

# BIOASORBABLE OSTEOFIXATION USED DEVICES IN 165 CRANIAL AND MAXILLOFACIAL CASES: A MULTICENTER REPORT

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## Abstract

*Bioabsorbable osteofixation devices were developed to avoid problems associated with metals. Bioabsorbable devices are mostly made of the polymers polylactide (PLA), polyglycolide (PGA) and their copolymers (PLGA and P(L/DL)LA). Using the technique of self-reinforcement of bioabsorbable materials, it is possible to manufacture osteofixation devices with ultra high strength. Self-reinforced (SR) polyglycolide-co-polylactide (SR-PLGA) 80/20 was selected to make devices (Biosorb™ PDX) for this study because of its favorable degradation characteristics. The aim of this study was to evaluate the efficacy of using SR-PLGA (Biosorb™) plates and screws in the fixation of osteotomies in craniomaxillofacial (CMF) surgery. In a prospective study, 165 patients (161 children and 4 adults) were operated on in four EU centers (Paris, Innsbruck, London and Oulu) from May 1st, 1998 to January 31st, 2002. Indications included correction of dyssynostotic deformities (n=159), reconstruction of bone defects following trauma (n=2), tumor removal (n=2), and treatment of encephalocele (n=2). Plates used were 0.8, 1 or 1.2 mm thick and screws had an outer (thread) diameter of 1.5 or 2 mm and a length of 4, 6 or 8 mm. Tacks had an outer diameter of 1.5 or 2 mm and a length of 4 or 6 mm. Intraoperatively the devices were easy to handle and apply and provided stable fixation apart from two cases. Postoperative complications occurred in 12 cases (7.3%), comprising infection (n=6), bone resorption (n=4), diabetes insipidus (n=1), delayed skin wound healing/skin slough (n=2), and liquorrhea (n=1). Accordingly, SR-PLGA 80/20 (Biosorb) plates and screws can be used safely and with favorable outcome in corrective cranioplasties,*

especially in infants and young children.

**Keywords:** Bioabsorbable, biosorb, bone, fixation, polylactide, polyglycolide, self-reinforced  
[Engineering of Biomaterials, 38-43, (2004), 13]

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# INVESTIGATION OF THE EFFECT OF CIPROFLOXACIN- RELEASING BIOASORBABLE IMPLANT ON STAPHYLOCOCCUS EPIDERMIDIS ATTACHMENT AND BIOFILM FORMATION IN VITRO

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**Keywords:** Antibiotic, bioabsorbable, biofilm, ciprofloxacin, polylactide-co-glycolide  
[Engineering of Biomaterials, 38-43, (2004), 13-14]

## Background

Antibiotic coating systems have been successfully used to prevent bacterial attachment and biofilm formation. Our purpose was to evaluate whether bioabsorbable polylactide-co-glycolide (PLGA) 80/20 on its own, and PLGA together with ciprofloxacin (PLGA+AB) have any advantages over titanium in preventing Staphylococcus epidermidis attachment and biofilm formation in vitro.

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Cylindrical specimens of titanium, PLGA and PLGA+AB in triplicate were examined for *S. epidermidis* ATCC 35989 attachment and biofilm formation after incubation with a bacterial suspension of ca. 105 cfu/ml for 1, 3, 7, 14 and 21 days, using scanning electron microscopy. Growth inhibition properties of PLGA and PLGA + AB cylinders were tested on agar plates.

## Results

On days 1, 3 and 21, no bacterial attachment was seen in 19.5%, 9.2% and 41.4% of the titanium specimens, in 18.4%, 28.7% and 34.5% of the PLGA specimens and in 57.5%, 62.1% and 57.5% of the PLGA + AB specimens, respectively. During the whole study period no biofilm was observed on 74%-93% of the titanium specimens, 58%-78% of the PLGA specimens and 93%-100% of the PLGA+AB specimens. PLGA + AB showed clear bacterial growth inhibition on agar plates while PLGA and titanium did not show any inhibition.

## Conclusions

PLGA + AB bioabsorbable material was superior to titanium in preventing bacterial attachment and biofilm formation and may have clinical applicability, for example, in prevention of infection in trauma surgery or in the treatment of chronic osteomyelitis.

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# REPORT ON A NEW TECHNIQUE FOR CORRECTION OF TRIGONOCEPHALY USING BIOABSORBABLE OSTEOFIXATION TACKS AND PLATES AND A NOVEL TACK-SHOOTER

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## Abstract

*We report on the feasibility of applying bioabsorbable tacks using a new tack-shooter to fix bioabsorbable plates applied endocranially for the correction of three cases of trigonocephaly. Tacks do not require tapping or tightening because they are applied using a tack-shooter directly into drill holes in the bone. Hence, the technique saves valuable operative time. A 1.5- to 2.0-cm broad supraorbital bar (bandeau) was raised and reshaped. The corrected shape was maintained using a Biosorb plate (Bionx Implants Ltd, Tampere, Finland), and tacks were applied on the endocranial side of the bar. The plate extended a few centimeters laterally beyond the edge of the supraorbital bar, and it was fixed with Biosorb miniscrews and/or tacks affixed to the temporal bones. Other molded bone pieces were fixed using Biosorb plates, screws, and/or tacks. The technique of using tacks was easy, and it provided secure osteofixation. Cosmetic results were excellent, and no complications were encountered except for palpability of plate edges on the right side of the skull in one case.*

*[Engineering of Biomaterials, 38-43, (2004), 14]*

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