Supracondylar fracture of femur after total knee arthroplasty (TKA) presents a challenge for orthopedic surgeons. It is controversial to treat such a fracture by using closed method or open method. Non-union, malunion, knee rigidity and other complications in prolonged immobilization were noted in the closed method. Implant migration, infection, non-union and malunion were also reported in open reduction treatment due to the difficulty to achieve rigid fixation. In this periprosthetic fracture, retrograde intramedullary Huckstep nailing provides a better chance to get rigid fixation compared with other fixation devices, especially in osteopenic bone. We reported 2 cases with supracondylar fracture of femur after total knee arthroplasty that have been successfully treated with retrograde intramedullary nailing.

**Case Report**

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(PCL) (Fig. 2), just like the entry point of intramedullary guide of femur during TKA. A flexible guide pin was inserted into the canal, followed by reaming along the pin step by step till 13 mm in diameter. The nail with jig was inserted into the canal (Fig. 3). Under the monitoring of fluoroscopic images, 7 screws of 5 mm in diameter were put in percutaneously. A long leg cast was applied for six weeks. With the support of a walking frame, she was allowed to walk with protected weight bearing. The fracture healed uneventfully three months postoperatively (Fig. 4). The range of motion of left knee was from 0 to 90 degrees, the same with her pre-injury status. Her left knee still did well after a 6-year follow-up.

Case 2
The 68-year-old man received primary TKA (Miller Galante II; Zimmer, Warsaw, Indiana) for his right osteoarthritic knee at our institution in July 1995. During the follow-up period, the implant was functioning well with
pain-free range of motion from 0 degrees to 100 degrees. Unfortunately, supracondylar fracture of the right femur happened in a motor vehicle accident about 6 months postoperatively (Fig. 5).

Open reduction and internal fixation was carried out. A retrograde intramedullary Huckstep nail (12 mm in diameter and 20 cm in length) was utilized as mentioned in case one. After surgery, a long leg cast was applied and partial-weight bearing was suggested for 6 weeks. The fracture site healed uneventfully three months postoperatively (Fig. 6). The range of motion of his right knee was from 0 degrees to 105 degrees. He was still able to walk without limping and pain at seven-year follow-up.

**DISCUSSION**

Supracondylar fracture after TKA is not an uncommon problem. The incidence has been estimated to be 0.6–1.0%. The etiology may involve trauma, anterior notching of the femoral cortex, revision arthroplasty, osteoporosis, prolonged steroid use, and pre-existing neurologic disorders.

Successful management of periprosthetic supracondylar fracture of femur is a great challenge. There are controversies in the options of treatments, which vary from observation, operation to revision TKA. Some authors have recommended closed treatment first even in displaced cases, with ORIF in which adequate alignment cannot be obtained. Others recommend that ORIF should be the initial treatment for displaced fractures.

Non-operative treatment, including splinting, casting or traction should not be the first choice due to difficulty in maintaining fracture alignment. Nonunion can be noted in about 20% of the patients, while malunion in about 25% of the patients. Complications associated with prolonged immobilization include residual pain and decreased ambulatory status in 50% of patients.

Open reduction and internal fixation with a condylar screw, Rush pins or blade plate has not achieved uniformly good results. High failure rate and complications such as migration, nonunion, malunion and loss of range of motion have all been reported, because of the limited length of distal fragment, comminution of the fracture and the osteopenic bone.

Satety results have been achieved by using interlocking nail system, including antegrade or retrograde interlocking system. They provide much stability in this fracture with out periosteal strip ping, bony devitalization or other surgical trauma. Especially in osteopenic bone, they eliminated the problem of loss of fixation, varus or valgus malalignment. Antegrade interlocking nail used in this fracture has been described by Hanks et al. The technique is limited only to the fractures that are at least eight centimeters proximal to the joint line. Retrograde interlocking nail, like the Seligson nail, has the advantage of being designed specifically for introducing into the supracondylar region. But the device can be used only in the cruciate-retaining (CR) femoral components where the inter femoral condyles was not cov-
ered by the prosthesis. In the PCL-substituted system, it is a contraindication for retrograde nailing because there is no adequate inlet but a metal box.

In the interlocking nail system, there are only one or two screws for interlocking nail system to fix the distal comminuted fragments in this fracture. It can get excel lent stability in selected cases. As no retrograde in ter locking nail system is available in our country at present, we use retrograde intramedullary Huckstep nailing instead. Besides, Huckstep nailing has interlocking screws de sign every 2 cm to meet the needs. Under the fluoroscopic control, the use of multiple 5.0 mm interlocking screws has more chance to get early stability after surgery, especially in the osteopenic bone. Just like the inter locking nail system, no further periosteal striping, bony devitalization or other surgical trauma is needed. It can be a less traumatic and not as technically demanding way to achieve reliable initial fixation than other more ambitious reconstructive techniques for supracondylar fracture after TKA.16,18,20

In the 2 cases presented, retrograde intramedullary Huckstep nailing was chosen to treat the fractures. The mid-term result of the treatment is satisfactory. It may be considered as an alternative method to treat the periarticular supracondylar fracture of the femur after TKA.

REFERENCES