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Preliminary Results of Curettage and Cementation in the Treatment of Fibrous Dysplasia of the Proximal Radius

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Abstract

Introduction: Fibrous dysplasia (FD)is a benign pathological condition usually observed in the first three decades of life. A single bone may be involved either wholly or partially, or multiple bones may be affected, we aimed to use curettage and cementation as a control method of FDfibrous dysplasia of the proximal radius.

Methods: We describe our finding with the treatment of FDfibrous dysplasia of the proximal radius in five patients(four females and, one male), the mean age of 28.6 years (22 to –39 years). The lesions were in the metaphysis extending to the diaphysis. Persistent pain and pain after pathological fracture were the indications for surgical intervention. We used an extensile approach to expose the lesion then extended curettage using a high-speed burr and filling the cavity with bone cement. Functional outcome and radiological findings were monitored on follow-up visits.

Results: The mean follow-up period was 3.2 years (ranged from 2 years to 5 years).There waswereno recurrences and no patient sustained a fracture at the end of the filling cement. At the time of the last follow-up, all patients have excellent score(mean 27 points) according to the musculoskeletal tumor society scoring system.

Conclusion: Extended curettage and cementation provide a safe and reliable alternative for control of FDfibrous dysplasia of the proximal radius with little morbidity with little risk of recurrence and low incidence of complications.

Keywords: Fibrous dysplasia, Curettage, Cement.

Introduction

Fibrous dysplasia (FD) is a relatively common, benign developmental skeletal disorder accounts for 7% of benign bone tumors. It is usually observed in the first three decades of life but can present at any age. There is no gender dominance. In FD, the medullary canal is replaced and weakened by immature fibrous tissue, resulting in poorly formed trabeculae of immature woven bone and prone to expansion [1, 2, 3, 4]. A single bone (monostotic FD) may be involved either wholly or partially, or multiple (polyostotic FD) bones may be affected. The monostotic form is more common, occurring in75–80%of cases. Usually, bone lesions are distributed throughout the skeleton, including the ribs, craniofacial bones, and appendicular skeleton [3, 5, 6, 7]. The more extensive, aggressive and more often symptomatic lesions are commonly found in polyostotic FD [8, 9] and may be found in association with café-au-lait spots and endocrinopathies (McCune-Albright syndrome) or multiple softtissue myxomas (Mazabraud's syndrome) [3, 10, 11]. Common clinical presentations of FD are swelling and/or deformity of the affected site and pain. Female patients may have an increase in pain or even an increased tendency to fracture during and immediately after pregnancy. Frequent fractures and progressive deformity may lead to difficulties with ambulation and impaired mobility [9, 12, 13]. Fractures in bones affected with FD often do not require operations since they generally heal without difficulty. Callus formed at the affected site, however, is dysplastic and patients are thus prone to repeated fractures and deformity. This can be prevented by prolonged immobilization in a cast but may lead to other problems such as joint stiffness and muscle atrophy[3, 14]. Monostotic lesions commonly are asymptomatic, discovered incidentally on radiographs, and can be observed for progression. Treatment is mainly palliative and is focused on managing large symptomatic lesions with pain or at risk of fractures and preventing deformity. There are no medications capable of altering the disease course. Intravenous bisphosphonates may be helpful for the treatment of pain, but there is no clear evidence that they strengthen bone lesions or prevent fractures[15, 16]. Pain and deformity are signs that microfractures are developing in a lesion. Appropriate treatment of FD is often highly individualized and based on patient-specific presentation [17]. Management is designed to prevent pain, limit deformity, and treat pathological fractures[1, 8, 18]. The type and severity of the complications, therefore, depend on the location and extent of the lesion[5, 9]. Curettage and bone grafting have been used to replace the dysplastic fibro-osseous tissue with normal bone. Instead of creeping substitution with healthy normal bone, the cancellous and

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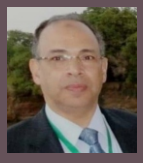
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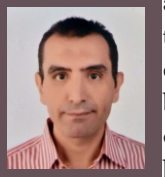
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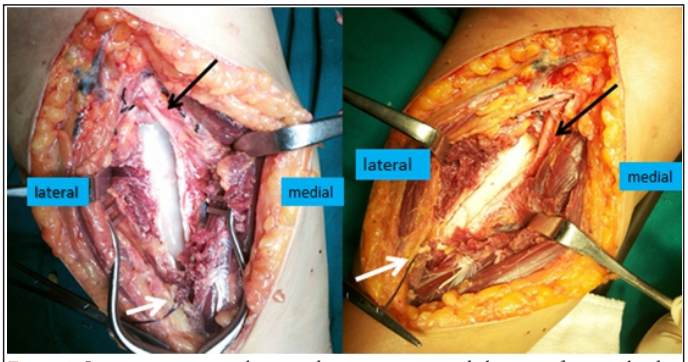

Figure 1: Intraoperative image showing adequate curettage and cleansing of proximal radius fibrous dysplasia lesion (left). Filling of the resultant cavity with bone cement (right), biceps tendon (black arrow), and insertion of pronator teres muscle (white arrow) was cut to give adequate exposure of the lesion.

Figure 2: (a-d) Pre-operative X-ray (a and , b) of proximal radius fibrous dysplasia lesion (left). Post-operative follow-up X-ray (c and, d) after three3 years (right).

occasionally cortical bone grafts are completely replaced with dysplastic woven bone. Cortical strut grafts have a slower rate of incorporation and are beneficial as a structural support. However, cancellous and strut grafts with and without implants are not always successful and are associated with a high rate of recurrence[8, 9, 18, 19]. Intramedullary rods are generally preferred for the management of fractures and deformity in the lower extremities, but they are prone to fatigue failure[19]. The use of cortical autografts and allografts has likewise been employed[20, 21]. Vascularized bone grafts which promote early remodeling and hypertrophy have been used to bridge large skeletal defects[22]. Intralesional curettage and the use of adjuvants to reduce the risk of recurrence arethe treatment of choice for giant cell tumor.Adjuvants presumably remove the tumor cells which remain after curettage due to their thermal (liquid nitrogen and cement) or chemical (phenol, hydrogenperoxide, and alcohol) effects. Cement allows early diagnosis of local recurrence so further intervention can be done, avoiding resection and reconstruction[23]. Gitelis et al.confirmed that it is more difficult to see recurrences when a bone graft had been used[24]. Effective curettage is the most important step in the treatment of aneurysmal bone cyst. Adjuvants should be included. Better ability to detect recurrence with the use of bone cement[25]. We evaluated five patients with FD of the proximal radius in whom surgical intervention was indicateddue to progressive disease and persistent pain. In all patients, we used a bone cement to fill the cavity after aggressive curettage of the lesion.

Patients and Methods

Fivepatients operated at Menoufia University Hospitals between 2012 and 2015 (fourfemales andone male), the mean age was 28.6 years (22–39 years), were included in this report after written informed consent of all patients. All had FD in the proximal radius. Persistent pain was associated in all lesions, with no initial primary treatment by curettage and grafting in any patient. One patient sustained pathological fracture healed in a splint before the intervention.

Operative Technique

We used an extensile approach to expose the affected segment of bone and window is planned corresponding to the length of the lesion to allow visualization of the entire tumor cavity after curettage is achieved; the cavityis deepened with high-speed burrs. Curettage was considered to be complete when the medullary cavity was completely clear of dysplastic bone and only a thin shell of cortex remained, Fig. 1. The meanlength of the lesions was12 cm ranged from 10 cm to 15 cm and the cavity was filled with bone cement. No metal augmentation was used depending on that the radius is a non-weight-bearing bone. Movement of the upper limb was encouraged early after a period of immobilization for about 4weeks. Thiswas supervised in the outpatient clinic during the follow-up visits. The mean follow-up period was 3.2 yearsranged from 2to 5 years. Clinical evaluation of the function of the hand and upper limb was carried out using the musculoskeletal tumor society (MSTS) system assigns numerical values (0–5) to each of six categories. For the upper limb, these are pain, function, emotional acceptance, lifting ability, hand positioning, and dexterity[26]. Radiography was used to detect any fracture or recurrence, Fig. 2.

Results

Functional evaluation was done on follow-up visits, rapid improvement in patient scores was observed. Functional results were excellent in all patients with mean MSTS score 27 points. Four patients regained a complete range of motion of the shoulder and forearm within 6weeks and maintained their score until the last visit before the study was held.Only one patient hasflexion deformity about 10°, without affection of the patient activities. There were no recurrences and no fractures at the proximal or distal end of cement.

Conclusions

FD is a benign condition characterized histologically by poorly orientated osseous trabeculae weakened by replacement with fibrous tissue. Not all the lesions require surgical intervention, and most of those in the upper limb are amenable to non-surgical management[27]. Persistence of pain, progression of the lesion, and pain after a healed pathological fracture are indications for surgical intervention[11]. Due to pain, surgical intervention was chosen to aim to ensure adequate clearance, keeping of bony continuity, and maintenance of limb function. Although small focal sites may be treated successfully using cancellous bone grafts after curettage, local recurrence remains a problem. Cancellous bone grafts are dependent on the local healing response for their remodeling by creeping substitution involves resorption of the bone graft and replacement with newlyformed host bone. In FD, cancellous bone grafts undergo resorption and replacement with the same type of poorlyformed woven bone so that curettage and cancellous bone grafting do not prevent recurrence and may lead to fracture and deformity. Even aggressive extraperiosteal resection may not eliminate these problems[28]. Unlike

cancellous bone grafts, vascular grafts are unaffected by the dysplastic process. Remodeling of the graft and incorporation are independent of the local dysplastic tissue and depend on the immediate restoration of the vascular supply after anastomosis[14, 28, 29]. In a study by Guille et al. examining curettage and grafting in FD of the proximal femur found that the disease was not eradicated in any femur, no lesion decreased in size after curettage and bone grafting, and all grafts were resorbed[8]. Stephenson et al. noted that curettage and bone grafting for upper extremity lesions led to a high number of satisfactory results[27]. Intramedullary fixation is very useful for the long bones. Curetting the lesion and allograft bone grafting may be considered if the lesion is accessible[8]. Due tounpredictable clinical course of FD and the successful results in the treatment of giant cell tumor by curettage, we assumed thataggressive extended curettage using high-speed burr and filling the cavity with bone cement may provide adequate control of disease process with avoidance of the morbidity of bone graft harvesting, especially vascularized one. We found that this technique has advantages providing immediate and reliable structural support and sufficient stability to allow early mobilization with less morbidity, alsocement can act as a local adjuvant; mechanical support; and, to allowearlier detection of recurrence. No internal fixation was required and early restoration of function was obtained after4weeks of immobilization. We suggest that if surgical intervention is considered for FD of the proximal radius with partial affection; curettage, and bone cement, allows satisfactory restoration of the limb function within a short period of time.

Conclusions

Extended curettage and cementation provide a safe and reliable alternative for control of FD of the proximal radius with little morbidity with little risk of recurrence and low incidence of complications.

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