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May bone cement be used to treat benign aggressive bone tumors of the feet with confidence?

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ABSTRACT

Using bone cement for the reconstruction of defects created after curettage of benign aggressive bone tumors is among acceptable methods. The study aimed to assess the effect of bone cement used in aggressive bone tumors in the feet on the function of the feet. Five patients were reviewed. They were treated between 2004 and 2010. Three cases were female and two male. Their age ranged from 16 to 55 with an average of 34.8. Follow up period ranged from 14 to 86 months with an average of 34. Two cases were giant cell tumor of bone located in calcaneus and 3 were solid variant aneurysmal bone cyst located in talus, navicular and first proximal phalanx. None had any previous treatment. A biopsy was done in all cases. Treatment was curettage, high speed burring (except phalanx case), and filling the cavity with bone cement. The case located in talus recurred and re-operated 1 year later doing the same procedure. Final evaluation included physical examination, X-ray and Maryland Foot Score.

No recurrence was present in the final evaluation. No problems were detected related to bone cement. Maryland Foot Scores ranged 84–100, average of 94. Cement integrity was not disturbed. The procedure is found not to effect foot functions adversely.

1. Introduction

Using bone cement for reconstruction of defects created after curettage of aggressive benign bone tumors is a currently accepted treatment method especially for giant cell tumor of bone. Application of bone cement as an adjuvant not only fills the defect area created after tumor removal but also reduces recurrences significantly [1–5].

The goals of treatment include local tumor control, restoration of function and stability during standing and walking [6].

The musculoskeletal structure of the feet is complicated by multitudinous bone and joints subjected to relatively high forces. Surgeons hesitate to use bone cement when filling tumor cavities in the feet due to concerns including cement breakdown or loosening under tension and thermal injury to joint cartilages. Moreover, benign aggressive bone tumors are rare in the feet and thus the currently available literature has scarce information regarding the use of cement in such cases. This study aims to retrospectively evaluate available cases of benign aggressive bone tumors of the feet treated by curettage, followed by bone cement application thus revealing the surgeons' confidence in the procedure and its effects on foot functions.

2. Material and method

Review of available charts revealed five cases of benign aggressive bone tumors in the feet between 2004 and 2010. Three cases were female and two were male. Mean age was 34.8 (16–55). Mean follow up was 34 months (14–86). All patients were treated by removal of tumor followed by filling the created cavity with bone cement as an adjuvant and filling material. The radiologic criteria for aneurysmal bone cyst were ballooned view on radiography, liquid/liquid levels in MRI lytic lesions surrounded by serious spongious edema. The criteria for giant cell tumors of bone were lytic lesions with little or no sclerotic rim, and hypointensity on T1 and T2 sequences. Biopsy results revealed prediagnose in all cases. Two cases were giant cell tumor of bone, both placed in the calcaneus. Three cases were solid variant aneurysmal bone cysts located in the talus, the navicular bone and the first proximal phalanx. None of the patients had previous treatment for the condition. There was no case of expansion beyond bone. All cases were curettaged and four (exception being the case located in the phalanx) had additionally applied high-speed burr. All cavities were filled with bone cement. No other adjuvant was used. Patients were allowed to weight bear as tolerated immediately. The case located in the talus recurred and

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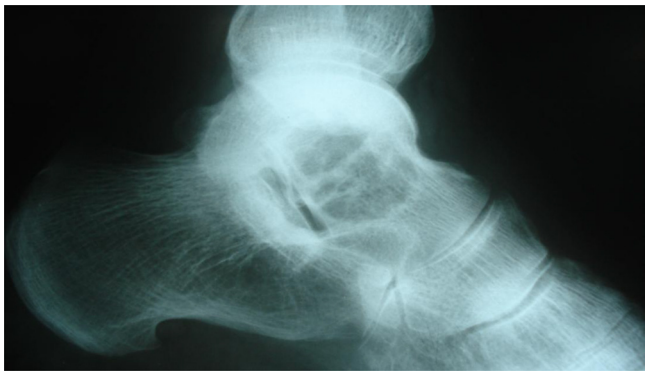

Fig. 1. Preoperative lateral X-ray view of aneurysmal bone cyst of talus.

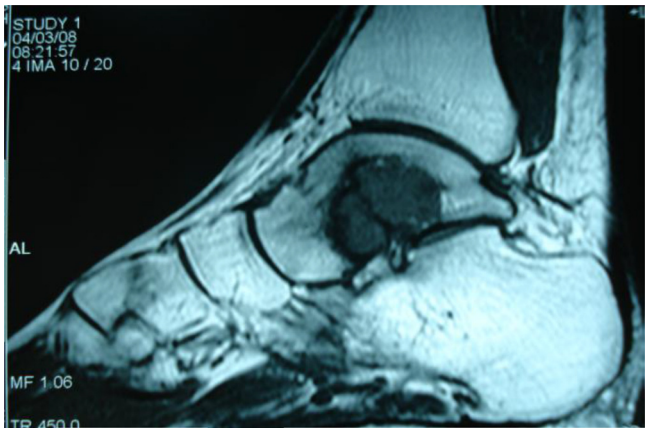

Fig. 2. Preoperative saggital T1 MRI section of aneurysmal bone cyst in talus.

was re-operated 1 year after initial operation. The bone cement was removed, curettaged, high-speed burred, and followed by cementing. Final evaluation in all cases was by physical examination and anteroposterior and lateral roentgenograms. Functions of the feet were evaluated according to "Maryland Foot Score" (Figs. 1–11).

3. Results

Final evaluation revealed no recurrences (including the case in the talus which was cemented after recurrence). No problems regarding bone cement stability (fragmentation, etc.) were observed. X-rays revealed no adverse findings. Maryland Foot Score averaged 94 (84–100).

4. Discussion

Local effects of bone cement are well known. Thermal effect is reported to result in tumor necrosis 1 mm of depth beyond bone/cement interface and this effect may even reach up to 2–3 mm [7–9].

Bone cement is used widely as a local adjuvant following curettage in the treatment of benign aggressive bone tumors for its thermal effect. Several articles have reported that this treatment method decreases recurrence [2–5]. Bone cement provides mechanical support when the cavity is filled. This immediate stability allows early mobilization and weight bearing. These advantages usually enable conservation of joints when the lesion is large and close to the joint [1]. Another advantage of bone cement is that it allows early radiologic detection of recurrences owing to its radioopacity [1,2]. Alternatively, some reports discuss that it may result in early degeneration of joint cartilage because of its toxic

Fig. 3. Preoperative coronal T2 MRI section of aneurysmal bone cyst in talus.

Fig. 4. Postoperative X-ray lateral view of talus aneurysmal bone cyst stuffed with bone cement.