

Tissue response biodegradation of polylactic acid bone screw and plate

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Abstract

Our team devotes bioresorbable polymer (poly-lactic acid, PLA) series in a long time, including the in vitro test, biocompatibility, and animal study have good results in our preliminary studies. The aim of this trial was to compare the clinical outcomes of bone flap fixation using a new bioresorbable system (Bonamates®) and a traditional titanium plate/screw system. Bioresorbable devices are particularly useful for skull bone reconstruction. Different systems are now commercially available. Patients diagnosed with a head injury, brain tumor, or cerebral vascular stroke and who received a craniotomy in our hospital in 2003 and 2004 were randomly allocated to 2 treatment groups for skull flap fixation (study group A: Bonamates®: n=4; control group B: titanium plate: n=4). Treatment outcomes and complication rates were compared between these 2 groups. In total, 8 patients (study groups A and B) were followed-up for at least 6 months after surgery. All patients in the study group A whose bone flap was fixed with bioresorbable plates/screws were reviewed postoperatively. Uneventful healing occurred during the entire follow-up period for all 4 patients (100%) in group A but for only 3 of 4 patients (75%) in group B. None of the patients developed postoperative complications (i.e., infection, soft tissue dehiscence, bone flap sink, or implant-related tissue reactions). After the operation, all patients in group B had severe artifacts on the imaging study (especially the computed tomographic scan), but none was seen in group A. For patients who received radiotherapy (1 from each group), the one fixed with the titanium plate had some dosimetry considerations and complications, but the one using Bonamates® fixation had none. There were no significant differences between the bioresorbable device and titanium fixation with respect to fracture healing, bone flap sink, or postoperative complications. But the fusion rate appeared to be higher in the Bonamates® group. If patients are going to receive radiotherapy (especially brain tumor patients), the Bonamates® system seems to be an ideal choice for bone flap fixation.