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Ossifying Fibroma of Rib: A Case Report and Literature Review

Weijin Miao [1, 2], Xianmao Liu [1, 2], Wen Wang [2, *]

[1] Jinan University, Guangzhou, Guangdong 510632, China
[2] Guangzhou Red Cross Hospital of Jinan University, Guangzhou, Guangdong 510220, China
*** Corresponding author:** Wen Wang (Email: warrenwangrch@outlook.com)

Abstract: Ossifying fibroma (OF) is a rare benign bone marrow tissue mesenchymal tumour. It replaces normal bone with fibrous tissue. This type of lesion is commonly observed in children and young people. The craniofacial bone is the most frequently affected site, with rib OF occurring at a relatively low frequency. This article presents a case of ossifying fibroma of the rib, confirmed by surgical and pathological examination, and combines a literature analysis to improve the diagnosis and differential diagnosis of this disease.

Keywords: Ossifying Fibroma; Bone Tumor; Rib; Case Report; Rare; Literature Review; Craniofacial Bone.

1. Introduction

Ossifying fibroma (OF) is a rare benign bone tumor [1-3], characterized by replacement of normal bone by varying amounts of fibrous connective tissue and varying proportions of bone and cement [1]. This lesion is frequently observed in the jawbone, particularly in the mandible [4, 5], it has also been reported in the paranasal sinuses, frontal, ethmoid, and sphenoid bones, and orbital roof. The pathogenesis of tumors is currently unclear, and trauma is thought to be a contributing factor. It is also thought that developmental abnormalities may be related to the tumors, as these tumors typically occur in the membranous bone and in young patients [6]. OF is a benign tumor that grows slowly and has a clear border with adjacent bone. OF is initially asymptomatic and may be discovered unexpecOssifying fibroma, bone tumor, rib, case report, rare, literature review, craniofacial bonetedly on radiography. However, as the size of the lesion increases, it can cause a number of complications, including swelling, facial asymmetry, sensory abnormalities, and pain due to the destruction of the normal structure of the lower jaw [1]. Clinical manifestations, computed tomography (CT) and magnetic resonance imaging (MRI) scans, and pathologic findings collectively aid in the diagnosis of osteofibrous dysplasia (OF).[3]. OF usually requires surgical resection and subsequent treatment, although it is a benign tumor with a slow development rate. It is important to note that the risk of tumor recurrence is significantly increased if the tumor is not completely eradicated [2, 7].

2. Case Report

In March 2013, a 35-year-old male patient sought medical attention from our department after a physical examination revealed bone destruction in the twelfth posterior rib on the right side. The patient had no associated sensory abnormalities or pain symptoms, and no abnormalities were found on physical examination.

An X-ray film shows that there are damage and alteration of the right thoracic 12th rib of unclear nature. A CT scan shows a lesion in the right thoracic 12th rib, initially benign bone tumor not excluded, with erosive or low-grade malignant not excluded. The MRI results show that the twelfth rib on the right side is locally swollen, with an area of approximately 0.9 × 2.5cm, with uneven internal signal, mainly low signal in T1 and T2, with patchy lower signal visible inside. On enhanced scan, there is mild uneven enhancement within the area, and no clear soft tissue mass is found around it (figure 1).

Figure 1. MR images of patients: with a range of approximately 0.9 × 2.5cm, with uneven internal signal, mainly low signal in T1 and T2, with patchy lower signal visible inside. On enhanced scan, there is mild uneven enhancement within the area.

During the surgery, a bone destruction lesion was found in the middle segment of the right 12th posterior rib. We completely removed the 12th posterior rib and underwent pathological examination. The pathological examination results showed that the bone trabecular malformation in the rib tumor tissue presented as a fishhook shape, with some areas attached to osteoblasts on the surface, irregular fibrous tissue proliferation and collagen fiber formation between the bone trabeculae, some bone marrow cavities filled with fatty

tissue, and the surrounding lamellar bone differentiated and matured; the lesion is consistent with ossifying fibroma (Figure 2). No clinical or radiologic evidence of recurrence was observed during 10 years of follow-up.

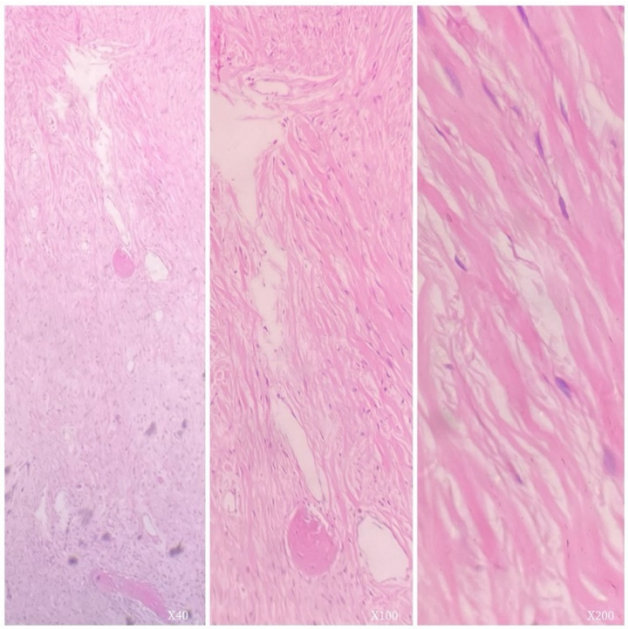

Figure 2. Pathological pictures of the patient: The rib tumor tissue has a fishhook-shaped bone trabecular malformation with some areas attached to osteoblasts on the surface. Fibrous tissue proliferation and irregular collagen fiber formation between the trabeculae are observed, and some marrow spaces are filled with adipose tissue. The surrounding lamellar bone differentiation is mature (HE staining X40, X100, X200)

3. Discussion

Ossifying fibroma (OF)was first proposed in 1927[8], OF is a rare benign fibrous bone lesion[9], it can be further divided into cement ossifying fibroma (COF), juvenile psamomacho ossifying fibroma (JPOF), and juvenile trabecular ossifying fibroma (JTOF)[2]. COF is a rare benign tumor that grows slowly. It peaks in incidence in the third and fourth decades of life and is more common in women (1:5). It usually affects only the mandible and maxilla[10]. The main treatment for COF is surgical resection, with lower recurrence rates[11]. JTOF is another rare tumor with no gender difference that occurs mainly in children between 8 and 12 years of age. It mainly affects the maxilla and mandible. JPOF is a rare tumor with a median age of 16 to 33 years old. It occurs primarily in the extracranial craniofacial bones. Both JTOF and JPOF are benign and usually require complete surgical resection for treatment. However, the recurrence rate is higher than that of COF[12, 13].

The etiology of ossifying fibroma is still unclear, but some scholars believe that it develops from multipotent mesenchymal cells in the periodontal ligament of teeth[1]. In addition, developmental abnormalities and trauma are considered to be initiating factors for ossifying fibroma[1, 14, 15]. The patient in this case report has no history of trauma or developmental abnormalities. In clinical practice, most OF have no symptoms and are usually discovered unexpectedly during physical examination. However, as it gradually increases, it may cause swelling, facial asymmetry, sensory abnormalities, and pain[1]. It grows slowly but is occasionally invasive, especially in its juvenile subtype. OF often affects the craniofacial bones, particularly the lower frontal bone[8, 16].

CT and MRI imaging examinations studies are helpful in the diagnosis of OF[11, 17]. However, the definitive diagnosis of OF must be made by histopathologic examination of the excised biopsy specimen[18]. The differential diagnosis of ossifying fibroma includes: fibrous dysplasia, bone dysplasia (early), odontogenic cyst, periapical granuloma, traumatic bone, glioblastic dysplasia, calcified epithelial odontogenic tumor (Pindborg tumor), coagulative osteoarthritis, bone dysplasia (late), or osteocytoma[8, 19].

OF usually requires surgical treatment, ranging from curettage and resection to more extensive resection. The choice of surgical approach depends on the type, size and location of the lesion. The most important consideration is whether the margins of the specimen are sufficiently removed during surgery to reduce the risk of residual tumor and subsequent disease recurrence. Surgical curettage or resection is the preferred treatment for small ossifying fibromas because it has good margins and can usually remove the lesion completely. If the tumor is large and damaging a large amount of bone, surgical resection and bone grafting may be required[19]. According to literature reports, the recurrence rate of OF varies widely[4, 20]. Factors that influence the recurrence rate of OF include the size and maturity of the lesion, the patient's age, the type of surgical treatment, and the follow-up period. The risk of recurrence is highest after curettage surgery, while the risk of recurrence is lowest after extensive resection surgery[21]. Our patient showed no clinical or radiological evidence of recurrence during the 10-year postoperative follow-up period.

4. Conclusion

Ossifying fibroma is a benign tumor that is common in the lower frontal bone and rare in the ribs. Clinicians must be aware of this particular case to avoid missed diagnosis, misdiagnosis, or incorrect treatment.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

We have obtained written informed consent from the patient for the publication of the report and accompanying images. And all authors and the patient agreed to publish.

Availability of data and materials

All the data and materials of this case is contained within the manuscript.

Competing interests

The authors declare no competing interests.

Author contributions

Weijin Miao wrote the main manuscript text. Xianmao Liu prepared Figs 1. 2. Wen Wang was responsible for editing and reviewing the manuscript. All authors reviewed the manuscript.

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