

TREATMENT OF A SIMPLE BONE CYST OF THE CALCANEUS BY ENDOSCOPIC CURETTAGE WITH CANCELLOUS BONE INJECTION

F. BONNEL, F. CANOVAS, P. FAURE

The authors report a case of simple bone cyst involving the calcaneus, treated by curettage under endoscopy with cancellous bone injection, and its course and follow-up at two years. This new technique has not yet been published for simple bone cysts of the calcaneus. Endoscopic curettage of the cavity of a simple bone cyst can be advocated for the calcaneus to minimize incisions and to avoid cutaneous complications.

Keywords : solitary bone cyst ; endoscopic treatment.

Mots-clés : kyste osseux solitaire ; calcaneum ; traitement endoscopique.

Simple bone cysts present some unresolved problems. They are considered as resulting from an atrophic degenerative osteolytic process which produces a cavity filled with fluid. They most commonly affect the proximal humerus, the proximal femur, the calcaneus, and the metaphysis of long bones. The lesion is seen in children (between 5 and 15 years of age), and in adults and predominantly affects male patients. It is asymptomatic, but it becomes painful after pathologic fracture, which occurs frequently. Sometimes in these situations, the callus formation induces healing of the cyst as well as fracture consolidation. We report the case, with its course and follow-up at two years, of a simple bone cyst involving the calcaneus, treated under endoscopy by cancellous bone injection.

CASE REPORT

In August 1996, a 16-year-old boy presented with a history of limp for 6 weeks with increasing

pain for 3 days. The pain was localized at the heel. No history of trauma was noted. Xrays of the hind foot showed a calcaneus cyst. The lesion was then injected with methylprednisolone in July 1992, but it did not respond. This procedure was repeated in January 1993 and June 1993, but the lesion continued to enlarge. On examination of the right foot, tenderness was noted on the lateral aspect with a full range of motion of the ankle joint. Xrays disclosed a central lytic lesion thinning and inflating the cortex without periosteal reaction in the middle part of the calcaneus (fig. 1). TDM after injection of Gadolinium showed slight non-specific peripheral uptake with a cold central area,

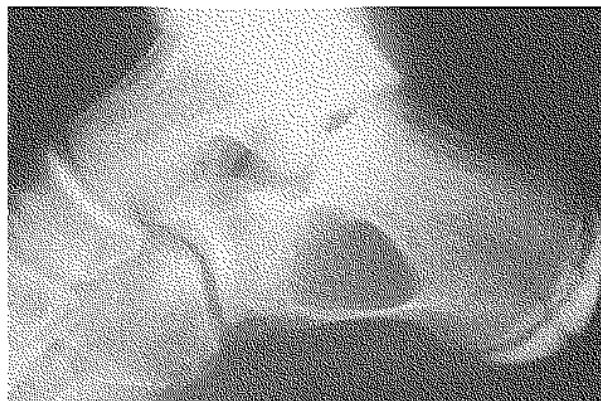


Fig. 1. — Lateral xray of the calcaneus, showing a simple bone cyst.

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Fig. 2. — CT-scan of the calcaneus showing the cavity with partial rupture of the lateral cortex. The wall of the cavity is thinned.

indicating a liquid-filled lesion (fig. 2). A discontinuity in the lateral part of the calcaneus was noted, further suggesting the possibility of microfracture. MRI showed a low signal on the T1-weighted scan and a bright signal on T2. Routine hematology and biochemistry results were normal.

In April 1997 we decided to operate under endoscopy with curettage and bone grafting with autogenous bone harvested from the iliac crest.

Operative technique

The operation was performed under general anesthesia, with a pneumatic tourniquet at the thigh. After skin preparation and draping, a thin trocar with a pointed coaxial mandrel was used to perforate the bone cortex. A 1-cm incision was made on the lateral aspect of the calcaneus, and a cannulated needle was inserted under fluoroscopy. The cortex over the cyst was fenestrated using the endoscope. A 1.5-mm diameter endoscope was introduced into the bone cavity. Another incision was then made 3 cm distal to the first incision, and the cortex was fenestrated in the

same way. A small curette was then inserted into the cavity, which was found to be filled with serous fluid stained by hemorrhage. The fluid was evacuated by aspiration with endoscopic assistance and was sent for histological examination. Thorough curettage of the walls of the cyst was performed under endoscopic visualization, using small curettes and a minishaver system (fig. 3). The diameter of the minishaver was 2.5 mm. Portals were exchanged to ensure complete visualisation of the interior of the cavity, especially the blind area in the vicinity of the primary endoscopic portal. After thorough removal of the connective tissue membrane, only normal bone was observed lining the cavity. The latter was washed with irrigation. Through a small incision (0.5 cm long), bone marrow was then aspirated from the iliac crest. Autologous cancellous bone from the patient was crushed to obtain a paste which was mixed with the marrow (10 ml). The mixture was then injected under pressure into the bone defect. The volume of marrow-impregnated cancellous bone injected was 50 ml. One stitch was used to close each incision. The time required for surgery was approximately 60 minutes.



Fig. 3. — Intraoperative view with the endoscope and curette (lateral xray).

There were no perioperative complications. Postoperative immobilization in a bulky compression dressing without splinting was prescribed for six days; active mobilization (and use of the foot in

daily activities) was then allowed. The lower limb was kept non-weight-bearing for six weeks and then gradually returned to full weight-bearing. The range of motion of the ankle joint was measured, and the patient was able to walk normally after 2 months.

The biopsy from the lesion was consistent with a simple bone cyst. The cyst was lined by a thin membrane of fibrous tissue with scattered mononuclear cells or cuboidal cells with an endothelial appearance.

Long-term follow-up

The patient was reviewed clinically and radiologically at 3.5 and 20 months. Xrays were evaluated using the criteria of Campanacci *et al.* (2). Review radiographs showed new bone formation and remodelling of the lesion. Bone formation was observed 3 months after surgery and remodelling was observed 5 months after surgery. The results of the radiological examination were evaluated according to the amount of new bone formed in the cavity left after curettage. The cyst had healed with narrowing, disappearance of the cystic pattern, and thickening of the cortex within 12 months (fig. 4). There was no recurrence at 2 years.

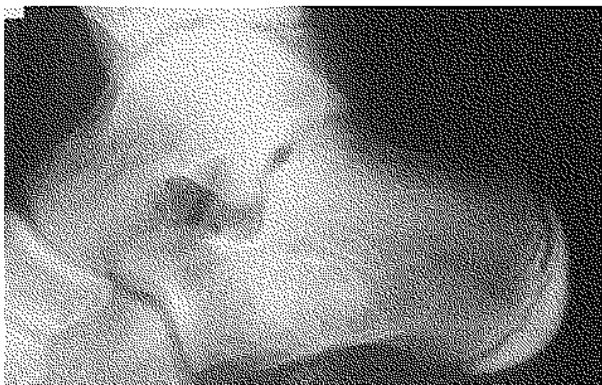


Fig. 4. — Postoperative xray view after six months with cancellous bone graft in place.

DISCUSSION

The treatment of a simple bone cyst of the calcaneus by endoscopically assisted cancellous

bone grafting has not yet been published. However the endoscope is currently used for the diagnosis and treatment of many intraarticular disorders. Endoscopic surgery has been widely applied to the treatment of some bone tumors (6, 7). Mechanical weakening of the cyst has often been pointed out as a disadvantage of curettage without bone grafting. From this point of view, the use of the endoscopic technique preserving the integrity of the cortex and avoiding a large cortical defect is important in maintaining the strength of the affected bone. Endoscopic curettage is advantageous, as it allows for complete curettage even through small portals. Because of the minimal surgical aggression, postoperative rehabilitation is not necessary and early functional recovery is achieved. The cavity of the tumor is large enough for endoscopic visualization; two or more adequate portals can be used.

Several techniques have been used for the treatment of simple bone cysts of the calcaneus. Open curettage and grafting with corticocancellous autografts or allografts have been advocated for many years; the recurrence rate has been 30% to 40% (2). A few authors have tried to decrease this rate by performing subtotal resections with autograft reconstruction (5). Lokiec *et al.* (3) evaluated percutaneous injection of autogenous bone marrow for the treatment of active simple bone cysts in ten children with cysts of the humerus, femur and tibia. The treatment included percutaneous biopsy, aspiration of fluid and injection of autogenous bone marrow aspirated from the iliac crest. The patients became pain free after two weeks. All cysts showed remodelling and satisfactory healing at 12 to 48 months. Adamsbaum *et al.* (1) used a percutaneous treatment with injection of a fibrosing agent Ethibloc (protein emulsion, alcohol, poppy seed oil and contrast medium) and reported complete healing of two bone cysts without any complications.

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SAMENVATTING

F. BONNEL, F. CANOVAS, P. FAURE. Behandeling van een calcaneaire botkyste door endoscopische curettage en spongiosa injectie.

De auteurs beschrijven het resultaat na 2 jaar van een botkyste in het calcaneum behandeld door endoscopische curettage en injectie van spongiosa. Deze techniek werd nog niet gepubliceerd. Deze techniek, vnl. in het calcaneum vermijdt incisies en letsels aan de cutane zenuwen.

RÉSUMÉ

F. BONNEL, F. CANOVAS, P. FAURE. Traitement d'un kyste osseux solitaire du calcaneum par endoscopie avec injection de tissu osseux spongieux.

Les auteurs rapportent un cas de kyste essentiel du calcaneus traité par curetage et greffe d'os spongieux sous endoscopie, avec un recul de deux ans. Cette technique n'a jamais été publiée pour un kyste essentiel du calcaneus. Le curetage endoscopique d'un kyste essentiel du calcaneus permet, grâce à un abord limité, d'éviter les complications cutanées de la chirurgie du calcaneus.