MINIMALLY INVASIVE TREATMENT OF A FEMUR BONE CYST WITH PERCUTANEOUS AUTOGENOUS BONE MARROW INJECTION CASE REPORT

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Abstact

The management of a unicameral bone cyst varies from percutaneous needle biopsy, aspiration and local injection of steroids, or demineralized bone matrix, to the more invasive surgical procedures of conventional curettage and grafting or subtotal resection with bone grafting. The best treatment for a unicameral bone cyst is yet to be identified. Better understanding of the pathology will change the management concept. The aim of this treatment is to prevent pathologic fractures, to promote cyst healing, and to avoid cyst recurrence and re-fracture. We present a case in which the management of the bone cyst was local injection of bone marrow. Percutaneous bone marrow injection is an effective method for managing simple bone cysts and it might be considered before the application of more extensive procedures.

Key words: bone cyst, percutaneous needle biopsy, percutaneous bone marrow injection.

Introduction

The nicameral bone cyst is a relatively common lesion of the child's bone. It appears to originate from the growth plate and represents a failure of ossification and remodeling of the metaphyseal bone. Cysts contiguous with the growth plate are classified as active cysts; cysts with bone intervening between the lesion and the growth plate are inactive.

The proximal humerus and the proximal femur account for 90% of cases of unicameral bone cyst.

The failure of metaphyseal remodeling accounts for an increased width of the bone at the site of the cyst, but the diameter is not larger than that of the physis. The cyst is surrounded by a thin rim of bone.

The majority of simple bone cysts (SBC's) is not symptomatic and remains undiagnosed or is discovered by accident. A number of simple bone cysts are only diagnosed after a pathological fracture which occurs as a presenting symptom.

Treatment is only indicated to prevent pathologic fracture of the bone. If the percentage of bone occupied by the cyst is > 85% in both radiographic planes, the risk of fracture is high, and spontaneous healing usually does not occur. The diagnosis is based on characteristic radiography.

The success rate following open procedures has ranged from 55% to 65%.[13]

The remaining 35% to 45% of patients have had recurrence of the cyst, requiring additional open surgical procedures. As a result of the high reoperation rate and considerable morbidity associated with such procedures, alternate methods of treatment have been pursued.[13]

Case presentation

We present a case of a years old boy that was admitted in our department for pain in the region of the upper knee. The diagnosis was established after an x-ray examination was performed. The images are shown below (fig. 1).

The bone cyst was treated with the injection of bone marrow in the operating room, with the patient under general anesthesia and with a sterile technique.

A cystogram was made by placing a gauge bone-marrow needle into the inferior portion of the cyst. The aspiration of the cyst revealed sero-sanguinous fluid and contrast material.

Trepanation of the cyst was then performed by placing a second gauge needle into the most superior portion of the cyst.

Bone marrow was then aspirated from the anterior iliac crest with a gauge spinal needle as showed in the pictures bellow. The amount of bone marrow injected into the cyst was the same as the amount aspirated previously from it. In this case 30 ml of bone marrow was injected into the cyst.

Placing the needles far apart from each other, at the extreme ends of the cyst, is an important technical point. Most of the recurrences develop at the ends of the cyst and may have been related to incomplete filling of the ends of the cyst.[13]

Persistently pulsating bloody fluid should not be encountered with a unicameral bone cyst. If it is, an open biopsy should be done to rule out other neoplastic entities such as an aneurysmal bone cyst or a sarcoma. [13]

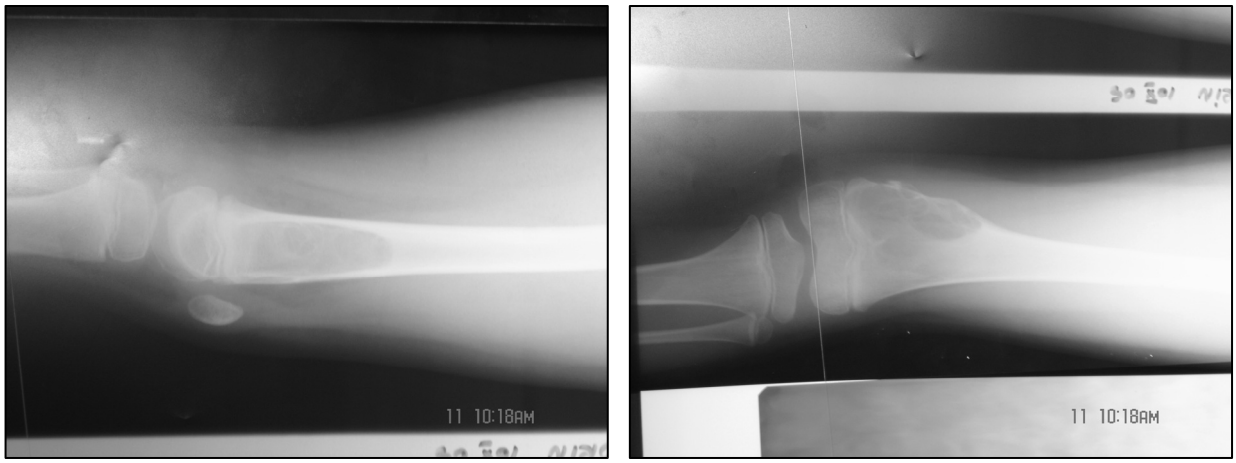

Fig. 1 The radiological aspect of the femur cyst.

If a lesion does not fill completely after the injection of the contrast material, an open biopsy should be performed to confirm the diagnosis. After a fracture has occurred through a cyst, the cyst may be multiloculated and may require the use of more than two needles.[13]

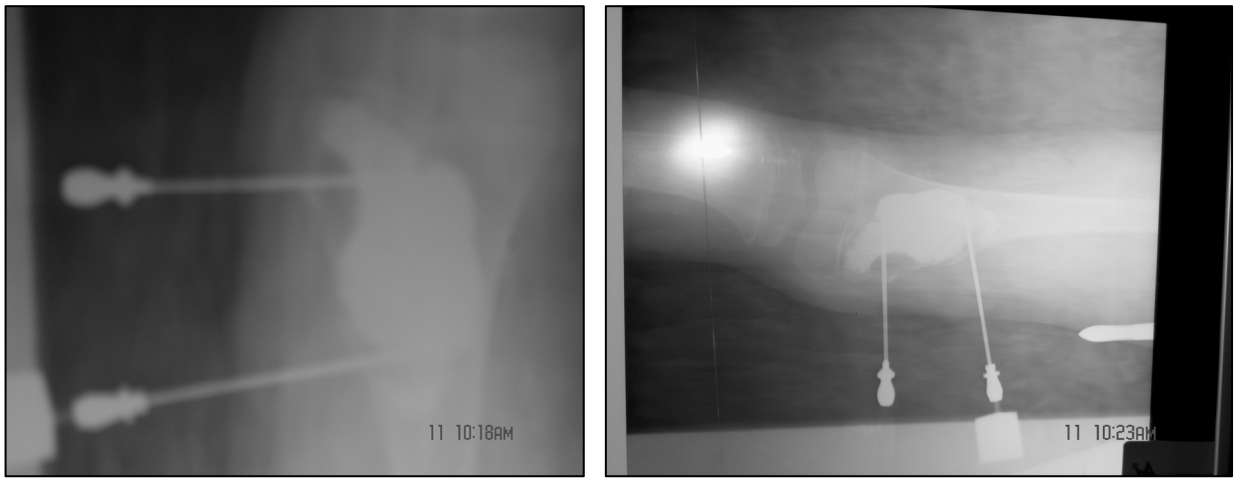

Fig. 2 Percutaneous puncture of the cyst at two ends.

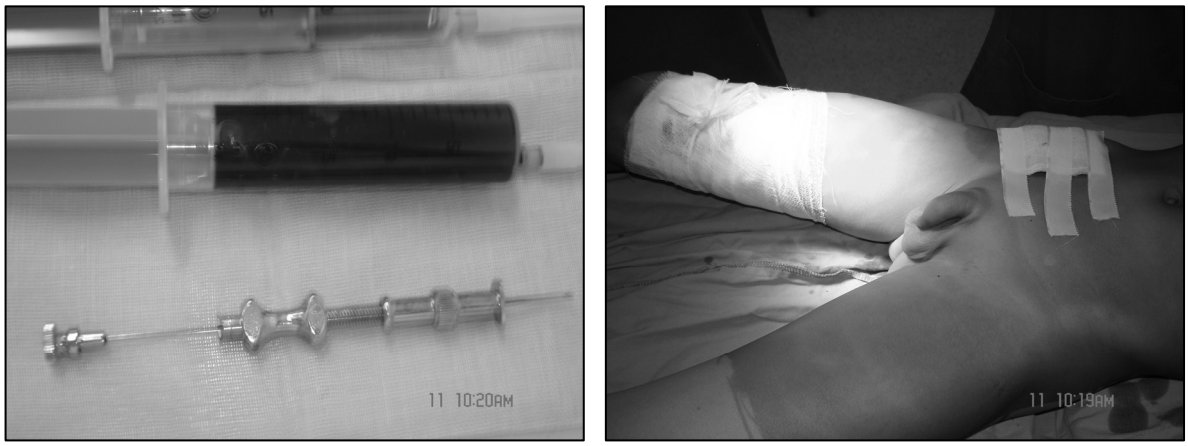

Fig. 3 The instruments used,amount of bone marrow harvested and the site where the bone marrow was harvested from.

Many authors recommend that the patients should be assessed five weeks after the injection; they then be followed radiographically every three months for two years and then every six to twelve months thereafter.

Rougraff et al. [7] reported that successful treatment was achieved with one injection in 78% of patients and with two injections in all patients. They did not observe any fractures of non-enlarging lytic bone defects associated with incomplete bone-healing following treatment. There were no late recurrences of any of the cysts reported by the authors.[7]

Kanellopoulos et al. [2], reported the successful treatment of 19 patients (mean age 10 years) with active unicameral bone cysts using a combination of percutaneous reaming and injection of a mixture of demineralized bone matrix and autologous bone marrow.[2]

The follow-up ranged from 12 to 42 months (mean 28 months). All patients were asymptomatic at the latest follow-up. Two required a second intervention to accomplish complete cyst healing. The radiographic outcome was improved in all patients according to the Neer classification at the latest follow-up. There were no significant complications related to the procedure, nor did any fracture occur after the initiation of the above regimen. [2]

Docquier et al. [4] presented, in their study, the results of this treatment in 21 simple bone cysts with a high risk of fracture. Slow regression of the cyst and progressive healing were obtained in 15 cases (71.4%), whereas no response was noted in 3 cases (14.3%) and recurrence in another 3 (14.3%), after a mean follow-up of 37.1 months.[4]

Yandow et al. [10] reported a study of 12 patients with the following results ; eight (67%) patients demonstrated substantial healing, two (17%) showed partial healing, and two (17%) did not respond to bone marrow therapy.[10]

The advantages of bone marrow injection over the currently practiced methods include a higher success rate with a single injection and earlier healing.[10]

In conclusion the percutaneous injection of autogenous bone marrow is an effective treatment for active unicameral bone cysts.

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