Intramedullary Nailing for Atypical Femoral Fracture with Excessive Anterolateral Bowing

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Purpose: Intramedullary (IM) nailing is the treatment of choice for atypical femoral fractures (AFFs). However, several problems, such as iatrogenic fracture and medial gap opening, can occur during IM nailing when AFFs are associated with excessive anterolateral bowing. To overcome these problems, we have developed a new grading system for anterolateral femoral bowing and a new technique for IM nailing. The purposes of this study were (1) to introduce a new grading system and new IM nailing technique for AFF with anterolateral femoral bowing and (2) to compare the postoperative outcomes between the new technique and the conventional technique for IM nailing.

Methods: The new grading system was divided into 3 grades according to the position of the reference line at the apex of the curve of the anterolaterally bowed femur on a true AP view radiograph. The reference line is drawn from the tip of the greater trochanter to the center of the intercondylar notch. The core of the new IM nailing technique is matching the anterior curvature of the femoral nail with the anterolateral bowing of the femur when the nail passes the apex of the curvature, by rotating the nail externally. From January 2005 through March 2016, 24 female patients (30 cases) who underwent surgery for AFF with anterolateral bowing at 2 institutes were evaluated retrospectively. The postoperative outcomes (anterolateral bowing grade, anterior and lateral bowing angle, medial gap and posterior gap of the fracture site, iatrogenic fracture, and time to initial medial callus formation and bone union) were compared between the new technique (group A, 18 cases) and the conventional technique (group B, 12 cases).

Results: The interobserver and intraobserver reliability of the new grading system demonstrated an almost perfect agreement ($kappa_{inter}$ = 0.893, $kappa_{intra}$ = 0.883). There were no significant differences in the preoperative factors between two groups. The differences between the preoperative and postoperative anterior and lateral bowing angles were significantly less in group A ($p = 0.013$ for both). The medial and posterior gaps of the fracture site were also significantly less in group A ($P_{med} = 0.013$, $P_{post} = 0.022$). Iatrogenic fracture occurred only in group B, affecting 2 cases. The time to initial medial callus formation was significantly shorter in group A than in group B ($P = 0.033$).

Conclusion: Our new grading system for anterolateral femoral bowing is convenient and reliable. Furthermore, the new IM nailing technique with the current IM nail system is appropriate for the repair of AFFs with excessive anterolateral bowing.