Case Report

# The Use of Medulloscopy for Localized Intramedullary Lesions: Review of 5 Cases

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**Abstract:** We report 5 cases of a localized lesion (4 with osteomyelitis and 1 with an intraosseous ganglion cyst) that were treated successfully by medulloscopy. Medulloscopy is a standard arthroscopic technique for visualizing the intramedullary canal of the tibia. Two portals were created to allow easy access and triangulation to the lesion, one for the 5-mm arthroscope and the other for the instrument. Debridement, irrigation, and resection of the sequestrum were performed for the cases with osteomyelitis, and the intraosseous ganglion cyst was treated with biopsy, debridement, and autogenous bone grafting. All cases were treated successfully with medulloscopy and did not show recurrence at the last follow-up. In addition, there were no complications related to the procedure.
**Key Words:** Chronic osteomyelitis—Medulloscopy—Intramedullary lesion—Intraosseous ganglion—Saucerization—Sequestrum.

Roberts et al.[1] examined the intramedullary canal of the tibia using a standard arthroscopic technique and referred to this as “medulloscopy” to treat medullary lesions. They performed medulloscopy after opening the intramedullary canal of the femur or tibia by removing the intramedullary nail and reaming the canal. The nail or reamer entry site was used to introduce the endoscope. They used the same entry portal regardless of the location of the pathologic lesion in both the femur and tibia. However, it is difficult to access lesions by use of a standard endoscope when they are located at the distal portion of the femur or tibia. We report the use of medulloscopy for treating localized intramedullary lesions located in the metaphysis of the long bone.

## REVIEW OF CASES

We encountered 5 cases in which medulloscopy had been performed. Four cases had chronic osteomyelitis. Among these 4 cases, 1 was in the distal femur, 2 in the proximal tibia, and 1 in the distal tibia. One case had an intraosseous ganglion cyst near the lateral epicondyle of the distal femur. The precise location and extent of the lesion were assessed preoperatively by a standard radiograph and magnetic resonance imaging (MRI) scan. Once the pathologic lesion was confirmed to be a localized lesion, 2 portals were created according to the following guidelines to allow easy access and triangulation to the lesion while minimizing the biologic and biomechanical damage to the bone. One portal was made for the 5-mm arthroscope (Stryker, Kalamazoo, MI), and the other was made for the instrument. Each portal was made after a guide pin was placed toward the center of the pathologic lesion. The distance between the portals should be separated with enough distance to allow easy instrumentation

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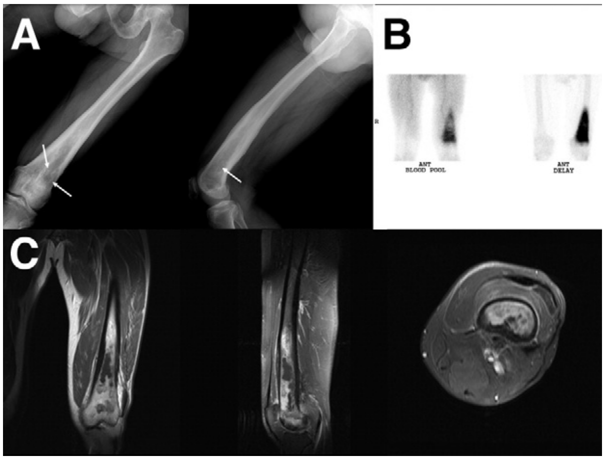


FIGURE 1. (A) Radiographs showed thickening of the cortex, reactive sclerosis, and focal destruction of the medullary portion. (B) The 3-phase bone scan showed increased uptake in all 3 phases. (C) MRI scans showed patchy bone marrow replacing the soft-tissue signal intensity and thickened bony cortex with surrounding inflammatory extension. (arrows, sequestrum; R, right; ANT, anterior.)

and prevent stress fractures connecting the 2 portals. The preferred angle between the 2 guide pins is 90°. In addition, the medial cortex was not considered to be a site for portal placement so as to avoid an increase in stress that might result in fractures. The major neurovascular structures should be avoided during portal placement. Debridement, irrigation, and resection of the sequestrum were performed in the chronic osteomyelitis cases. Biopsy, debridement, and autogenous bone grafting were performed to treat the intraosseous ganglion cyst.

## Osteomyelitis

A 63-year-old man had been injured by fragments from a hand grenade during the Vietnam War. These fragments were removed from the left distal femur. He visited our hospital 2 months earlier complaining of painful swelling with localized warmth and erythema in his left thigh. The white blood cell (WBC) count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) level, radiographs, 3-phase bone scan, and MRI scan were evaluated for suspicion of chronic osteomyelitis. The WBC count, ESR, and CRP level were $12.24 \times 10^3/\text{mm}^3$, 34 mm/h, and 6.25 mg/dL, respectively. The radiographs showed thickening of the cortex, reactive sclerosis, and focal destruction of the medullary portion. A 3-phase bone scan showed increased uptake in all 3 phases (Fig 1). MRI showed a lesion with patchy enhancement with a central non-enhancing portion that suggested a sequestrum and thickened bony cortex with surrounding inflammatory extension (Fig 1). The lesion was well localized at the metaphysis of the distal femur on the radiographs and MRI scan.

The patient was placed under general anesthesia in the supine position without a tourniquet to distinguish the vascularized tissue from the avascularized tissue. Fluoroscopy was used to identify the lesion. An incision was made on the lateral thigh, and the vastus lateralis muscle was split. Although there was substantial skin and fascial incision, the muscle was split slightly to expose the site for portal opening. It is believed that open exposure would be advantageous in cases of infection because contamination by flowing pus would be minimal and instrumentation, such as an osteotome or curette, can be used easily. In addition, there will be less bone loss because there is no need to use a cannula, which requires more reaming for its adaptation and would be necessary if the percutaneous approach were used. The lateral cortex of the distal femur was exposed without detachment of the periosteum to preserve the periosteal blood supply. Two guide pins were inserted into the center of the lesion under fluoroscopic guidance. A cannulated reamer was used to create 7-mm-diameter portals. One portal was used for the arthroscope, and the other was used for the instrument (Fig 2). The endoscopic findings showed pus and granulation tissue. After irrigation, the pathologic soft-tissue material was taken for biopsy. The sequestrum was easily identified during medulloscopy because it appeared white and lacked vascularity. The fibrotic tissues and sequestrum were

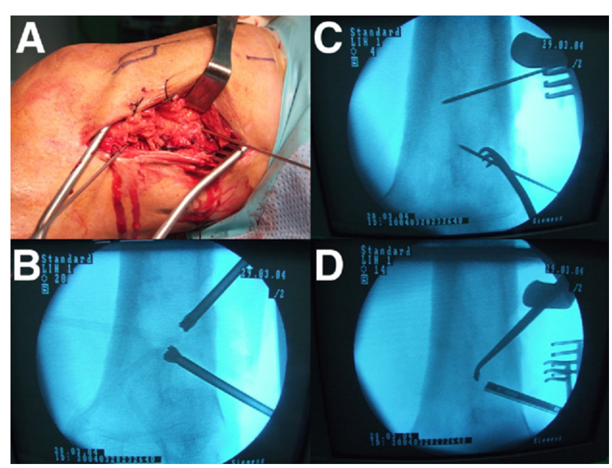


FIGURE 2. (A) Exposure of bone without detachment of periosteum. (B) Insertion of 2 guide pins by use of fluoroscopy. (C) Reaming to create portals. (D) Removal of fibrotic tissues and sequestrum with a curette.