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## The Combined Impact of Compromised Medial Calcar and Lateral Humeral Wall Integrity on Mechanical Failure After PHILOS Plating in Proximal Humerus Fractures

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### Introduction and Background

Compromised medial calcar integrity is a known risk factor for mechanical failure after open reduction and internal fixation (ORIF) of proximal humerus fractures; however, the role of lateral humeral wall integrity remains unclear. This study evaluated the incidence of mechanical failure after PHILOS plating according to preoperative integrity of the medial calcar and lateral humeral wall.

### Material and Method

Patients who underwent ORIF using a PHILOS plate for acute proximal humerus fractures (2009–2024) with preoperative CT and minimum 1-year follow-up were retrospectively reviewed. Pathologic fractures, open fractures, and previous ipsilateral shoulder surgery were excluded. Compromised medial calcar was defined when disruption of the posteromedial calcar cortex with loss of medial column support was present. Compromised lateral humeral wall was defined when either a sagittal split fracture through the greater tuberosity or a fracture line at or above the most proximal screw hole of the PHILOS plate was present. Radiographic outcome was first compared between patients with intact versus compromised medial calcar integrity. Subsequently, patients were stratified into four subgroups based on the combined status of medial calcar and lateral humeral wall integrity. Mechanical failure (varus collapse, loss of reduction, tuberosity migration, or screw penetration) was compared among groups.

### Results

Of 125 patients, mechanical failure occurred in 17 (13.6%). Comparison based on medial calcar integrity alone showed no significant difference in failure rates. However, subgroup analysis according to the combined status of medial calcar and lateral humeral wall integrity revealed a significant difference among the four groups ( $P = .0035$ ), with the combined compromised group (both structures involved) showing the highest failure rate (45.5%).

### Conclusions

Isolated medial calcar or lateral wall compromise did not significantly affect mechanical failure rates. However, combined involvement markedly increased failure risk, suggesting that this pattern represents a structurally unstable fracture configuration

