The position and number of screws influence screw perforation of the humeral head in modern locking plates: a cadaver study

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OBJECTIVES
Screw perforation of the humeral head in locking plate osteosynthesis occurs in up to 30% of cases. The current study compared different fixation possibilities (e.g., number and position of screws) to reduce screw perforation in the humeral head.

METHODS
A humeral head fracture with a missing medial support was created in 30 fresh-frozen cadavers and fixed with a polyaxial locking plate (NCB PH; Zimmer, Warsaw, IN). The constructs were loaded with increasing force and the number of cycles until screw perforation was recorded. Four different fixation methods were tested: group 1 five screws with fixed angle, group 2 five screws in polyaxial position according to bone strength, group 3 three screws, and group 4 five screws with 1 as an inferomedial support screw.

RESULTS
More screws in the humeral head significantly increased the number of cycles before screw perforation. An inferomedial support screw further increased the number of cycles. Polyaxial screw placement compared with fixed-angle placement had no effect on the screw perforation phenomenon.

CONCLUSIONS
We recommend to position an inferomedial support screw, and at least 5 screws in the head fragment, when using a locking plate in proximal humerus fractures with disrupted medial hinge.