

Minimally Invasive Plate Osteosynthesis for Humeral Shaft Fractures: A Case-Matched Comparison Between Far Cortical Locking Screw and Locking Head Screw

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Purpose: Far cortical locking (FCL) system is known to reduce the axial stiffness of the locked plating constructs while retaining the construct strength, promoting secondary bone healing following fracture fixation with locked bridge plating constructs. However, to the best of our knowledge, there is little information regarding its efficacy compared to the conventional locking head screw (LHS) system. We treated humeral shaft fractures with minimally invasive plate osteosynthesis using the FCL system and the LHS system and compare the treatment outcome and complications.

Methods: A comparative study of 40 patients with diaphyseal humeral fractures who underwent minimally invasive plating with either FCL or LHS was undertaken. The FCL group comprised 20 patients with a mean age of 36.1 years. These included 16 type A, 3 type B, and 1 type C fractures by the AO classification system. The mean follow-up period was 23.2 months. The LHS group comprised 20 patients with a mean age of 34.2 years and included 16 type A, 3 type B, and 1 type C fractures. The mean follow-up period was 28.2 months. The healing rate and time, postoperative alignment, the function of the shoulder and elbow, and complications were analyzed and compared between the 2 groups.

Results: Bony union was achieved in 18 of 20 cases (90%) of the FCL group by a mean of 13.6 weeks postoperatively. In the LHS group, 20 cases (100%) healed by a mean of 20.1 weeks. Although the union time was significantly shorter in the FCL group ($P=0.05$, Mann-Whitney U test), there was no difference in the union rate ($P=0.487$, Fisher's exact test). Revision surgery was required in 2 cases in the FCL group due to the pull-out or breakage of the screw at the proximal of the fracture. There was no case of malalignment $>10^\circ$. The mean coronal and sagittal angulation in the FCL group were 2.9° and 4.8° , respectively, and that of the LHS group were 2.4° and 3.3° , respectively ($P=0.6$ and 0.24 , Mann-Whitney U test). The mean Constant score and Mayo elbow performance score in the FCL group were 98.4 and 95.5, respectively, and that of the LHS group were 99.6 and 96.2, respectively ($P>0.05$, Mann-Whitney U test).

Conclusion: Minimally invasive plate osteosynthesis using FCL demonstrates a high union rate, short union time, and favorable functional result. However, attention should be taken, as screw failure may occur proximal to the fracture site.