

## 경골 골수강 내 금속정 고정술 후 오삽입된 Endcap의 '낚시-바늘' Technique을 통한 제거 - 수술 술기 -

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중앙보훈병원 정형외과

### Extraction of Misplaced Endcap during Tibia Intramedullary Nailing by 'Fish-Hook' Technique - Technical Note -

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Endcap placement after intramedullary nailing can be cumbersome. Misplacement of the endcap which may be difficult to extract may occur. In this report, a simple Kirschner wire device with 'fish-hook' technique may ease the procedure without further violating bony or soft tissues.

**Key Words:** Endcap, Intramedullary nailing, Tibia

Intramedullary nailing is currently one of the most commonly used orthopedic implants for the treatment of long bone diaphyseal fractures. To facilitate easier removal after bone union, endcap insertion at the proximal aspect of inserted nail is often encouraged. After the nailing procedure, there is often a guide-wire provided by the manufacturer for proper endcap insertion. However,

this device may not always be successful. The misplaced endcap may propagate into the metaphyseal area of proximal tibia making extraction difficult. In this report, a simple device to extract the misplaced endcap is demonstrated.

### Case Reports

A 66-year-old man had sustained a right tibia shaft fracture 15 years ago. According to previous operative records, open reduction and internal fixation was performed. During the early postoperative period, the implant was removed due to infection. Sinus tract at fracture site was then managed conservatively until then. When the patient visited Veterans Health Service Medical

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Center, there was a crust formation with small open wound at previous fracture level with non-union of initial fracture site (Fig. 1). The fibular was hypertrophied compared with the contralateral limb. Magnetic resonance imaging revealed the increased signal intensity and enhancement in superficial and deep soft tissue around fracture site. Bone scan showed similar findings. The culture from the wound was confirmed as methicillin-sensitive staphylococcus aureus. Under the diagnosis of chronic osteomyelitis with nonunion of tibia, 2-stage operation was planned for the patient. For the initial operation, bone resection of the suspicious area and antibiotics (4.0 g of vancomycin in 1 pack of cement) cement beads were inserted. Other fixative devices were not applied at initial operation due to acceptable stability perhaps due to hypertrophied fibular. Five weeks after operation, C-reactive protein level was normalized without infection sign. The patient was returned to operating room for antibiotics cement beads removal and ti-

bia intramedullary nailing together with autogenous bone graft. Exploration of previous bone removal area was performed. Cement beads were removed and copious debridement was performed. Meanwhile, the frozen biopsy sent to pathologic department revealed no neutrophils at high power field. Cancellous autobone was harvested from the ipsilateral iliac bone and was inserted to bone defect area. After fibular osteotomy to control the varus deformity, tibia intramedullary nailing with interlocking screw insertion was performed as usual fashion.

As a last step, endcap insertion was tried. Although the guidewire was used, endcap somehow was misplaced to the metaphyseal area of proximal tibia (Fig. 2A). Multiple attempts was tried to extract the endcap using the curved Kelly forceps, but failed (Fig. 2B). To avoid further damage of the bone and soft tissues, smaller extraction device was needed. So, 1.6-mm Kirschner wire was bent in a 'fish-hook' fashion, where the tip was long enough to hold the endcap hollow area (Fig. 2C-E).



**Fig. 1.** Initial presentation radiograph at our clinic. Non-union and varus angulation of the previous fracture site is demonstrated. Notice the hypertrophied fibular. AP: Antero-posterior.



**Fig. 2.** (A) Endcap misplaced at the metaphyseal area of the proximal tibia posterior to the intramedullary nail. (B) Curved long Kelly forceps appear to displace the endcap further distally and anteriorly. (C) Without violating the anterior cruciate ligament footprint area, the fish hook K-wire was successful in holding the misplaced endcap. (D, E) Finally, the endcap was extracted.



**Fig. 3.** Immediate postoperative radiographs. AP: Antero-posterior.

By using this simple device which can be readily made at ordinary operative rooms, the misplaced endcap was successfully removed (Fig. 3).

### Discussion

Misplacement of endcap after nailing procedure should always be prevented. Correct nail length and nail insertion point is a prerequisite. Commercially available endcap guide-wire is recommended with the help of C-arm confirmation.

There are several techniques in extracting the distal fragment of broken intramedullary nails. These include making a bony window and impacting the nail,<sup>1)</sup> using the guide wire,<sup>2,3)</sup> the use of grasping sleeve, and jamming the nail with smaller diameter reamer.<sup>4)</sup> The use of 'fish-hook' technique have also been described previously.<sup>5)</sup> This 'fish-hook' technique is known to be effective in any retained hollow implants.

Extracting the endcap using the 'fish-hook' technique was successful as described. A 1.6-mm Kirschner wire

which is readily available in most operative rooms may be used for the extraction device. This device may prevent further damage to bone and soft tissues.

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## 경골 골수강 내 금속정 고정술 후 오삽입된 Endcap의 ‘낙시-바늘’ Technique을 통한 제거 - 수술 술기 -

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중앙보훈병원 정형외과

골수강 내 금속정 고정술 후 Endcap의 삽입은 번거로울 수 있다. Endcap의 오삽입은 종종 일어나곤 하는데 오삽입된 endcap의 제거는 상당히 까다로울 수 있다. 본 증례에서는 이 까다로울 수 있는 술식을 단순 Kirschner 강선에 ‘낙시-바늘’ technique을 접목하여 뼈나 연부조직의 손상 없이 손쉽게 시행하였다.

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