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Enchondroma of the Proximal Phalanx in an Adolescent - A Case Report of Surgical Management and Functional Outcome

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Abstract

Enchondroma is a benign intramedullary cartilaginous tumor commonly affecting the small bones of the hand. Although usually asymptomatic, it may present with pain, swelling, cortical thinning, deformity, or pathological fracture. We report a case of a 13-year-old male with a gradually increasing swelling over the left fifth digit for three months, associated with mild pain and a history of bicycle fall. Radiographs revealed a well-defined intramedullary lytic lesion involving the proximal phalanx with endosteal scalloping, cortical thinning, and a healing incomplete pathological fracture. MRI demonstrated a 12 × 7 mm cartilaginous lesion with cortical thinning and a uniting pathological fracture,

suggestive of Enchondroma. The patient underwent excisional biopsy, complete intralesional curettage, and autologous cancellous bone grafting from the iliac crest. Histopathology showed predominantly hyaline cartilage with mildly atypical chondrocytes, without pleomorphism, mitosis, or necrosis, confirming Enchondroma. Following two weeks of protection, gradual mobilization and physiotherapy were initiated. At one-month follow-up, satisfactory graft incorporation with resolution of pain and swelling and full finger and joint movements was observed.

Conclusion: Symptomatic Enchondroma with cortical thinning and pathological fracture can be effectively managed with curettage and autologous bone grafting, providing satisfactory healing and preservation of finger function.

Introduction

Enchondroma is a benign intramedullary neoplasm composed of hyaline cartilage and is among the most frequently encountered benign tumors of the small bones of the hand. The phalanges are commonly involved, and lesions may remain clinically silent for a prolonged period. Symptomatic lesions can manifest as localized swelling, pain, deformity, or pathological fracture.

The clinical and radiological appearance of an Enchondroma may overlap with other benign and, less commonly, malignant cartilaginous lesions. Plain radiography generally demonstrates a well-defined medullary lucency with varying degrees of endosteal scalloping and cortical thinning. Magnetic resonance imaging can further delineate the extent and cartilaginous nature of the lesion, particularly when cortical compromise or pathological fracture is suspected.

Management depends on the patient's symptoms, lesion characteristics, structural integrity of the affected bone, and diagnostic certainty. Asymptomatic lesions may be observed, whereas painful lesions, lesions associated with cortical destruction or pathological fracture, and lesions requiring tissue diagnosis are commonly treated surgically. Curettage remains the principal operative treatment, although the need for filling the resultant cavity with bone graft or another substitute remains debated in the literature.

We present an unusual case of an Enchondroma involving the proximal phalanx of the fifth digit in a 13-year-old boy, associated with cortical thinning and a healing pathological fracture. The lesion was treated with excisional biopsy, complete intralesional curettage, and autologous cancellous iliac crest bone grafting, resulting in satisfactory radiological healing and preservation of finger function.

Case Report

A 13-year-old male presented with a progressively increasing swelling involving the left fifth digit for approximately three months. The swelling was associated with mild pain, particularly during finger movement. There was a history of trauma following a fall from a bicycle approximately one month before presentation.

Clinical Examination

Examination revealed an approximately 1 × 1.5 cm oval swelling over the proximal phalanx of the left fifth digit. The swelling was associated with mild local tenderness and a mild angular deformity.

There was no crepitus or abnormal mobility of the proximal phalanx. The overlying skin appeared normal, without erythema, ulceration, or sinus formation. Movements of the metacarpophalangeal and proximal

interphalangeal joints were preserved. The distal neurovascular examination was normal.

Radiological Assessment

Plain radiographs of the left hand demonstrated **a** well-defined intramedullary osteolytic lesion involving the midshaft of the proximal phalanx of the fifth digit. The lesion was associated with endosteal scalloping and thinning of the surrounding cortex.

There was also evidence of a healing incomplete pathological fracture accompanied by mild anteroposterior angular deformity.

MRI demonstrated an approximately 12 × 7 mm intramedullary lesion within the midshaft of the proximal phalanx. The lesion showed a hyper intense cartilaginous appearance on MRI, with associated cortical thinning and a uniting pathological fracture. The radiological findings favored the diagnosis of Enchondroma.

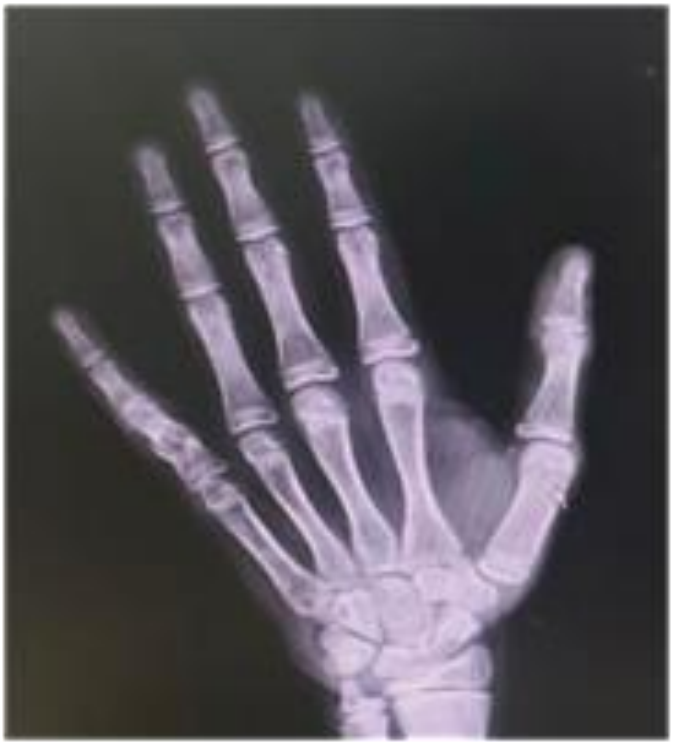

Figure 1

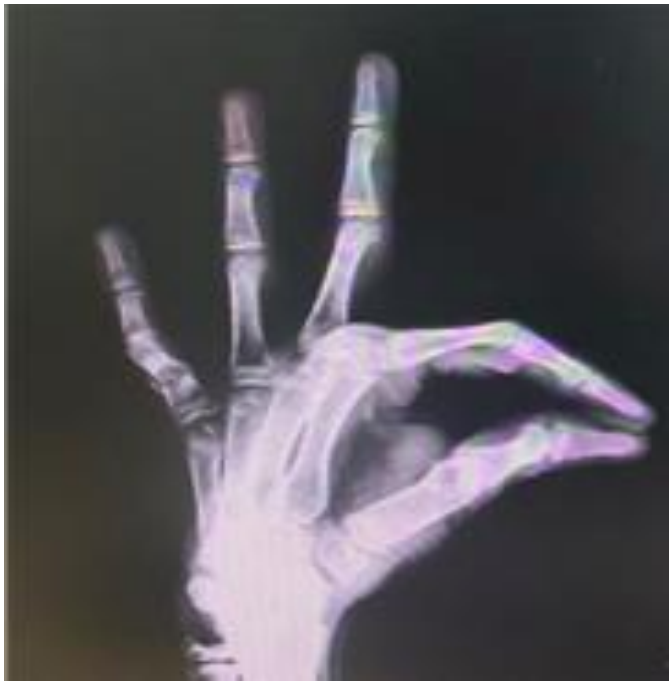

Figure 2

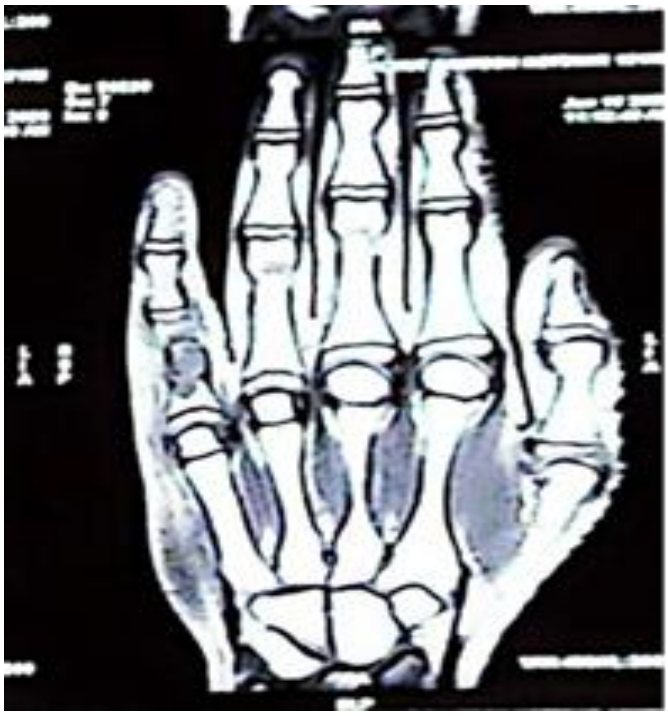

Figure 3

Differential Diagnosis

Based on the patient's age, anatomical location, clinical presentation, and imaging characteristics, the differential diagnosis included:

- Enchondroma

- Chondroblastoma
- Bone cyst
- Giant cell tumor
- Fibrous dysplasia

Histopathological examination was planned to establish the definitive diagnosis.

Management

The decision for operative treatment was based on the presence of pain, functional symptoms, cortical thinning with risk of pathological fracture, and the need for definitive Histopathological diagnosis.

The patient underwent excisional biopsy and complete intralesional curettage with autologous cancellous bone grafting under regional anesthesia.

A dorsal approach was utilized through a curvilinear S-shaped incision over the affected proximal phalanx. After adequate exposure, a cortical window was created to access the intramedullary lesion. The abnormal cartilaginous tissue was thoroughly removed by intralesional curettage.

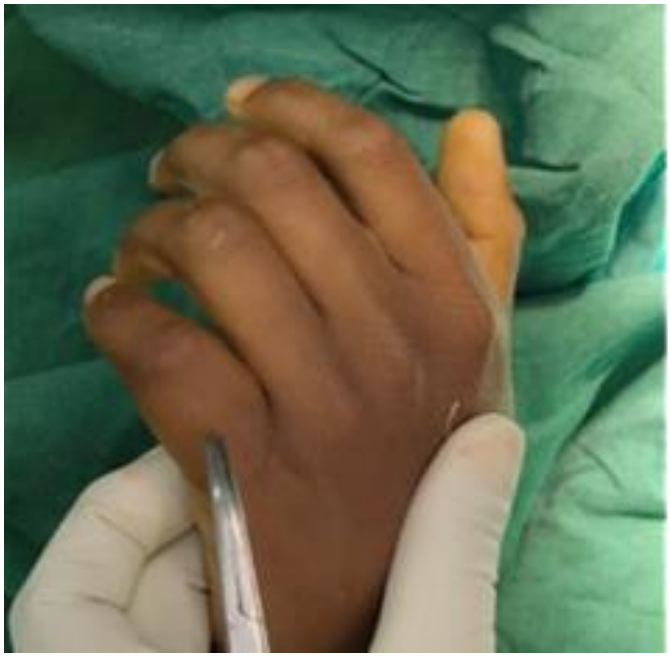

Figure 4

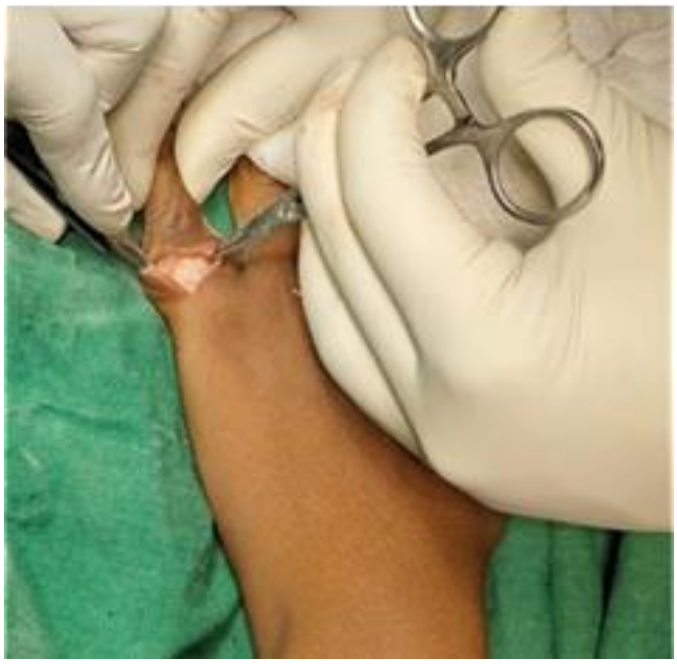

Figure 5

Following removal of the lesion, the residual cavity was filled with autologous cancellous bone graft harvested from the iliac crest**.** The graft was used to fill the osseous defect and provide structural support following curettage. The excised tissue was submitted for Histopathological evaluation.

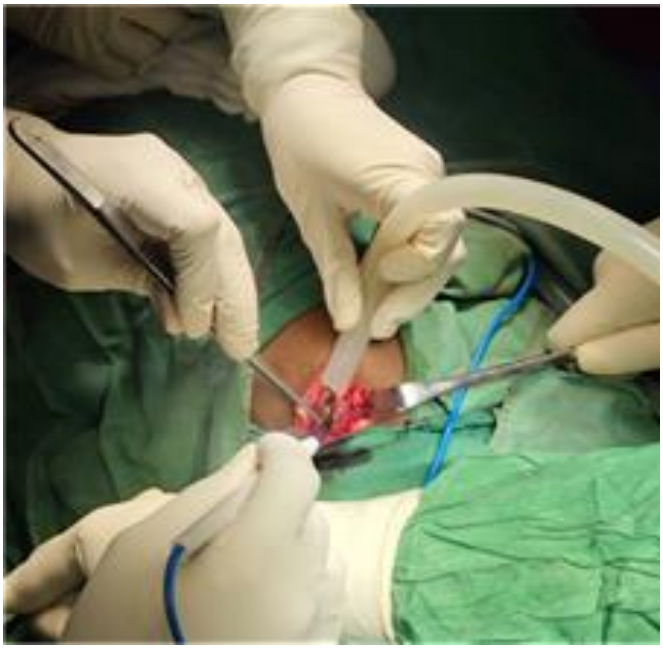

Figure 6

Histopathological Findings

Histopathological examination revealed a benign chondrogenic lesion predominantly composed of hyaline cartilage**.** Numerous chondrocytes were distributed within the cartilaginous matrix and demonstrated mild cytological atypia. Importantly, significant pleomorphism, mitotic activity, and necrosis were absent**.** The overall microscopic appearance was consistent with a benign cartilaginous tumor and favored the diagnosis of enchondroma**.** Thus, the radiological impression was confirmed histologically as enchondroma of the proximal phalanx**.**

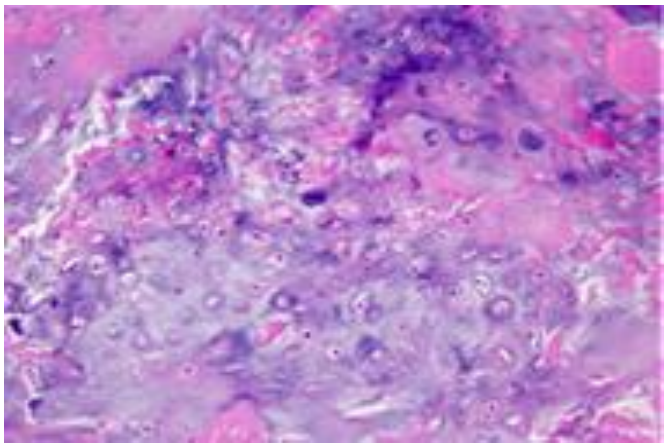

Figure 7

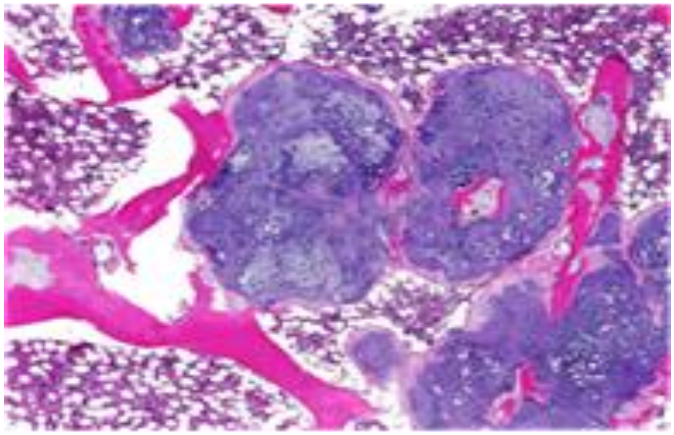

Figure 8

Postoperative Care and follow up

A finger cot was maintained for two weeks, after which gradual mobilization of the digit was initiated. Physiotherapy was continued to maintain finger and joint mobility, and the patient was followed clinically and radio logically.

At approximately three months after surgery**,** radiographs demonstrated satisfactory incorporation of the graft. Clinically, the patient had resolution of pain and swelling with full finger movement and preservation of joint motion. No evidence of recurrence was noted during the documented follow-up.

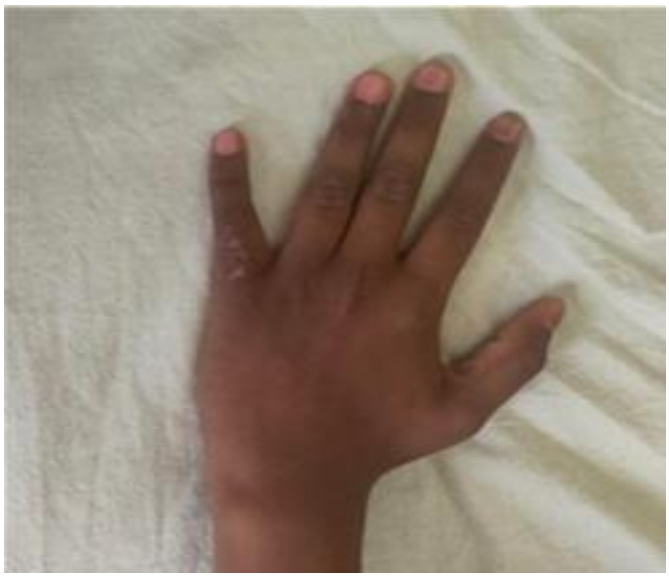

Figure 9

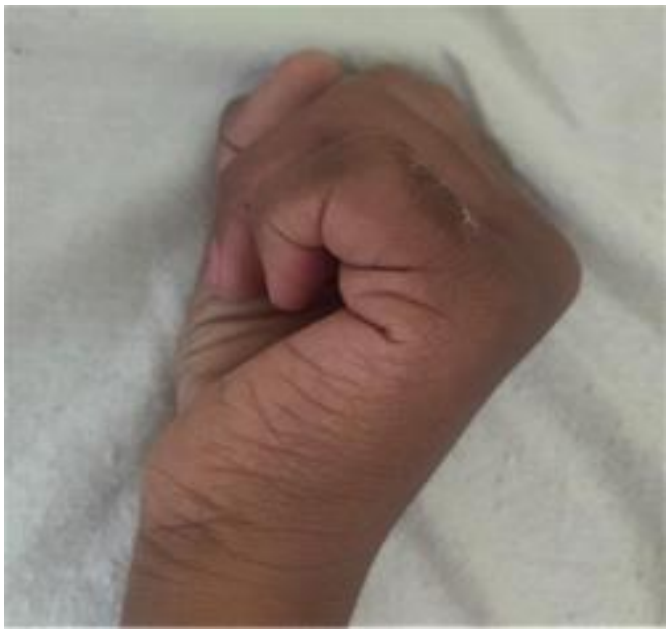

Figure 10

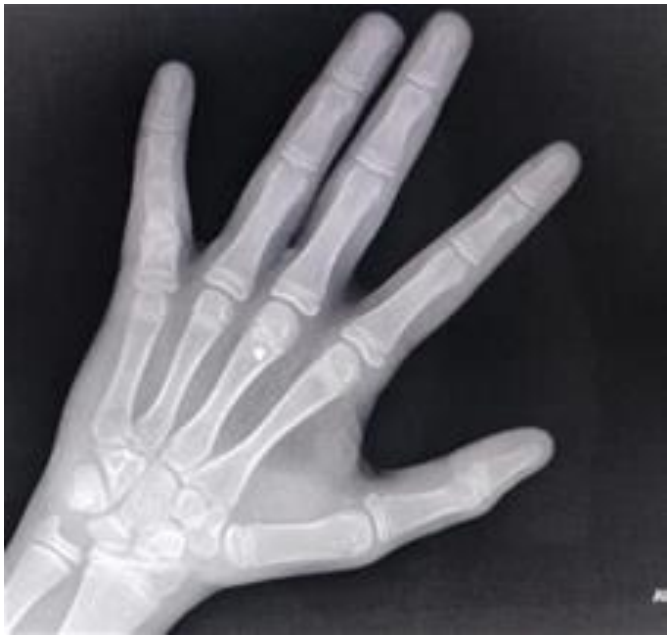

Figure 11: x-ray ap view-X-ray taken after 1 months.

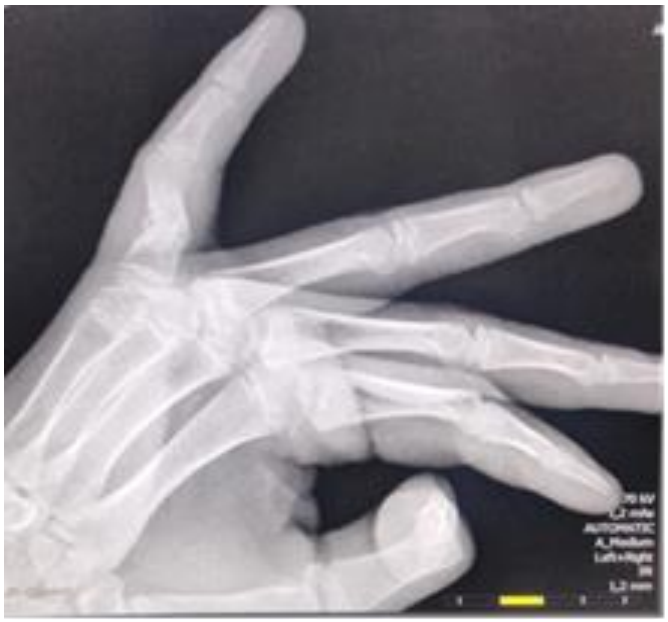

Figure 12: x-ray oblique view

Discussion

Enchondroma is a common benign cartilage-forming tumor of the hand. It frequently involves the phalanges and may remain asymptomatic until the lesion becomes sufficiently large to weaken the cortex or until a pathological fracture occurs. Pathological fracture is therefore an important mode of presentation of hand Enchondroma.

Our patient was a 13-year-old boy with a gradually enlarging swelling of the proximal phalanx of the fifth digit. The associated history of trauma may have drawn attention to a pre-existing lesion, while the radiographs demonstrated a healing pathological fracture. The combination of an intramedullary lytic lesion, endosteal scalloping, and cortical thinning was highly suggestive of a cartilaginous lesion.

The proximal phalanx and little finger are recognized sites of involvement. In a retrospective series of surgically treated solitary enchondromas, the proximal phalanx was the most frequently involved location and the little finger was also commonly affected. Radiological assessment is particularly important in these lesions. Plain radiographs provide information regarding the lesion's location, margins, cortical integrity, and associated fracture. MRI can further characterize the lesion and assess cortical involvement and adjacent soft tissues. In our patient, MRI demonstrated a 12 × 7 mm intramedullary cartilaginous lesion with cortical thinning and a uniting pathological fracture. The principal differential diagnoses include other benign cartilaginous and fibro-osseous lesions. Histopathology is particularly useful when the clinical or radiological findings are atypical or when operative treatment is being undertaken. In this case, the presence of hyaline cartilage with mild chondrocytic atypia, in the absence of pleomorphism, mitotic activity, or necrosis, supported the diagnosis of Enchondroma.

Conclusion

Enchondroma should be included in the differential diagnosis of an intramedullary lytic lesion involving the phalanges in children and adolescents. Although these tumors are benign and frequently asymptomatic, cortical

thinning may compromise bone strength and predispose to pathological fracture.

In the present case, the combination of clinical findings, characteristic radiographic features, and MRI findings suggested Enchondroma, while histopathology established the definitive diagnosis.

Excisional biopsy with meticulous intralesional curettage and autologous cancellous bone grafting provided satisfactory treatment in this patient**,** with radiological graft incorporation, resolution of pain and swelling, full finger movement, and preservation of joint function at the documented follow-up.The literature indicates that curettage is the central component of surgical treatment, while the need for cavity filling remains individualized. In lesions associated with significant cortical thinning or pathological fracture, bone grafting can be considered to restore structural support. Long-term follow-up remains important because recurrence, although uncommon, can occur.

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