

Retrograde Intramedullary Nailing for Distal Femur Fractures with Osteoporosis: An Appraisal

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To the Editor:

We read with great interest the manuscript by Kim et al.¹⁾ entitled “Retrograde Intramedullary Nailing for Distal Femur Fracture with Osteoporosis” in the current issue of your journal. We must congratulate the authors for this study. However, we would like to elaborate on few points and would like to draw attention of authors and readers to the following:

1. Filling void in comminuted fractures by bone cement inadvertently exposes the fracture site. Fig. 1 shows the distal femur exposed from its lateral to medial aspect. Thus, the concept of biological fixation is defeated. Sub-muscular bridge plating in such a scenario, allows for closed reduction of the diaphyseal/metaphyseal component of the fracture. One needs to take care of the length, alignment and rotation, and no anatomical reduction per se is required. With minimally invasive percutaneous plate osteosynthesis (MIPPO), favorable biological fixation for distal femoral fractures can be achieved, fracture haematoma is preserved and bone grafting is not required even in the case of metaphyseal comminution.²⁻⁴⁾ The authors should mention this drawback of cement augmentation and advantages of MIPPO in this subset of patients.

2. The authors did not mention the length of the nail they chose. A long retrograde nail is crucial for the stability of such fractures. In osteoporotic patients, the medullary canal tends to become very wide in the metaphyseal region which can be a risk factor for secondary displacement in varus or valgus depending on the nature of the fracture. Longer nails that achieve support in the isthmus region of the femur or incorporation of Poller screws that are close to the nail solves this problem.^{4,5)} Longer nails provide improved initial fracture stability when compared with short retrograde nails for supracondylar femur fractures due to a more stable mechanical interaction between the femoral diaphysis and the nail. This also needs to be addressed.

3. The authors also did not mention whether they used one or two proximal locking screws, though the im-

ages (Figs. 1 and 2) show two proximal locks. A second proximal locking screw is not known to provide any additional stability; rather the presence of proximal lock below the lesser trochanter is known to lead to a stress riser.^{5,6)} A single lock in a long nail saves surgical time and averts a stress riser and a fracture in the already osteoporotic bone.

4. The post operative treatment protocol is not clear. The authors used the statement “Weight bearing was allowed at 6th postoperative week.” Postoperative rehabilitation depends upon the stability of fixation and fracture pattern and has to be individualized for each patient.⁷⁾ Due to expanding trumpet shape of distal femur, in case of unstable fixation, when the fracture site is subjected to stress the nail may move within the bone; therefore it is necessary to provide splint age in such situation. If the authors initiated continuous passive motion from day 1, meaning that they probably were able to attain stable fixation in all cases. If such is the case, partial weight bearing can be started immediately after surgery with ambulatory aids,⁸⁾ though full weight bearing walking can be delayed until evidence of callus formation.⁷⁾ The whole purpose of stable fixation is defeated if walking is delayed. The authors should explain their postoperative rehabilitation protocol more clearly.

5. Many studies have highlighted the need for dynamization after retrograde nailing.^{7,9,10)} The need for dynamization of the implant to achieve fracture union has been reported to be as high as 19%.⁹⁾ The authors remained quiet about this procedure.

6. Knee pain, though mild, is common after retrograde nailing with the incidence ranging from 13% to 60%.^{7,9)} The authors did not make any comment about this in their series.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Jihyeung Kim, Kyungpyo Nam, Seung Hwan Rhee, Jong Won Won, Hyuk-Soo Han, Seung-Baik Kang, Reply:

First, we are very grateful for your interest in our study and valuable comments. Of the 13 patients diagnosed with extra-articular distal femur fracture and osteoporosis, we used cement augmentation in 5 patients. Cement augmentation can impede biologic healing of the fracture as you mentioned. However, cement augmentation has been described as good surgical option to increase biomechanical stability of the intramedullary nailing.^{1,2)} It can not only increase mechanical stability in early stage of fracture healing, but also decrease micromotion between fractured bone and intramedullary nail. When we manage osteoporotic distal femur fracture, biomechanical stability of the fracture is very important for early rehabilitation. And we also paid close attention to preserve periosteum for the biologic healing. Minimally invasive percutaneous plate osteosynthesis is also one of the good surgical options for the distal femur fracture with metaphyseal comminution. It can achieve biological fixation and early biomechanical stability of the fracture. To verify the superiority of those two treatment options, a prospective, randomized comparative study must be needed. However, in our study, we intended to suggest one of surgical techniques for the os-

teoporotic distal femur fracture with intramedullary nailing.

The AIM titanium supracondylar nail (Depuy ACE, Leeds, UK) we used in the previous study is a straight nail and the length of it varies from 15 to 30 cm. In most of our series, we used nails with a length of 15 and 20 cm. Anatomically, there is anterior bowing in the distal femur, and the sagittal bowing of distal femur (between the longitudinal axes of the proximal and distal femur) was measured as 13.9°. ³⁾ Because we used a straight supracondylar nail, we could not use a longer nail. If we use a supracondylar nail with anterior bowing, we can insert a longer nail and achieve mechanical stability of the fracture as you mentioned.

In a biomechanical study performed by Sears et al.,⁴⁾ a second proximal locking bolt in the long nail provides no additional stability. However, the addition of a second proximal locking bolt in the short nail reduced fracture translation in the coronal plane considerably. In our series, we used a short nail due to the anterior bowing of the distal femur. As we used a short intramedullary nail, a second proximal screw seems to be reasonable for the mechanical stability.

In the previous studies,⁵⁻⁷⁾ they started knee range-

of-motion physical therapy immediately after the surgery of distal femur fracture. Early range-of-motion exercise can prevent arthrofibrosis of the knee and improve final surgical results. As we achieved stable fixation with retrograde intramedullary nailing, we started range-of-motion exercise using a continuous passive motion machine one day after surgery. However, partial weight bearing was started at the 6th postoperative week in all of our patients. As most patients were advanced in age, there was a risk of secondary injury from a fall. In the elderly patients, limited weight bearing has been recommended until callus formation is seen to avoid fixation failure.⁸⁻¹¹⁾

We did not routinely perform dynamization of the implant to achieve fracture union. However, two of our patients complained of pain around the distal interlocking screw and that was managed with removal of distal screws under local anesthesia. Anterior knee pain is a possible complication after retrograde intramedullary nailing for distal femur fracture.^{12,13)} Of the 13 patients in our study, four patients (31%) complained of mild anterior knee pain at the time of functional evaluation 1 year postoperatively. However, the pain was not too severe to encumber their activities of daily living and was well controlled by medications.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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