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Research Paper

Enchondroma of the Hand: Result of Surgery Curettage and Grafting and Possible Factors Affecting the Outcome
手部內生性軟骨瘤 - 外科刮除術的結果和可能影響結果的因素

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ABSTRACT

A retrospective review for enchondroma in the hand which had undergone operative treatment is presented. Twenty patients were treated operatively over a 10-year period. A total of 70% of the patients presented with pathological fracture. Enchondromas were most commonly located in the little finger (65%) and proximal phalange (60%). Enchondromas presented with pathological fractures and were treated definitively after the fracture had healed, except for one patient with open reduction, internal fixation of fracture, and bone grafting. All 20 patients underwent curettage of the enchondroma. In the same operative occasion, 16 patients received bone grafting, three patients received bone substitutes, and one had received bone cement. Fourteen (70%) of the patients suffered no major postoperative complications. Postoperative stiffness was encountered in seven patients. A secondary operation for relief of postoperative stiffness was performed in three patients. Factors were assessed for their risk of resulting in postoperative stiffness and occurrence of secondary operation. Factors included sex, age, pathological fracture, location of lesion, and preoperative stiffness. Only preoperative stiffness was a statistically significant risk factor contributing to postoperative stiffness and occurrence of a secondary operation.

中 文 摘 要

這是一個關於用外科刮除術來治療手部內生性軟骨瘤的回顧性研究。在10年內有20例患者接受手術治療。當中70%病例呈現病理性骨折。內生性軟骨瘤最常是位於小指(65%)和近端指骨(60%)。除了一個接受了開放性復位、內固定和自體骨移植的病例之外,所有呈現病理性骨折的病例都是在骨折愈合後才進行骨瘤治療。所有20名患者都接受了經歷了外科刮除術。當中16例接受了骨移植,3例接受了人工骨,1例接受了骨水泥。十四例(70%)沒有重大術後併發症。7例出現術後關節僵硬,當中 3例因而要進行第二次手術。我們評估了可能導致術後僵硬和需要進行第二次手術的各樣風險因素,包括性別、年齡、骨瘤的位置和術前的關節僵硬程度等。我們發現只有術前的關節僵硬程度是達到統計學上意義的風險因素。

Introduction

Chondroma is the second most common benign bone tumor following osteochondroma. A total of 13.4% of benign tumours are chondromas according to the Mayo clinic series.[1] Chondromas are benign tumours from cartilage origin,[2] composed of mature hyaline cartilage. Chondromas are further classified according to the location with reference to bones. Chondromal lesions which are centrally located in the bone are called enchondromas. Chondromal lesions which are more eccentric and lead to bulging of the adjacent periosteum are called periosteal chondromas. Chondromas can also be located outside of bones in the soft tissue. Enchondromas can be solitary or multiple. Multiple enchondromas are related to failure of normal endochondral ossification, and lead to the production of cartilaginous masses. For solitary enhcondromas, 55% were diagnosed in the 2nd to 4th decades of life.[2] The age of presentation before the 2nd decade of life is younger in multiple

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enchondroma cases. The most common location of enchondromas is in the hand. In Dahlin's series,[2] 124 of 290 enchondromas (43%) were located in the hand, followed by the femur and humerus. Enchondromas are slow-growing tumours. They are often asymptomatic and diagnosed incidentally. However, some enchondromas are diagnosed with initial presentation of pain after minor trauma which results in a pathological fracture.

Curettage and bone grafting have been the conventional methods of treatment. Other treatment methods include curettage and filling of bone substitute, cementation, and additional chemical treatment. Results from surgery are usually good and the recurrence rate is low (2–15%).[3] Postoperative stiffness and deformity may be encountered. Various factors that have affected the outcome of surgery have been previously discussed. In this study, we review our local experience and identify possible factors affecting the outcome of surgery.

Materials and methods

A retrospective review of patients with an enchondroma of the hand (confirmed by histology) receiving surgery from 2001 to 2012 was completed. Outcomes analysed include the postoperative clinical range of motion and radiological trabecular remodelling. Outcomes were analysed based on the final range of motion of fingers and the need for additional subsequent surgery.

The average follow-up duration was 22.7 months, ranging from 8 months to 72 months. Potential factors affecting outcome were identified for analysis. These factors include pathological fracture, preoperative finger stiffness, location of lesion in the little finger, older age, sex, and location of the lesion in the proximal phalange.

Results

Findings of presentation (Figure 1)

In this study period, 20 cases were reviewed. Ten were men and 10 were women. There was no sex predilection. The average age of the group was 42.1 years (16–77 years). A total of 55% of the patients were diagnosed in the 3rd and 4th decade of life.

The left hand was involved in 11 patients. The most common digit involved was the little finger (13 cases, 65%) followed by the ring finger (three cases, 15%) and middle finger (two cases, 10%). The index finger and thumb were each involved in one case. The proximal phalange was the most common location (12 cases, 60%), followed by the metacarpal bone (four cases, 20%). For lesions that were located in the middle phalange and distal phalange there were two cases for each location.

With regards to initial presentation, 14 (70%) patients had presented with pathological fractures after a variety of trauma. One patient was diagnosed from incidental findings after investigation of vague hand pain. Five patients had presented with the presence of local swelling over the involved digits. Of these five patients, two had noted progression of the size and two patients had reported the presence of mild pain. Joint stiffness was also present in two cases. For this study, the average duration of symptoms before operation was 22.8 months, ranging from 6 months to 48 months.

Surgical treatment and postoperative outcome

One patient required a primary open reduction and internal fixation of a displaced metacarpal pathological fracture, accompanied with curettage of the endochondroma and bone grafting. All the other 13 patients with an initial presentation of pathological fracture, received surgery after the fracture had healed by conservative treatment. The average duration from fracture to final surgery was 12 months (4–36 months).

Currettage was performed for all 20 cases. Conventional dorsal approach to the phalange and metacarpal were used. Additional bone grafting had been performed in 16 cases with autograft (14 from iliac crest, one from distal radius, and one from olecranon). Instead of grafting, bone substitutes were employed in three patients and cement injection for the remaining one patient.

Additional concomitant surgeries were performed in two cases: open reduction and internal fixation for a displaced metacarpal pathological fracture in one case and extensor tenolysis for preoperative finger stiffness for another case.

Correct preoperative diagnosis of enchondroma was noted in 19 cases (95%). One patient with a lesion in the middle phalanx of the left little finger had been clinically diagnosed as fibrous dysplasia before the operation, but had been treated similarly by curettage and bone grafting. Subsequent histological diagnosis was reviewed as enchondroma.

There were no major complications from surgery in 14 cases. Postoperative finger stiffness was encountered early in five patients. Two patients had complained about donor site pain or related thigh numbness. Wound infection was encountered in one patient and successfully treated with a course of antibiotics. Excluding the case with cement injection, an average duration of 4.2 months (38 months) was required for trabeculae remodelling to appear on radiographs.

At the final review, 12 patients were symptom free (60%). One patient had donor site pain and lateral thigh numbness. Finger stiffness was noted in seven patients, six of them were mild ($< 20^\circ$ difference when compared with contralateral finger total active motion) and one had moderate stiffness ($> 20^\circ$ but $< 40^\circ$ loss). Four out of these seven patients had preoperative stiffness, and three were moderate. A second surgery of tenolysis was performed in three patients for stiffness. Additional capsulotomy was performed in all three settings and removal of the implant in one setting.

Another patient had complaints of swelling and pain at the distal phalanx at 2-years postoperation follow-up. However, the patient then defaulted follow-up in the clinic and definite evidence of recurrence could not be obtained.

Potential factors affecting outcome (Table 1)

Possible factors influencing surgical outcome were assessed. These factors included the presence of a pathological fracture, location of the lesion, age, sex, and preoperative finger stiffness.

Pathological fracture

Fourteen patients presented with pathological fracture, six patients (42.8%) had postoperative finger stiffness at final follow-up, and three patients (21.4%) had to undergo subsequent surgery to improve their range of motion. Among the six patients in the nonfracture group, only one had postoperative stiffness (16.7%) and none required additional surgery. The presence of a pathological fracture seemed to result in a poorer surgical outcome. However, this difference was not statistically significant.

Location of lesion

Of the 13 patients who had the lesion in the little finger, there were five patients (38.5%) with postoperative stiffness and three patients (23.1%) required subsequent surgery. Of the seven patients who had lesions in the other fingers, two patients (28.6%) had postoperative stiffness and none required further surgery. Lesions