

Malalignment After Minimally Invasive Plate Osteosynthesis in Distal Femoral Fractures

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Background/Purpose: Minimally invasive plate osteosynthesis (MIPO) is a preferred operative treatment for distal femoral fractures. Although it has the advantage of excellent bony union, malalignment is a significant concern because of the indirect reduction of the fracture. The purpose of this study was to evaluate radiologic alignment after MIPO for distal femoral fractures.

Methods: Of 138 patients with unilateral distal femoral fractures who underwent MIPO in our hospital from 2005 to 2013, we enrolled 52 patients in whom bilateral rotational alignment could be assessed by CT. The patients included 32 men and 20 women, with a mean age of 53.4 years. Thirteen patients had femoral shaft fractures (according to the AO-OTA classification: 32-A, n = 2; 32-B, n = 6; 32-C, n = 5), whereas 39 patients had distal femoral fractures (33-A, n = 7; 33-C, n = 32). Coronal and sagittal alignments were assessed by using simple radiography, whereas rotational alignment was assessed by using CT. According to the difference between the affected and unaffected side, we divided the patients into 4 groups: excellent, good, fair, and poor. Thereafter, we determined which factors can lead to malalignment, including fracture location (distal femoral shaft fracture or metaphyseal fracture), fracture pattern (simple fracture, n = 15; complex fractures, n = 37 patients), coronal and sagittal alignment, and the presence of combined ipsilateral long bone fractures.

Results: Coronal and sagittal alignment were satisfactory in 96.2% (average 2.8°, 0.2°-10.3°) and 98% (average 2.2°, 0-8.1°) of the subjects, respectively, whereas the rotational alignment was satisfactory in 57.7% of patients. The leg length discrepancy was satisfactory in 92.3% of the patients (average 10.9 mm, -9 to 112 mm). Concerning rotational malalignment, an unsatisfactory result was obtained in 48.6% of subjects with complex fractures and 26.7% of subjects with simple fractures (P = 0.114, Pearson's chi-square test). No significant correlation was noted between the angular deformity in the coronal and sagittal planes and the degree of rotational alignment (P = 0.691, multiple regression analysis). Even if good alignment of the coronal and sagittal planes achieved after surgery, this does not guarantee good postoperative rotational alignment.

Conclusion: Regardless of the fracture pattern, rotational malalignment may develop at an extremely high rate after MIPO for distal femoral fractures, whereas a satisfactory alignment is obtained concerning coronal and sagittal alignment. Extreme caution should be taken to avoid rotational malalignment using this technique.