

## Adverse cell and tissue reactions during delayed degradation of PLDLA-anchors for shoulder joint repair

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**INTRODUCTION:** Torn ligaments or tendons can be reattached to the bone by so-called suture anchors during reconstructive joint surgery. Particularly for minimal invasive arthroscopic surgery, anchors made of biodegradable polymers, mainly poly-glycolic and/or poly-lactic acid (PGA, PLA) were introduced [1]. However, these anchors seem not to be readily resorbed, and not bone healing, but osteolysis observed 8 months [2] to years at radiologic follow-ups.

In this prospective study, the bone reactions to biodegradable anchors were followed by radiologic imaging, and augmented by histopathologic evaluation of two illustrative cases.

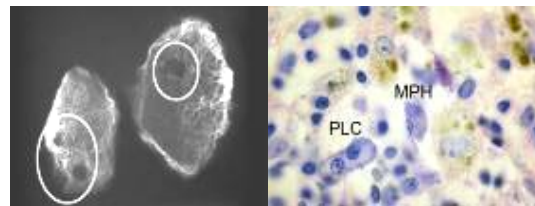
**METHODS:** So far, 43 patients (males > females, age range 54-83 yrs) from a single institution, with 9 to 24 months follow-up after arthroscopic rotator cuff repair, using 1 to 3 PLDLA-anchors (Arthrex, Inc., Naples FL, USA), were evaluated on plain radiographs and arthroMRIs. Bone healing, or residual bone defects and/or cystic lesions in the respective anchor positions were assessed.

At endoprosthesis replacement after clinical failure, for biopsy 1, one anchor bone bed was retrieved from a male patient (66a) 9 months p.implantation. For biopsy 2, two segments of the humeral head with anchor bone beds were retrieved from a female patient (74a) 24 months p.implantation. All specimens were plastic embedded, and undecalcified microtome and ground sections were evaluated by light microscopy.

**RESULTS:** Except in one case, in 35 cases the anchors were detectable up to 24 months p.impl. on MRI, irrespective of good or bad clinical results. The anchor bone beds were not healed, but had only formed a replica of the implant shape. In seven cases with clinical failure large cystic lesions were found at the anchor sites.

Biopsy 1 at 9 months p.impl. showed the PLDLA-anchor surrounded by foreign body giant cells and a thin bone lamella with signs of

demineralization. In biopsy 2, 24 months p.impl., the anchor sites appeared as osteolytic defects, containing foreign body giant cells and macrophages with PLDLA remnants(?) and abundant hemosiderin. In between, lymphocytes and plasma cells were found, and lymph follicles in the surrounding edematous fatty marrow.



*Fig.1: Humerus specimen radiographs of biopsy 2(left) show Swiss Emmental Cheese-like osteolytic lesions, filled with macrophages (MPH), lymphocytes and plasma cells (PLC).*

**DISCUSSION & CONCLUSIONS:** In the bone bed, “bioabsorbable” implants seem not to degrade in the same amount of time as e.g. suture materials. During delayed degradation, cases with osteolytic or cystic lesions and joint effusions have been observed [3]. In the present study, bone healing of the anchor sites seemed not only hindered by the presence of the not totally degraded implant, but also impaired by demineralization due to low pH at acid release, and by chronic inflammation with an immune cell reaction. One explanation for this immune response could be denaturation of proteins adsorbed to these semicrystalline degradable polymers [4].

### REFERENCES:

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