

# SUBUNGUAL EXOSTOSIS

*Alfred J. Phillips, DPM*

A subungual exostosis is a benign bone growth which arises from the distal tuft of the distal phalanx and grows dorsally, often disturbing the nail plate and causing pain. Another lesion which presents in the same manner is a subungual osteochondroma. In some texts these terms are used interchangeably. The principal differences between these two entities are the histopathologic findings and prognosis following treatment. In addition, rare instances of a subungual osteochondroma differentiating to an osteochondrosarcoma have been reported. Both of these conditions present with the same symptoms and will therefore be reviewed together.

## **HISTORICAL REVIEW**

The subungual exostosis was first described by Dupuytren in 1817. He described it as most commonly affecting the great toe. Paget later identified the lesion in the lesser toes in 1953, and Hutchinson was the first to describe it in the fingers in 1857. At the present time, there have been over 300 cases reported in the literature. These include both the subungual exostosis and subungual osteochondroma.

## **ETIOLOGY**

The specific etiology of these diseases is unknown. In general, trauma and infection appear to play a role in the pathogenesis of both the subungual exostosis and subungual osteochondroma. Some feel that a subungual osteochondroma is congenital in origin. The majority of cases reported in the literature which occur in the foot have a history of either direct trauma or chronic irritation.

It is the author's opinion that a subungual osteochondroma appears to be related more to

direct trauma, and these are usually seen in the second or third decades. A subungual exostosis can occur following direct trauma, but are probably more commonly caused by chronic irritation of the dorsal aspect of the distal phalanx. Evison theorizes that a subungual exostosis represents an ossifying form of fibrocartilaginous metaplasia which arises in response to chronic stimulation.

## **CLINICAL PRESENTATION**

A subungual exostosis typically presents first as a deformation in the nail plate. It has been noted to occur both in the fingers and the toes, however it is most commonly seen in the distal phalanx of the hallux.

A soft, pink to red, isolated mass can usually be identified protruding from the distal aspect of the nail plate. Historically, this was confused with various diseases of the nail (ie. onychomycosis). Commonly, severe pain is elicited upon palpation of the dorsal aspect of the nail plate.

A subungual exostosis is best viewed radiographically on a lateral projection. The digit should be raised to obtain an uninterrupted view of the phalanx. (Figure 1) A dorsoplantar projection is also helpful in identifying the exact position of the exostosis. Increased radio-density at the distal phalanx reveals the specific position of exostosis. The subungual exostosis can be seen as an outpocketing of trabecular bone protruding from the dorsal or dorsomedial aspect of distal tuft of the distal phalanx. The stem is commonly pedunculated and the cap is usually flattened, cupped or dome shaped.

A subungual osteochondroma usually appears more proximal than a subungual exostosis, and is often larger in size. It classically grows from the juxtaepiphyseal region of the distal pha-



**Figure 1.** Lateral radiograph of a hallux revealing a subungual exostosis on the tip of the distal phalanx.

lanx. (Figure 2). These two lesions are difficult to differentiate radiographically, thus definitive diagnosis is dependant on microscopic evaluation of the excised specimen. Both lesions are covered by a cartilaginous cap, which is obviously unidentifiable radiographically.

### HISTOLOGY

Upon gross examination, the cap is shiny and smooth and consists of cartilage. In general, a subungual exostosis consists of fibrocartilage, whereas the cap of the subungual osteochondroma consists of hyaline cartilage. In both cases, there are frequently signs of rapid growth. This is identified by hyper-cellularity and increased mitotic activity. This high level of cellular activity and growth has led some to diagnose the lesion as malignant. Careful examination usually reveals the lack of true anaplasia.

### TREATMENT

A number of treatment modalities have been reported in the literature, including radiation, cauterization, curettage of the lesion, partial phalangectomy, phalangectomy, and digital amputation. Excision of the lesion with adequate removal of the osteochondral cap is considered the treatment of choice, providing the best overall success rate with the least amount of destruction of normal anatomy.



**Figure 2.** Dorsoplantar radiograph of an osteochondroma projecting from the medial aspect of the distal phalanx.

### SURGICAL PROCEDURES

A variety of surgical procedures have been described for the excision of a subungual exostosis or osteochondroma. Although three approaches have been detailed below, they are merely variations of a common theme. The open methods of dissection provide direct visualization of the phalanx, and facilitate procurement of a specimen of bone for diagnostic study.

**Treatment 1.** Partial or total nail avulsion can be performed, followed by a linear incision of the nail bed. Excision of the exostosis is then performed with hand instrumentation, followed by curettage of the distal phalanx.

**Treatment 2.** A transverse incision is placed at the distal tip of the digit with excision of the exostosis and possible excision of distal aspect of the distal phalanx. Removal of the nail may not be necessary with this procedure.

**Treatment 3.** Minimal dissection is used through a small transverse incision at the tip of the digit. The protuberance of bone is then curetted or hand rasped prior to lavage and closure.

### COMPLICATIONS

The most common complications associated with the excision of a subungual exostosis are

recurrence, infection, nail plate growth disturbances, and subungual hematoma.

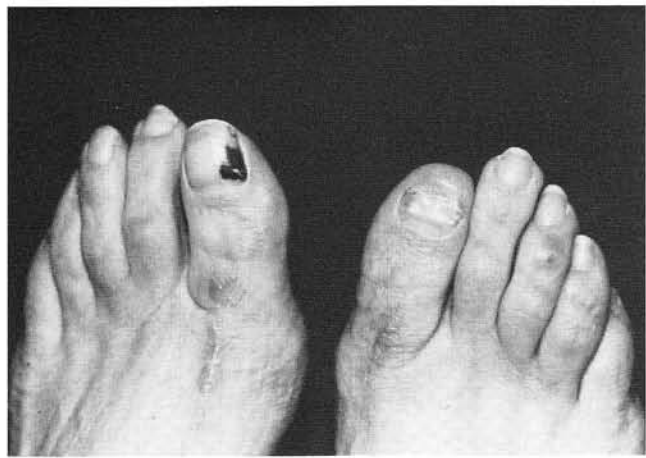
Recurrence is the most commonly reported complication following excision of a subungual exostosis. Oliviera reported a recurrence rate of 6% in a study of 49 cases. Landon, in a review of 44 cases, reported a 5% recurrence rate. And in Breslow's study, he noted 53% recurrence of the exostosis if a partial excision of the lesion was performed. There is a greater tendency for osteochondromas to reoccur, especially when the growth is not totally removed. The most reliable way to prevent the reoccurrence of any exostosis is to totally excise the osteo-cartilaginous cap in addition to the osseous spur. If the osseous spur is resected and the osteo-cartilaginous cap remains, the spur will most likely recur. If it is determined that chronic irritation of the distal phalanx is the etiology of the exostosis, then this must also be addressed.

Infection is a potential complication of any surgery. However, due to the difficulty in adequately prepping the nailbed and the surrounding area preoperatively, this type of surgery theoretically carries a slightly higher risk than other areas of the body.

Due to the proximity of the surgical site to the nail bed and matrix, there may be transient or permanent damage to these structures. Malformation of the nail plate or hypertrophic scarring of the nail bed may result. As a result of performing the procedure from a distal transverse incision, laceration of the nailbed from beneath the nail plate may occur. This usually results in a subungual hematoma with lysis of the nailbed, however eventual regrowth of a normal nail-plate occurs. (Figure 3)

### SUMMARY

Subungual exostoses and osteochondromas are relatively common deformities which are easy to treat surgically. Preoperative differentiation of a subungual exostosis from a subungual osteochondroma is not essential, as the diagnosis is best determined histologically. Recurrence is noted to be more common with subungual osteochondromas, thus documentation of the pathology is beneficial for long-term analysis. The most important aspects of treatment are total excision of the lesion, including the osteocartilaginous cap, and



**Figure 3.** Clinical appearance eight weeks following excision of bilateral hallux subungual exostoses. Note the resolving subungual hematoma on the left hallux, and nail deformation of the right hallux.

addressing the true etiology of the exostosis. This will drastically reduce the chance of a recurrence.

### BIBLIOGRAPHY

- Apfelberg DB, Druker D, Maser MR, Lash H: Subungual Osteochondroma: Differential Diagnosis and Treatment *Arch Dermatol* 115:472-473, 1979.
- Brenner MA, Montgomery RM, Kalish SR: Subungual Exostosis *Cutis* 25:518-523, 1980.
- Chesler SM, Basler RSW: Subungual Exostosis, *J Am Podiatry Assoc* 68(10):732-734, 1978.
- Dockery GL:Nails. In McGlamry ED, Banks AS, Downey MS (eds) *Comprehensive Textbook of Foot Surgery* Baltimore, Williams & Wilkins, 1992, p. 281.
- Dupuytren G: Lecons Orales de Clin *Chir Paris* 11:110, 1839.
- Evison G, Price CHG: Subungual Exostosis *Br J Radiol* 39:451-455, 1990.
- Ford LB: Hallux Tenotomy Capsulotomy *Clin Podiatr Med Surg* 8:9-12, 1991.
- Grisafi PJ, Lombardi CM, Sciarino AL, Rainer GF, Buffone WF: Three Select Subungual Pathologies: Subungual Exostosis, Subungual Osteochondroma, and Subungual Hematoma *Clin Podiatr Med Surg* 6(2):355-364,1989.
- Hoehn JG, Coletta C: Subungual Exostosis of the Fingers *J Hand Surg* 17A(3):468-471, 1992.
- Hutchinson J: Subungual Exostosis. *Lancet* II:246, 1857.
- Kato H, Nakagawa K, Tsuji T, Hamada T: Subungual Exostoses Clinicopathological and Ultrastructural Studies of Three Cases, *Clin Exper Derm* 15:429-432, 1990.
- Johnston JO: Affections of the Foot In Mann RA (ed) *Surgery of the Foot* St. Louis, Mosby 1986, pp.353-354.
- Landon GC, Johnson KA, Dahlin DC: Subungual Exostoses *J Bone Joint Surg* 61A(2):256-259, 1979.
- Miller-Breslow A, Dorfman HD: Dupreytren's (Subungual) Exostosis, *Am J Surg Path* 12(5):368-378, 1988.
- Nicklas BJ: Prophylactic Surgery in the Diabetic Foot. In Frykberg TG (ed) *The High Risk Foot in Diabetes Mellitus* New York, Churchill Livingstone, 1991, pp. 524-525.
- Oliviera ADS, Picoto ADS, Verde SF, et al: Subungual exostosis: Treatment as an office procedure *J Dermatol Surg Oncol* 6:555, 1980
- Paget J: Subungual Exostosis. *Surgical Pathology* ii:238, 1853.
- Yizhong L, Tong Y, Yuqi H: Subungual Exostosis *Chinese Medical Sciences Journal* 6(3):169-171, 1991.