation of 26 weeks.

**Material and Methods:** In the tensile and plate-screw pullout tests, the samples were loaded with a constant speed of 5 mm/min until failure of fixation. The yield load, maximum failure load and stiffness were recorded, and the failure mode was visually determined at time points of 0, 6, 9, 12, 20 and 26 weeks of hydrolytic in vitro degradation.

**Results:** Both fixations of the free-form plate, i.e., conventional countersunk screws or screws without screw heads, provide similar and sufficient postoperative fixation properties. No clinically relevant difference was found between fixations of the free-form plate during hydrolytic in vitro degradation of 26 weeks. Free-form plate, fixed with into-the-plate countersunk screws or fixed with screws without heads, remains most of its fixation strength up to 12 weeks.

**Conclusion:** No difference between screws with screw-head and countersunk screws was found during in-vitro degradation, therefore both types of fixation can be considered to provide sufficient postoperative fracture-stability.

#### O.447 Individual implant for lower orbital wall reconstruction

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Objective is to demonstrate the clinical application of three-dimensional, pre-bent titanium implants for orbital floor fracture surgery.

**Methods:** Six patients who had affected by facial injury were included into this study. 3D virtual models and later physical models were created basing on 64-slice CT, and rapid prototyping process. Models were used as templates to bend the titanium mesh and as guides to aid correct implant placement intraoperatively. Surgical field navigation was employed to confirm proper implant placement.