

Radiographic Overview of the Phalangeal Enchondroma: A Case Report

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Abstract: *Enchondroma is the most common benign tumor of the hand. These tumors are usually asymptomatic and are found as incidental radiographic findings. The imaging was similar with giant cell tumor. In some cases, these tumors can cause pain to pathological fractures, requiring conservative management or surgical excision. This case report aimed to report the radiographic features of a patient with phalangeal enchondroma. A 68-year-old female patient came with a lump on her left wrist which was accompanied by pain. The patient had a history of falling and spraining her hand about five years ago. Since then, a lump has appeared which enlarged progressively. The lump has a firm consistency, regular surface, well-defined border, immobile, and tender. Hand radiographic examination revealed expansive lytic lesion with narrow transitional zone with amorphous calcified matrix inside, endosteal scalloping, no periosteal reaction seen on metadiaphyse metacarpal V of left manus, suggesting an enchondroma with differential diagnosis giant cell tumor (GCT). No pathological fractures were found. The patient then underwent excision because there were symptoms and histopathological results confirmed the enchondroma. Radiographic examination is chosen for enchondroma because it can show an osteolytic appearance, is inexpensive, fast, and easy to access.*

Keywords: enchondroma, radiography, phalanx

1. Introduction

Enchondroma is a benign tumor of hyaline cartilage. The incidence of enchondroma is around 2.1 - 2.8%.¹ Enchondroma accounts for about 3 percent of all bone tumors and 13 percent of benign bone tumors.² Enchondroma most often attacks the metaphysics of the long bones, small bones in the hands and feet, and followed by the femur and humerus. This tumor is the most frequent benign tumor on the hand.³ Enchondroma tumors generally begin to grow in childhood from residual cartilage of growth plates or chondrocytes that proliferate and enlarge, then stop growing but remain during adulthood. Excessive enlargement of the lesion can lead to pathological fractures.^{4,5}

Enchondroma most often appears between the first and fourth decades of life, and is usually found as an incidental radiographic find. The initial supporting examination is by radiography, and the definitive diagnosis is established by histopathological examination. The radiographic picture of enchondroma is similar to giant cell tumor (GCT), which is a benign bone tumor that affects young adult patients whose bones have matured.⁵

In some cases, enchondroma can be symptomatic such as causing pain to pathological fractures, requiring conservative management as well as surgical excision.⁶ Akoh et al and Muller et al did not recommend surgery in asymptomatic enchondroma patients due to greater surgical

morbidity, and suggested routine radiographic surveillance on enchondroma.^{1, 7} Obtaining radiographic images of tumors is important to distinguish enchondroma from malignant tumors, thus preventing unnecessary surgery from being performed. This case report aimed to report radiographic images of phalangeal enchondroma patients.

2. Case Report

A 68-year-old female presented with a complaint of a lump in her left wrist. The patient had a history of sprains five years ago. Since then, a lump had appeared that was originally small became enlarged. Complaints were accompanied by pain in the left wrist, with a pain scale 2 out of 10. The pain appeared intermittently, aggravated during activities and improved at rest. History of chronic diseases, allergies, or similar complaints in the family were refuted. Vital signs were within normal limits. Examination of the left hand revealed a lump with solid consistency, flat surface, firmly bordered, immobile, and with tenderness.

The patient was then subjected to radiographic examination of anteroposterior and oblique manus (Figure 1). Radiographic results showed expansive lytic lesions with narrow transitional zones with calcified matrix amorphous in them, endosteal scalloping, no periosteal reaction in metadiaphyse metacarpal V of left hand effect of primary benign bone tumors, with differential diagnosis of enchondroma and giant cell tumor (GCT). There was no pathological fracture in the bones.



Figure 1: Anteroposterior and oblique radiograph of the left hand. There were expansive lytic lesions with narrow transitional zone with calcified matrix amorph in them, endosteal scalloping, no periosteal reaction in metadiaphyse metacarpal V of left hand

Based on the results of radiography, the patient was planned for tumor excision surgery. The patient underwent a chest X - ray, a complete blood count, and a SARS - CoV2 PCR in preparation for surgery. Due to the chest X - ray results were found cardiomegaly, echocardiography was performed with mitral regurgitation results and mild tricuspid regurgitation. The patient was allowed to undergo surgery. The excised tissue was then sent for histopathological examination describing pieces of tissue consisting of tumor cells containing an extensive (hypocellular) hyaline cartilage matrix, which forms a multinodular structure (lobule), enclosed by bone and fibrous tissue (Figure 2). Tumor cells were immersed in lacunar space, a small spherical nucleus, chromatin condensed (lymphocyte - like) (Figure 3). Part of the lobule is separated by a thin fibrous septa accompanied by a small blood vessel and endochondral ossification (Figure 4). In some parts of the tumor, appear more hypercellular areas, tumor cells with a mild - moderate core atypia picture, open chromatin, with small nuclei children, some appear binucleated (Figure 5). The result of histomorphology examination were indicating an enchondroma.

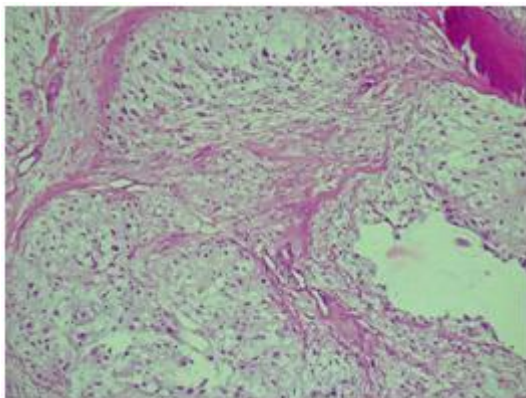


Figure 2: Fibrous tissue, bone, hyaline cartilage matrix

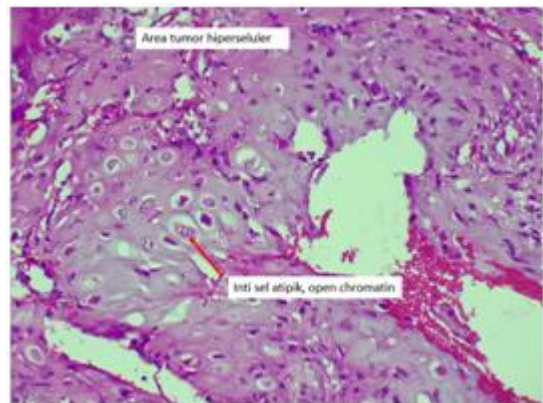


Figure 3: Tumor cells immersed in lacunar space, small spherical nuclei, chromatin condensed (lymphocyte - like)

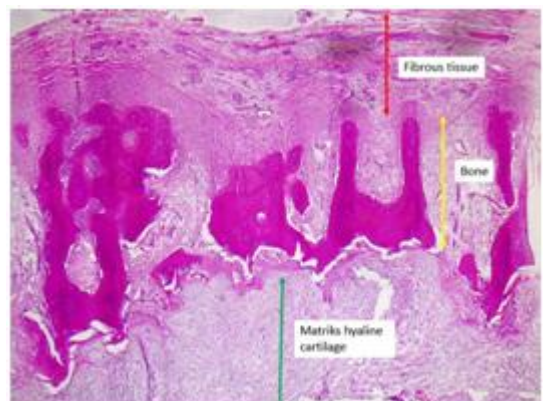


Figure 4: Endochondral ossification

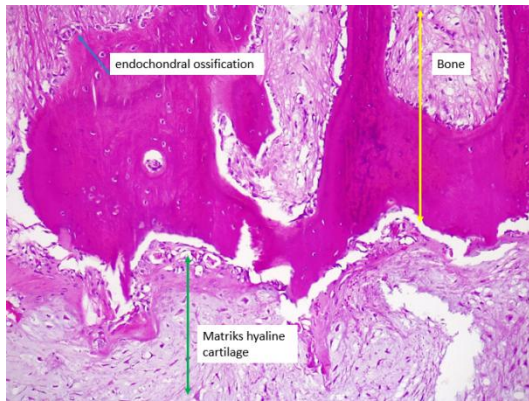


Figure 5: Hypercellular tumor area, atypical cell nucleus, open chromatin

3. Discussion

Radiological examinations that can be performed for enchondroma include radiography, CT - Scan, and MRI. Radiography is preferred as an initial examination because it is the cheapest, fastest, and easy access compared to the other two modalities.^{1,7}

Radiographically, enchondroma has a varied appearance based on the location and extent of tumor calcification, and may resemble a medullary bone infarction. Enchondroma usually appears as a pronounced solitary defect in the area of the metaphysical bone, especially in the long bone. Enchondroma can be central (58%), eccentric (19%), multiple (21%), polycentric (11%) and giant (3%). A rare variant is enchondroma protuberans, involving lesions that protrude from the side of the affected bone and can resemble other bone tumors. The lesion located in the center usually appears as a firmly delimited area with an expanding cortex around it. Juxtacortical lesions are eccentric and are located below the periosteum in firmly delimited cortical defects. A small, focal calcification of flocculants can be seen inside the tumor.⁸

Radiographically visible calcifications appear as fine spots and may indicate bone infarction. Calcification can take the form of punctate to ring. Larger lesions can cause endosteal scalloping along with the expansion and thinning of the cortex. Highly calcified lesions can resemble bone or bone island infarctions, while unclassified lesions may appear lytic. The appearance of cortical depletion, expansion, or damage to the cortex or the involvement of soft tissues already signals the presence of advanced lesions or chondrosarcoma.⁹⁻¹¹

In general, the radiographic picture of enchondroma is a lytic lesion with a narrow transitional zone, a typical chondroid matrix of stippled rings and arcs / popcorn type appearance, no periosteal reactions or cortex disruption, and can cause bone expansion, thinning and endosteal scalloping of the cortex. This radiographic picture has several differential diagnoses that are challenging to distinguish. Differential diagnosis of benign osteolytic lesions can be remembered with mnemonic "FEGNOMASHIC" (fibrous dysplasia, enchondroma or eosinophilic granuloma, giant cell tumor, nonossifying fibroma, osteoblastoma, metastases or myeloma, aneurysmal bone cyst, simple bone cyst,

hyperparathyroidism, infection, and chondroblastoma or chondromyxoid fibroma).¹²

The closest differential diagnosis of enchondroma is giant cell tumor (GCT). If enchondroma is a benign bone tumor derived from hyalin cartilage, then GCT derived from mature bone. Giant cell tumors are rare and aggressive benign tumors. About 3 - 5% of all primary bone tumors constitute GCT. The tumor usually develops from the metaphysis of the bone and extends to the epiphysis. Most cases of GCT occur in long bones in the legs and arms. GCT most commonly occurs in young adults when skeletal bone growth has been completed. The exact cause of GCT is still unknown. GCT appears similar to enchondroma in radiography, where it shows lytic lesions with firm boundaries and non - sclerotic margins, so it is necessary to add a differential diagnosis of GCT and enchondroma to the radiographic readings. The difference is that enchondroma is mostly located in the central, while the GCT is mostly eccentric, although not always. The management of GCT and enchondroma is similar, namely with tumor excision. The exact way to distinguish GCT and enchondroma is by histopathological examination.⁵

Other imaging that can be performed for enchondroma are CT - Scan and MRI. Computed tomography (CT) is useful for detecting matrix mineralization and cortex integrity, whereas MRI adds information about aggressive and destructive tumor features. Indicators of potential malignancy in imaging are large tumor size, large unmineralized components, significant depletion of the adjacent cortex, and bone scan activity greater than the superior anterior iliac bone (ASIS). Malignant transformations of the enchondroma are characterized by the progressive destruction of the chondrite matrix by the expansion of non - mineralizing components, or enlarged and pain - related lesions.¹³

Computed tomography (CT) shows local osteolytic lesions with local calcification and scalloping of cortical bones. Magnetic Resonance Imaging (MRI) shows intermediate signal intensity on the T1 sequence and the high signal intensity on the T2 sequence for cartilage - rich areas and the low signal intensity on T1 and T2 sequences for the calcification area. Enchondroma is diagnosed based on histological findings, but asymptomatic typical enchondroma does not require histological examination. In MRI, enchondroma, and chondrosarcoma often appear similar in the initial analysis. Both show a low signal intensity at T1 with a high intensity change in the T2 sequence with a lobular growth pattern. Both show improvement with gadolinium contrasts in peripheral and spatial areas.¹³

Akoh et al and Muller et al did not recommend surgery in asymptomatic enchondroma patients due to greater surgical morbidity, and suggest routine radiographic surveillance on asymptomatic enchondroma. Given the low risk for malignant transformations, surveillance with radiography for stable enchondromas is recommended every 6 months for the first year and then annually for at least three years.¹⁷

4. Conclusion

It has been reported a 68 - year - old female with a lump in the left wrist accompanied by pain. Radiographic examination of revealed expansive lytic lesions with narrow transitional zone and calcified matrix amorph in them, scalloping endosteal, no periosteal reaction in metadiaphyse metacarpal V left hand which was suspected as enchondroma or GCT as differential diagnosis. The patient underwent surgical excision due to the symptoms and histopathological results confirm enchondroma.

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