

Relationship Between Femoral Head Osteonecrosis and Posterior Tilt and/or Valgus Deformity in Garden I Femoral Neck Fracture in Elderly Patients: Let's Do Reduction for Nondisplaced Femoral Neck Fractures

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Purpose: Internal fixation is currently considered the standard of care for nondisplaced femoral neck fracture (Garden stage I and II) in elderly patients. However, outcomes following this procedure are not uniformly positive. These fractures are generally treated with in situ internal fixation (without reduction). However, the need of the reduction for its posterior tilt has been suggested recently. Furthermore, valgus deformity has been also discussed. The purpose of this study was to investigate the relationship between femoral head osteonecrosis after osteosynthesis for nondisplaced femoral neck fracture and its posterior tilt and valgus tilt.

Methods: 107 patients who underwent internal fixation for nondisplaced femoral neck fracture were retrospectively reviewed between 2014 and 2018. 72 patients were classified as Garden stage I. 53 of these patients with more than 1-year follow-up were available for analysis. The patients included 8 males and 45 females with an average age of 78.0 years (range, 65-94). All patients were treated with internal fixation using the Hansson Pinloc System (Stryker, Mahwah, NJ) at our institution. Closed reduction on a traction table was initially conducted by traction and internal rotation. In addition, posterior tilt was reduced in a closed fashion as anatomically as possible. Full weight-bearing was allowed just after operation. Plain radiographs and MRI were taken at postoperative 3, 6, and 12 months.

Results: Bone union was achieved in all patients (107/107; 100%). Among 53 patients classified as Garden stage I with more than 6-month follow-up, there were 8 occult fractures detected with MRI. Excepting these 8 fractures, 45 patients were classified as truly valgus-impacted fractures. Among these, 9 cases (20%) showed osteonecrosis after achieving bone union. Posterior tilt at trauma was 8.9° in the non-osteonecrosis group (Non-ON group) and 13.2° in the osteonecrosis group (ON group). Posterior tilt after reduction was 1.9° in the Non-ON group and 1.3° in the ON group. Valgus deformity at trauma was 13.6° in the Non-ON group and 15.1° in the ON group. Valgus deformity after reduction was 5.6° in the Non-ON group and 9.2° in the ON group. These results showed 2 factors that may indicate osteonecrosis. One is fractures with both posterior tilt and valgus tilt. Another is fractures remained with valgus deformity even after reduction.

Conclusion: Good clinical outcomes using the Hansson Pinlock System has been reported in Japan because it has firm torsional stability. In fact, bone union was achieved in all our series. However, osteonecrosis after bone union was found in 20% in Garden stage I. Not only posterior tilt but also valgus deformity may need to be reduced during operation. Furthermore, Garden I should not be underestimated and longer follow-up will be needed even after bone union.