CT-Based Study for Postoperative Rotational Malalignment of Femoral Shaft Fractures Using Modified Lesser Trochanter Shape Sign

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Purpose: Lesser trochanter shape sign (LTSS) is widely known as an intraoperative rotational reduction technique for femoral shaft fractures. However, rotational malalignment greater than 15° was found in 20% to 30% of the patients treated with antegrade intramedullary nailing for femoral fractures. In the present study, we aimed to analyze the usefulness of a new intraoperative technique for the rotational reduction of the femur.

Methods: In a retrospective nonrandomized study, 130 patients (mean age, 54.4 years) with femoral shaft fractures that were operatively treated with antegrade nailing during a period of 15 years were reviewed. LTSS was used to decide the rotation of the femur intraoperatively; however, the landmark of the distal part was modified to overlap distance between the lateral edge of the medial femoral condyle and the medial edge of the patella (modified lesser trochanter shape sign [MLTSS]). Rotational malalignment was measured as the angle between the line tangential to the dorsal bony contours of the femoral condyles and the line drawn through the center of the femoral neck in computed tomography whole length of the bilateral femur. The difference in angle between the fractured and uninjured side determines, and more than 10° defined the malrotation. The malrotation between the LTSS group (92 patients) and MLTSS group (38 patients) was statistically analyzed by $\chi 2$ test and Student t test, and a value of $P<0.05$ was considered statistically significant.

Results: The mean rotational malalignment was 9.4° ± 6.7° and 6.8° ± 4.7°, malrotation greater than 10° was seen in 40 (43.5%) and 8 patients (21.0%) in LTSS and MLTSS groups, respectively ($P<0.05$). Anteversion of the femoral neck of the fracture side increased by mean 10.3° ± 6.1° in 40 patients (43.4%) and decreased by mean 9.2° ± 7.1° in 52 patients (56.6%) in LTSS group. On the other hand, anteversion increased by mean 7.2° ± 5.0° in 33 patients (84.8%) and decreased by mean 4.8° ± 2.2° in 5 patients (15.2%) in MLTSS group.

Conclusion: Because the lateral edge of the medial femoral condyle and the medial edge of the patella were clearly visible on intraoperative fluoroscopy, these could be used as landmarks, further enhancing the accuracy of LTSS.