



## Technical tip

# Endoscopic curettage and bone grafting of the enchondroma of the proximal phalanx of the great toe



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## ABSTRACT

Enchondromas are the most commonly found benign tumors of the small bones of the foot, mainly involve the phalanges and metatarsals. They are usually asymptomatic, and are found as an incidental finding on routine X-rays. Surgical intervention is indicated in symptomatic lesions as well as larger lesions (greater than 3–4 cm) even if these lesions are asymptomatic. Enchondroma most often can be adequately treated with intralesional curettage and bone grafting. A technique of endoscopic curettage and bone grafting of enchondroma of the proximal phalanx of the hallux is described. This has the advantage of minimally invasive surgery of better cosmesis, less surgical trauma and preservation of the cortical integrity.

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## 1. Introduction

An enchondroma is defined as a benign tumor composed of mature hyaline cartilage which occurs in the medullary cavity of bone [1,2]. This osseous dysplasia is characterized by an excess of mature hypertrophic hyaline cartilage that has not resorbed or ossified in the normal fashion [1]. Although only 6% of all enchondromas are present in the foot, they are the most commonly found benign tumors of the small bones of the foot, mainly involve the phalanges and metatarsals [1,2].

Enchondromas affecting the small bones of the foot are usually asymptomatic, and are found as an incidental finding on routine X-rays [2,3]. When enchondromas become symptomatic, the most common cause of pain is an increase in pressure due to the expansion of the lesion with deformity of the cortex of the affected bone. The patient may also give a history of gradual enlargement of the digit. Other causes of symptoms are pathologic or stress fracture of the lesion (Fig. 1), with a history of trauma or strenuous physical activity, or malignant conversion of the tumor [2]. Secondary malignant transformation of a solitary enchondroma into a chondrosarcoma has been reported although extremely rare, which may not be distinguishable with enchondroma radiologically [4,5]. Differentiating between enchondroma and chondrosarcoma should be based on the overall behavior of the tumor derived from clinical

presentation, radiographs and histopathology [6,7]. Surgical intervention is indicated in symptomatic lesions as well as larger lesions (greater than 3–4 cm) even if these lesions are asymptomatic [2,11]. We describe our technique of endoscopic curettage and bone grafting of enchondroma of the proximal phalanx of the hallux. This has the advantage of minimally invasive surgery of better cosmesis, less surgical trauma and preservation of the cortical integrity.

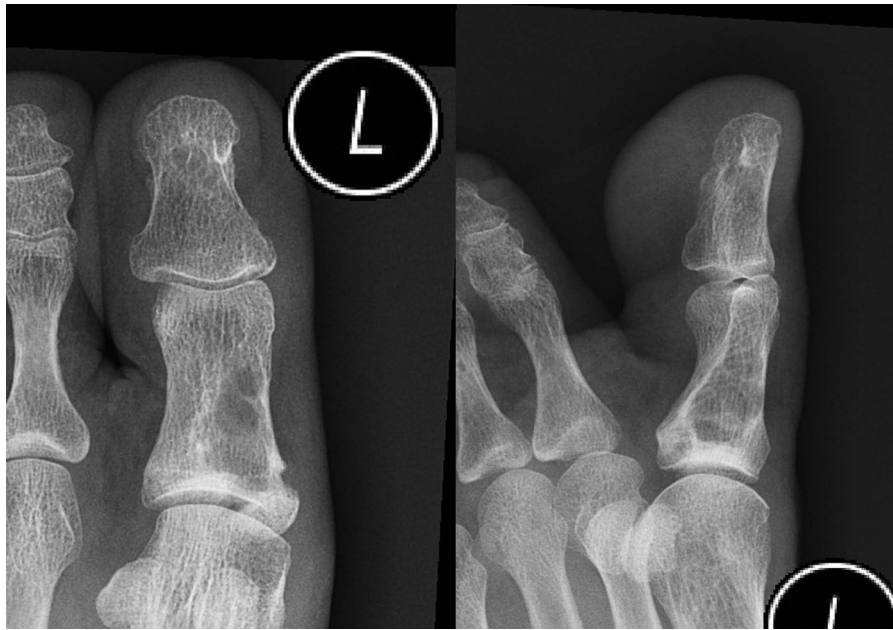
## 2. Description of technique

The patient is placed in the supine position with the leg spread. A thigh tourniquet is applied to provide a bloodless surgical field. Two osseous portals are needed for the procedure. The design of the portals are based on the following guidelines (Fig. 2):

- 1) The portals should be as coaxial as possible so that the working distance between the portals are maximized and avoid “blind spots” during the procedure.
- 2) Portals should not be at the same side of the bone, otherwise “blind spots” may be present at that bone surface.
- 3) The portals should avoid disruption of the articular surfaces.
- 4) The portals are preferably at the thinnest points of cortical wall of the lesion which may be the previous fracture site.
- 5) The portals should avoid the midline of the phalanx in order to prevent damage to the tendons.
- 6) The portals should avoid the sides of the phalanx in order to prevent damage to the neurovascular bundle
- 7) Portals should not be at the same level of the bone, otherwise there may be increased chance of stress fracture.

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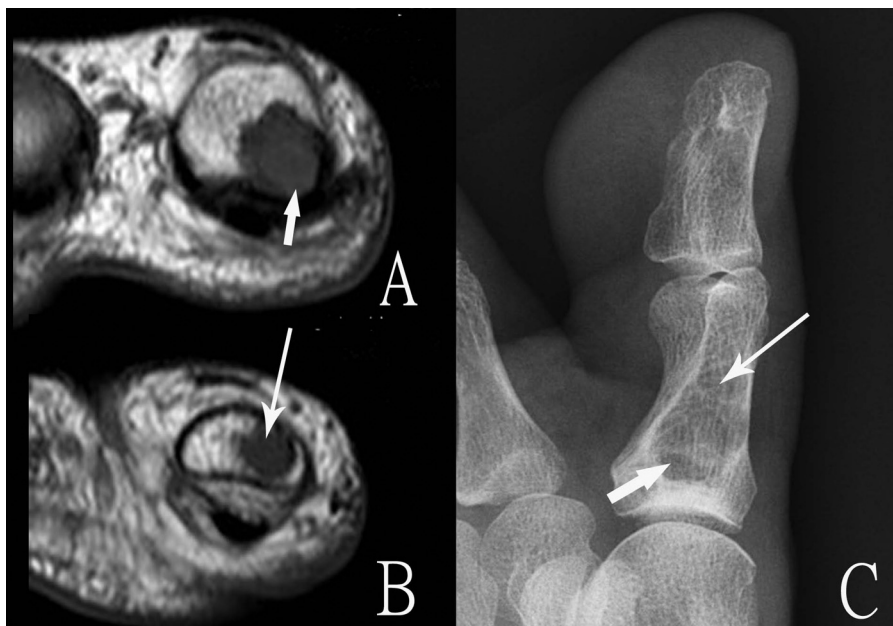
**Fig. 1.** Radiographs showed enchondroma of the proximal phalanx of the great toe with healed fracture of the medial corner of the base of the bone.

Once the portal sites are decided, a stab wound is made over one of it and the osseous portal is made by a 3.5 mm drill. The drill is directed toward the other portal under fluoroscopy guide. By this, the portals will be coaxial. A 2.7 mm 30° arthroscope is used for this procedure. The portals can be switched as visualization and instrumentation portals. The tumor tissue can be biopsied and removed by means of arthroscopic curette, biopsy forceps and arthroscopic shaver (Fig. 3). After all the tumor tissue is removed, the osseous wall is micro-fractured with arthroscopic awl. Finally, the cavity can be packed with cancellous bone graft by means of a 2.5 mm drill guide (Fig. 4). In case that the articular surface is perforated, a piece of

Surgicel can be inserted to cover the perforated site before bone grafting. The complete fill up of the cavity can be confirmed by radiograph (Fig. 5). Post-operatively, the patient is advised on partial weight bearing walking as pain tolerated with a wooden based sandal.

### 3. Case illustration

A 51 year old lady had a minor contusion to her left great toe and suffered from pain and swelling of the great toe. Radiographs showed fracture of the base of the proximal phalanx of her left great toe with an enchondroma of the proximal phalanx



**Fig. 2.** (A)–(C) the thick arrow showed the location and direction of the proximal plantar portal while the thin arrow showed the location and direction of the distal dorsal portal.

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