Whatever Your Preference Is for the Treatment of the Proximal Humeral Fracture

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The incidence of proximal humeral fractures in the elderly is on the rise due to increasing sports activities and incidence of osteoporosis.^{1,2)} Unstable and displaced proximal humeral fractures are generally accepted indications for surgeries.³⁾ Current treatments include osteosynthesis using proximal humeral nails and plates, tension band wiring, percutaneous or minimally invasive techniques, such as pinning, intramedullary flexible nails, and screw osteosynthesis, hemiarthroplasty, and reverse total shoulder arthroplasty.⁴⁻⁷⁾ Surgical treatment requires anatomical reduction and a stable fixation, which proves to be especially difficult in an osteoporotic bone. Unreduced or poorly reduced fractures with varus angulation of the neck-shaft angle can also be a cause of immediate postoperative failures.^{8,9)}

With the advent of locking plates and screw fixation, a greater number of displaced proximal humeral fractures are being treated with osteosynthesis.¹⁰⁻¹⁴⁾ Although locking plates have a mechanical advantage over standard implants in osteoporotic bones,^{13,15)} complication rates after surgical stabilization remain high.^{11,16)} Several studies have reported complications, two of the most common being varus inclination and screw penetration. Gardner et al.¹³⁾ reported that a varus collapse is typically caused by rotator-cuff forces, thereby suggesting that maintaining a reduction necessitates some medial support. Other than these, loss of fixation is another frequently observed complication, and requires removal of the screws to avoid impending joint destruction in locking plates.^{17,18)}

Fixation loss is often encountered after surgical treatment of displaced unstable proximal humeral fractures in elderly patients with osteoporosis. Despite many approaches and attempts to overcome this problem, no definitive consensus operation exists. Liew et al.¹⁹⁾ found screw purchase to be significantly greater when screws were placed into the medial subchondral bone,

and cautioned about relying on fixation in the superior humeral head. Fixative construction should be augmented with heavy sutures wherever required, which passes adjacent to the bony fragments, goes through the rotator cuff tissue, and winds back to the fixation implant to provide maximal implant-fragment stability.¹⁹⁾ In other words, the displacing force of the rotator cuff must be reduced through additive fiber cerclages. We have previously reported the effects of additive augmentation sutures in proximal humeral fractures stabilized by locking plates.²⁰⁾ Our results show that the loss of neck-shaft angle was greater in patients who did not receive additive augmentation sutures than in patients who received it. Thus, in cases of severe dislocation or comminution of the fracture (especially in elderly patients with concomitant osteoporosis), we believe that making additive trans-cuff sutures after internal fixation provides a sturdier fixation.

An article by Min et al.²¹⁾ evaluated the clinical and radiologic results between the periarticular proximal humerus locking plate and Polarus nail for displaced proximal humerus fractures. The overall results showed no significant difference in the clinical outcomes between the plate and nail. However, in the nail group, the rate of failure to maintain reduction during the 1-year period after surgery was significantly higher than in the plate group. In addition, when comparing the plate groups based on with or without the medial support, the presence of medial support was found to be beneficial in maintaining the fracture reduction and bone union rate.

The choice of surgical treatment for proximal humeral fracture is irrelevant. Whatever the preference, the priority is to maintain the surgical principles. It is important to remember that treatment of proximal humeral fractures is a balancing surgery that not only treats the fracture piece, but also obtains the initial mechanical support of the medial calcar and neutralizes the

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forces of the surrounding rotator cuff tissue. If the fundamentals are clearly upheld, good results are logically expected.

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