

Association Between the Reduced Position in Lateral View and Postoperative Early Excessive Neck Shortening After Intramedullary Nailing of Intertrochanteric Fracture: A Retrospective Cohort Study

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Purpose: Excessive neck shortening after internal fixation of intertrochanteric fracture potentially associates the postoperative impairment of ambulation and quality of life. However, little is known whether the reduced position of the fragments associates the postoperative neck shortening. We hypothesized that the inappropriate reduction caused excessive neck shortening particularly in unstable fractures such as lack of posteromedial support. The purpose of this study was to investigate the association between the reduced position evaluated in lateral view and postoperative neck shortening among the intertrochanteric fractures fixed by cephalomedullary nail.

Methods: At a single hospital from November 2010 to August 2017, all intertrochanteric fracture patients fixed by cephalomedullary nail over the age of 65 years were retrospectively evaluated. We divided the patients into 2 groups according to the reduced position of the anterior cortex between neck and shaft fragments. We defined Subtype P as the neck fragment placed posteriorly from lateral view of postoperative radiograph. The other types of position were defined as Subtype AN. Neck shortening was defined as the amount of lag screw sliding by radiograph measured several times after surgery. The primary outcome was whether the sliding was more than 8 mm after 3 weeks from surgery or not. As primary analyses, we estimated the influence of Subtype P on the primary outcome using logistic regression model stratified by lesser trochanter fracture to adjust the confounding factors. As sensitivity analyses, we imputed the missing outcomes using multiple imputation by chained equation with panel data of the sliding and we analyzed in the way as the primary analyses. In addition, to evaluate the validity of the outcome, we compared the occurrence of postoperative cutout and the primary outcome by χ^2 test with significance set at $P < 0.05$.

Results: Of the 995 patients, 182 had Subtype P and 813 had Subtype AN. Primary outcome was measured in 496 patients. Among the fractures with posteromedial support ($n = 196$), there was no significant difference (adjusted odds ratio [AOR]: 1.9, 95% confidence interval [CI]: 0.61 to 6.1, $P = 0.26$). On the other hand, among the fractures without posteromedial support ($n = 300$), excessive neck shortening significantly increased in Subtype P (AOR: 2.5, 95% CI: 1.1 to 5.7, $P = 0.03$). Sensitivity analyses showed similar results as primary analyses, with posteromedial support (AOR: 1.4, 95% CI: 0.50 to 4.1, $P = 0.50$) and without posteromedial support (AOR: 2.1, 95% CI: 1.1 to 4.2, $P = 0.03$). The occurrence of cut-out was significantly associated with the primary outcome (risk ratio 8.2, risk difference 6.3%, $P < 0.01$).

Conclusion: In the nailing of unstable intertrochanteric fractures, orthopaedic surgeons should be careful that the reduced position in lateral view does not become Subtype P to avoid early excessive neck shortening.