Impact of Trochanteric and Retrograde Femoral Nailing on Patient Gait

Small study finds more favorable results with retrograde nails

Trochanteric-entry femoral nailing can potentially cause a mechanical disturbance in patient gait, according to data presented at the 2012 annual meeting of the Orthopaedic Trauma Association. In comparison, although retrograde nailing involves the knee joint for proper entry portal placement, it does not have a significant effect on gait function.

Femoral shaft fractures have historically been treated with antegrade intramedullary (IM) nails inserted through the piriformis fossa. However, the advent of trochanteric and retrograde nails has led to controversy regarding the optimal entry portal, according to presenter Kellen L. Huston, MD, of Saint Louis University.

“Our goal was to evaluate patient gait after fixation of isolated femur fractures using either an antegrade (trochanteric) or retrograde IM nail to determine if any potential gait abnormalities existed,” he said.

Previous studies have associated antegrade femoral nailing with damage to the abductor and short external muscle attachments at the entry portal site. Use of a trochanteric-entry portal can lessen the risk of insult, but not completely eliminate it, the authors noted. They added that isolated cases of gait disturbances related to intraarticular insertion of retrograde IM nails have not been documented in the literature.

“We hypothesized, therefore, that the trochanteric nailing (TN) group would have significant disturbances in gait patterns and that the retrograde nailing (RN) group would show little or no gait abnormalities,” Dr. Huston said.

Retrospective analysis
The research involved two Level 1 trauma centers. Researchers conducted gait analysis on 16 patients who had been treated with either TN or RN for isolated diaphyseal femur fractures by the same group of surgeons. The following inclusion criteria were used:

- Isolated femoral shaft fracture stabilized with appropriate TN or RN per the surgeon’s discretion
- Independent ambulation without assistive device for at least 6 months
- Less than 2 cm leg-length discrepancy
- Radiographic and clinical union

The TN cohort included eight patients (average age: 29 years; range: 22–44 years); the RN cohort included eight patients (average age: 32 years; range: 22–45 years). The average length of time since injury in both groups was 24 months (range: 10–41 months).

Patients in both cohorts completed the Musculoskeletal Function Assessment Injury and Arthritis Survey (MFA). Using a high-definition camcorder, the researchers recorded each patient walking on a treadmill at a self-selected pace and ascending and descending a six-step staircase six times. Walking on the treadmill was recorded for 2 minutes from a posterior view and 1 minute from each lateral view. The following parameters were measured using gait analysis software (Darfish, Alpharetta, Ga.):

- Walking velocity
- Subjective symmetry (walking and stair-climbing)
- Lower extremity (hip and knee) kinematics for heel-strike and toe-off for both the normal and affected leg

TN affects hip motion
Although most patients indicated that the MFA that they had residual pain at the entry portal site, the level of pain was not significantly different in one cohort versus the other. In addition, no significant differences between the groups were noted in subjective measures of gait or stair climbing.

After statistical analysis, the researchers found no significant differences between the groups in knee kinematics in the normal or affected leg at heel-strike or toe-off. However, when comparing hip kinematics, researchers found that the patients in the TN cohort demonstrated significant differences compared to those in the RN cohort in the normal leg at toe-off (P < 0.05) and in the affected leg at heel-strike (P < 0.05), consistent with abductor alteration (Fig. 1).

“These results indicate a substantial opportunity for injury to the hip abductors, which have not recovered to their preinjury strength, with the trochanteric-entry portal,” the authors wrote. They added, “Although RN does involve the knee joint for proper entry portal placement, it does not have any significant effect on gait function.”

Dr. Huston’s coauthors of “Gait Analysis After Retrograde and Trochanteric Entry Intramedullary Nail Fixation of Femoral Shaft Fractures” are J. Tracy Watson, MD, and Lisa K. Cannada, MD.

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Bottom Line
• The optimal entry point for femoral nailing remains controversial.
• This small retrospective study evaluated entry portal influence on gait and stair climbing following retrograde- and trochanteric-entry nailing.
• Results indicated that trochanteric-entry femoral nailing can potentially cause a mechanical disturbance in patient gait and that retrograde-entry femoral nailing has no significant effect on gait function.
• The study also found that both retrograde- and trochanteric-entry nailing may lead to residual discomfort at the entry portal site.