# Augmentation of Osteoporotic Proximal Humerus Fractures Using Injectable Calcium Sulfate-based Bone Graft Substitute with a Locking Proximal Humerus Plate

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## Background

We evaluated the usefulness of injectable calcium sulfate-based bone graft substitute with locking proximal humerus plate for osteoporotic surgical neck fractures of the humerus.

## Methods

A prospective clinical review was performed on 13 osteoporotic surgical neck fractures of the humerus. Inclusion criteria were two- or three-part osteoporotic surgical neck fractures in patients over 65 years of age. Complications and radiological and clinical results (Constant and Murley score) were observed prospectively over 6 months.

## Results

All of the surgically treated metaphyseal bone defects healed, requiring an average time of 9.9 weeks for resorption of calcium sulfate. In all patients, 12-week follow-up radiographs showed that there was 100% resorption of the calcium sulfate. All surgical neck fractures healed and showed complete union. The average Constant and Murley score after 6 month was 73.2 points (range, 60~87). There was one case of mild bending or buckling of the plate and one case of calcium sulfate leakage. However, there were no other complications associated with surgery.

## Conclusions

Calcium sulfate may be an effective method of filling humerus metaphyseal bone defects and leads to good bone repair. Using augmentation with calcium sulfate-based bone substitute and fixation with locking proximal humerus plates, the hardening capacity of injectable calcium sulfate may allow stabilization of the plates and reduce postoperative complications, such as implant loosening or failure and malalignment, in older patients with osteoporotic proxial humerus fractures.

## Key Words

Calcium sulfate, Locking proximal humerus plate, Osteoporotic proximal humerus fractures