

**Intertrochanteric Osteotomy for Femoral Neck Nonunion:
Does “Undercorrection” Result in an Acceptable Rate of Femoral Neck Union?**

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Purpose: Femoral neck nonunions in young patients present multiple treatment challenges. The valgus-producing intertrochanteric osteotomy improves the biomechanical environment for union through reduction of shear forces across the nonunion. Prior descriptions of this procedure have advocated adjusting the degree of correction based on the verticality of the femoral neck fracture, with the goal of completely neutralizing the shear forces across the fracture (Pauwels angle $\sim 25^\circ$). However, this degree of correction often results in significant deformity of the proximal femur; as the neck is brought into more valgus, the femoral shaft is medialized and the greater trochanter is distalized. The use of a smaller closing wedge osteotomy of 20° or 30° allows for neutralization of most of the shear forces across the femoral neck nonunion without the severe alteration of the proximal femoral anatomy. The purpose of this study was to analyze the radiographic outcomes of valgus-producing intertrochanteric osteotomy for the treatment of femoral neck nonunion with “undercorrection” of the Pauwels angle and relative preservation of the proximal femoral anatomy.

Methods: 32 consecutive patients with established femoral neck nonunion treated with an intertrochanteric osteotomy were identified. Seven patients were treated with a 30° closing wedge osteotomy and 25 with a 20° or smaller osteotomy. All patients were treated with a valgus-producing intertrochanteric osteotomy with a blade plate. Demographic data were collected and pre- and postoperative radiographs were reviewed. All patients were followed for at least 6 months after osteotomy.

Results: 31 of 32 patients (97%) proceeded to osseous union of the femoral neck, and all intertrochanteric osteotomies healed. There was no significant difference in the rate of union between those patients treated with a 30° versus a 20° (or less) osteotomy. The mean Pauwels angle decreased from 71° (range, 52° - 95°) to 47° (range, 23° - 67°) and the mean proximal femoral offset decreased by 11 mm (range, 0-23 mm). Seven patients developed radiographic signs of osteonecrosis after osteotomy (22%), three of whom developed femoral head collapse and were treated with total hip arthroplasty (9%). Patients treated with a 30° osteotomy were more likely to develop osteonecrosis than those treated with a 20° or less osteotomy (67% vs 12%, $P = 0.014$).

Conclusion: A valgus-producing intertrochanteric osteotomy for nonunion of the femoral neck that results in a smaller degree of correction than has been traditionally described leads to an excellent rate of radiographic union while preserving more of the native proximal femoral anatomy.