CHAPTER **33**

GIANT CELL TUMOR OF TENDON SHEATH IN THE FOOT: CASE STUDIES

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INTRODUCTION

Giant cell tumor of the tendon sheath (GCT-TS) is a relatively common and often painless benign soft tissue tumor. It is more commonly documented in the hand, but the second most common site is a toe. There are 2 types: the localized type is most common and the diffuse type which is more rare. The diffuse type of giant cell tumor of tendon sheath is considered the localized form of pigmented villonodular synovitis (PVNS) at tendons. The term PVNS is used when the disorder affects a joint. Both are benign proliferative conditions of unknown etiology that tend to affect patients younger than 40 years old. The diffuse form can be aggressive locally and has a high recurrence rate. DNA analysis suggests that PVNS and GCT-TS are histopathologically similar, but clinically distinct (1). Mononuclear and giant cells histologically resemble osteoclasts and are non-neoplastic (1).

Patients often report a long-standing mass that may cause numbness depending on the location. It is associated with arthritis at the interphalangeal joints. It may occur dorsally or plantarly. They are firm, lobulated, slow-growing masses that are typically nonadherent to the skin. Unlike ganglion cysts, they do not transilluminate. A pressure effect from the mass on bone may result in cortical erosion. They range in color from gray-brown to yellow-orange depending on the hemosiderin content. Final diagnosis relies on a pathology specimen from excision although a recent study indicates that a fine-needle aspiration may provide a reliable diagnosis (2).

IMAGING MODALITIES

Radiographs may be negative or may show a soft-tissue shadow, rarely with intralesional calcification. The readiographs additionally may demonstrate a cortical bone erosion from pressure effect of the mass on bone. Magnetic resonance imaging (MRI) appearance of these extra-articular lesions (and PVNS) are distinctive compared to other soft tissue tumors because of the intermediate to low signal intensity areas on both T1- and T2-weighted images, this reflects the hemosiderin deposition that is common to GCT-TS and PVNS tumors (although PVNS tends to have higher hemosiderin content and therefore tends to be darker) (1). Ultrasound may confirm the presence of a soft tissue tumor adjacent to a tendon, but it can be difficult to differentiate between a solid versus cystic mass accurately (3). The mass will often be hypervascular on color or power Doppler imaging with ultrasound (4).

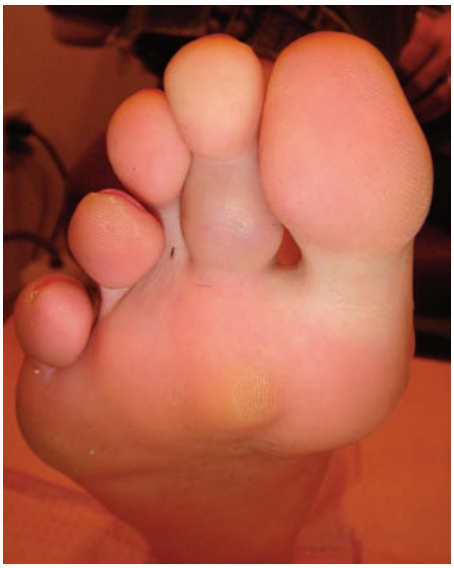
TREATMENT

Excision of the mass may involve complete or partial excision with a high recurrence rate, highest when there is bone involvement or excision is partial. Satellite lesions are common. Puncturing the mass can result in seeding adjacent soft tissue structures. Bone debridement may be needed in the presence of bone involvement. If the tumor is adhered to the skin than a skin ellipse in conjunction with the mass may be warranted (1).

CASE STUDY 1

A 35-year-old woman presented with a long-standing tender firm mass to the plantar right second toe that did not transilluminate (Figures 1-3). No fluid was present on attempted aspiration. Radiographs were negative for bone erosion, although pressure effect appeared to be present plantarly at the proximal phalanx (Figure 4). MRI showed areas of low signal intensity on both T1- and T2-weighted images (Figures 5-7).

Surgical excision was performed with the use of a tourniquet. A modified S-type incision was placed plantarly curving over the tumor (Figures 8, 9). The mulit-lobulated mass was reddish-orange and 2 cm x 2 cm associated with the flexor tendon, but without destruction of the tendon (Figures 10-12). It was dissected free of the tendon and removed as a solid mass (Figures 13, 14). Histopathology confirmed GCT of the tendon sheath. The patient was allowed heel touch only for 2 weeks in a postoperative shoe, then moved to a running shoe thereafter. No recurrence or complications were seen post-operatively (Figure 15).



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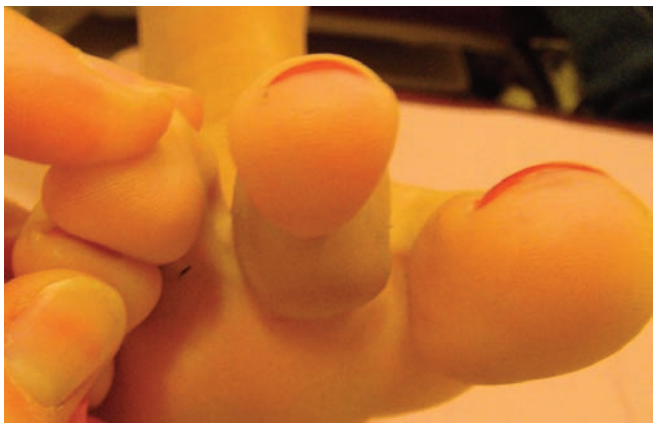

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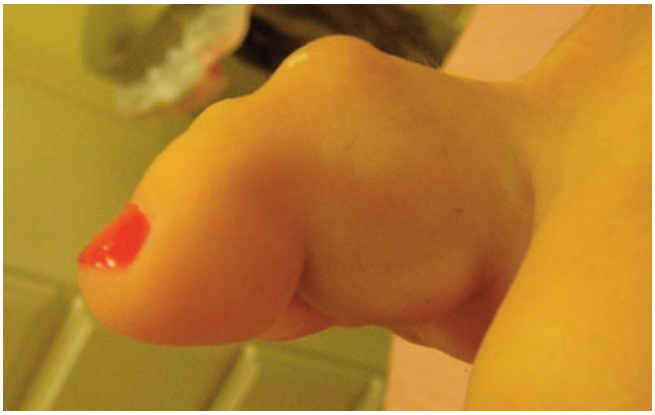

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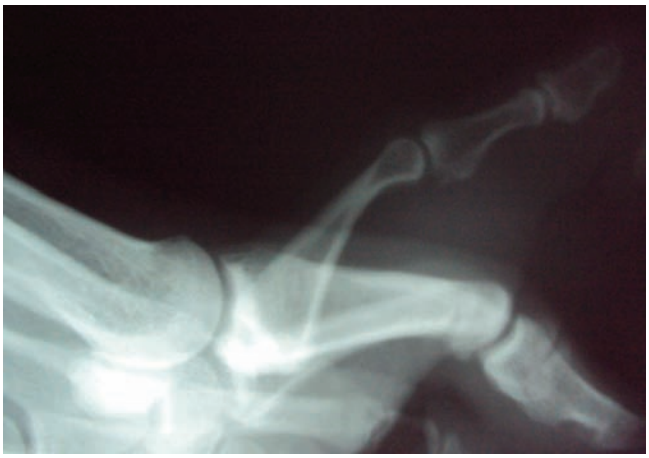

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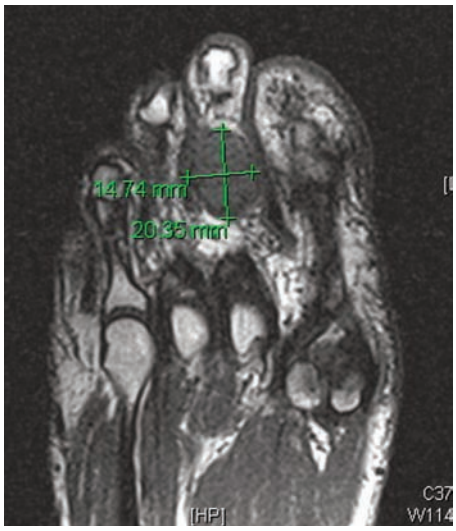

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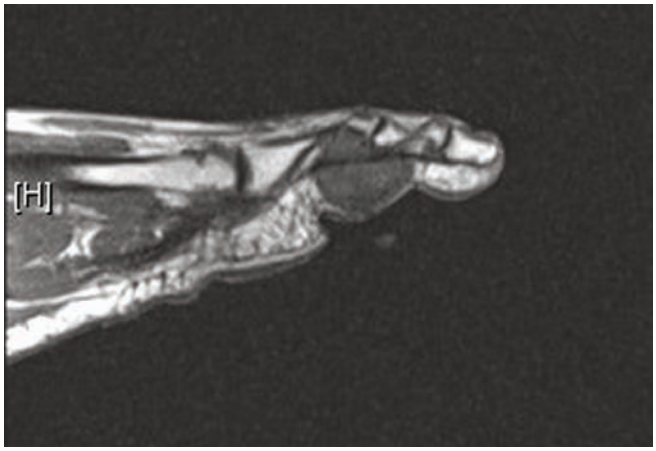

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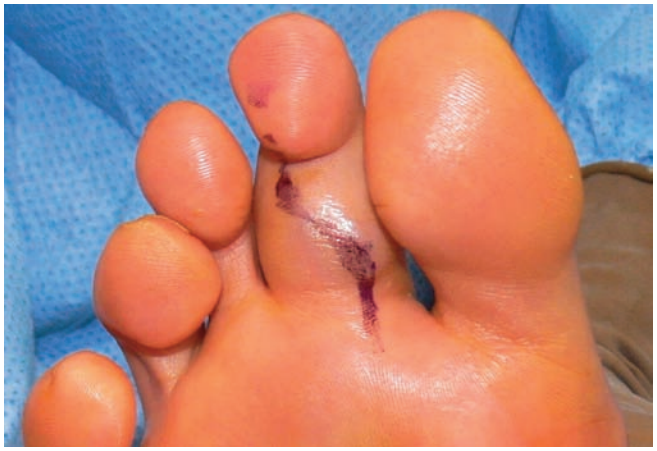

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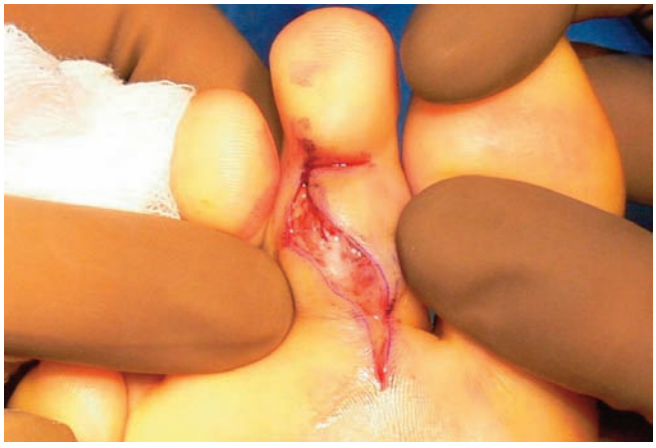

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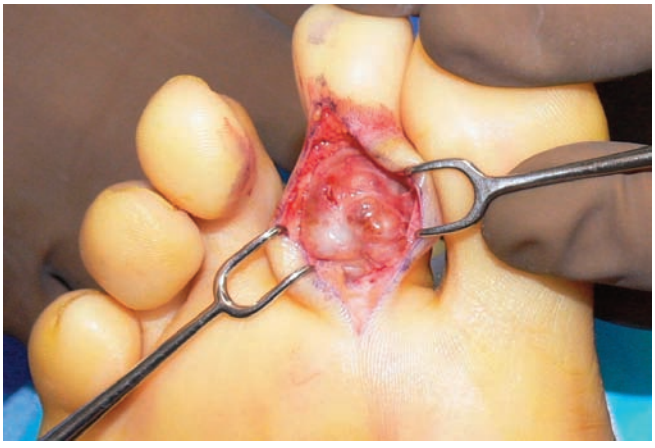

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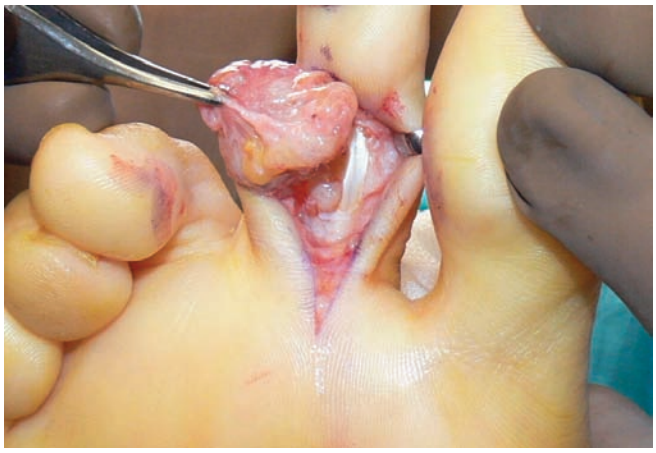

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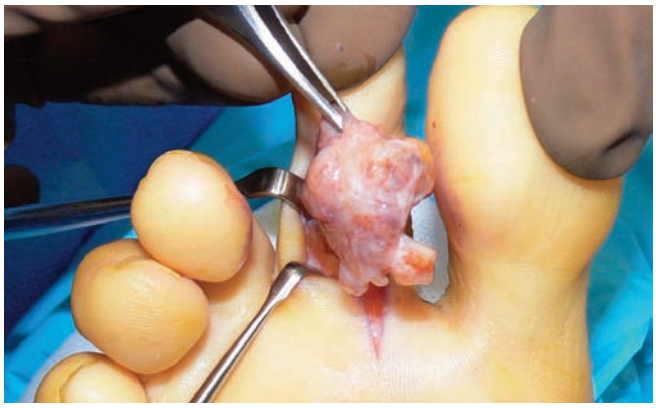

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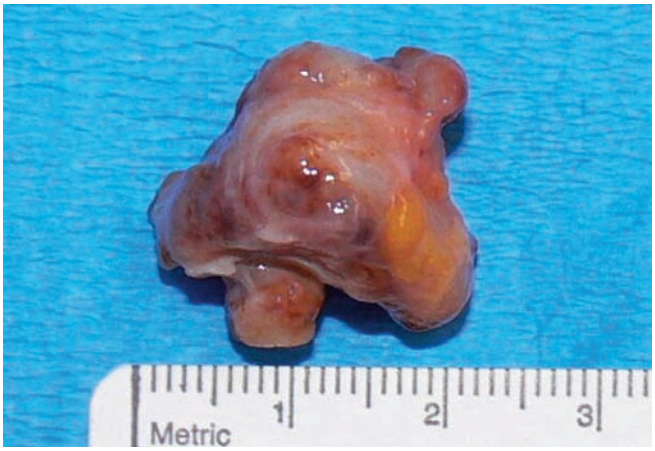

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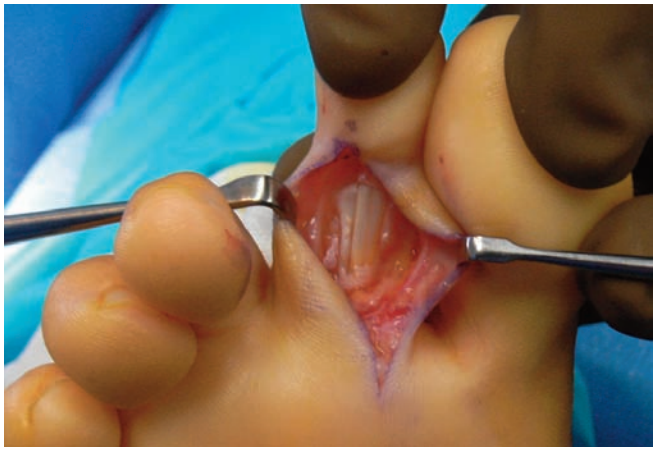

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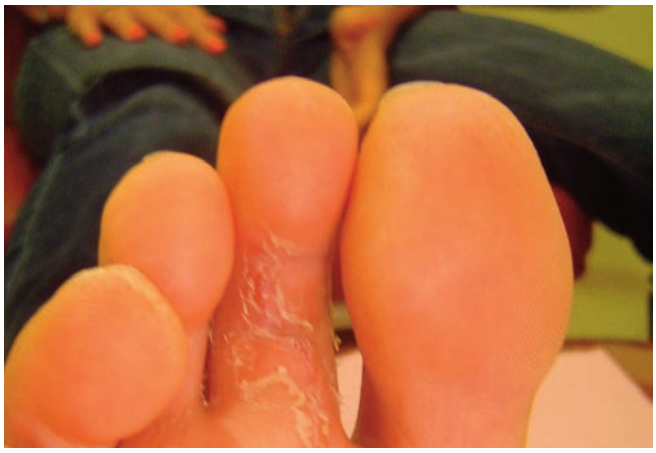


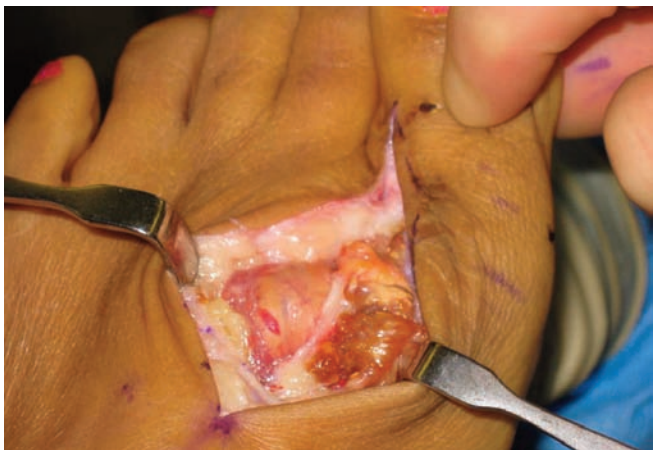
Figure 15.

CASE 2

A 52-year-old woman presented with a recurrent firm mass located on the dorsal aspect of the left first metatarsophalangeal joint after previous GCT-TS removal a year ago by another physician. She was experiencing pain, numbness, and swelling. The numbness was present at the hallux branch of the deep peroneal nerve. Radiographs did not show an osseous abnormality. MRI demonstrated an erosion at the first metatarsal head.

Surgical excision was planned for the tumor that had extensive involvement about the first metatarsophalangeal joint extending circumferentially about the joint. A calf tourniquet was utilized and anatomic dissection performed. Because of the extensive nature of the tumor, a 3 incisional approach was necessary. The removal began with a first interspace 6 cm linear incision, dissecting medially along the first metatarsophalangeal joint capsule with some disruption and adherence to the capsule noted. A medial incision 6 cm in length was than created allowing further dissection of the tumor medially and under the adductor muscle belly (Figures 16, 17).

The tumor continued to wrap around the metatarsophalangeal joint plantarly requiring a third incision at the plantar first interspace to complete the removal of the multi-lobulated extensive tumor (Figure 18). The patient was placed nonweight bearing and a posterior splint was applied. Long-term 6 month follow-up revealed no recurrence of the tumor and full resolution of her pre-operative neuritic symptoms.



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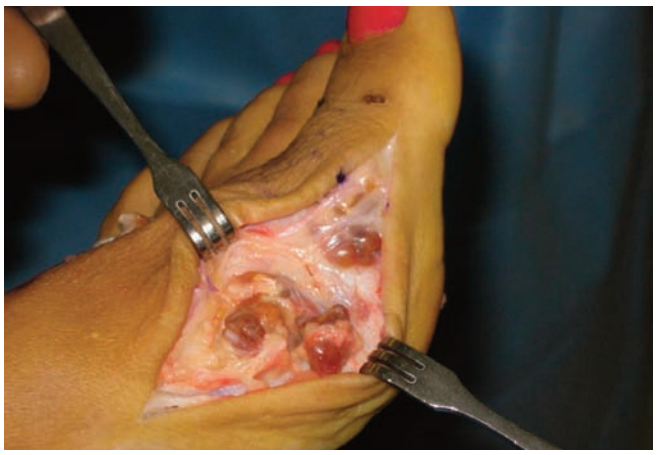

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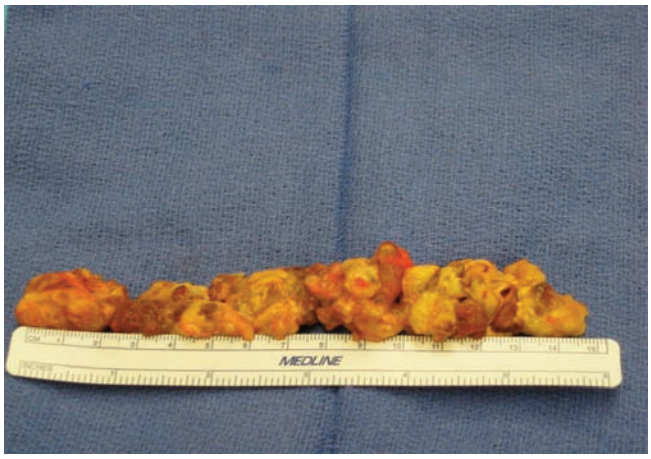


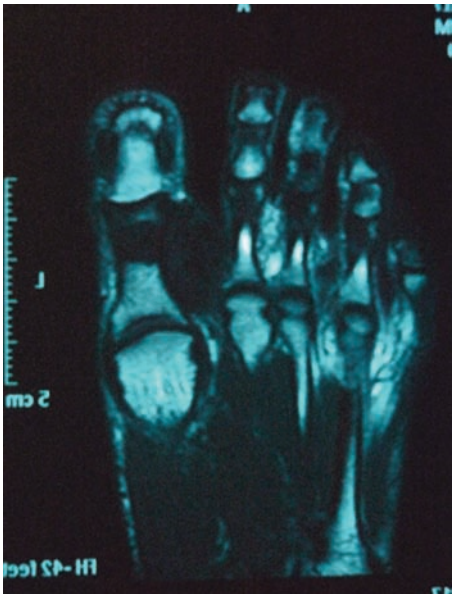
Figure 18.

CASE 3

This case is a 36-year-old man in good health. Per his recollection, he developed a mass growing on his great toe approximately 20 years ago. He thought it was a sports injury where the toe may have been broken and did not heal well. About 3 years prior, he had a biopsy of the tumor at the Mayo clinic. The diagnosis was GCT. He decided to have the mass removed because of the size of it and difficulty wearing shoes, although the pain was minimal. He had been told by other physicians that he had a "hole" in his bone. MRI showed ~3.5 cm x 2 cm soft tissue mass located lateral to the hallux proximal phalanx with bone erosion plantarly with expansion of the mass into the bone to the dorsal cortex. The mass was dark on MRI T1-, and T2-images were consistent with the GCT-TS diagnosis (Figure 19). The case involved excision of the GCT, which was growing along the lateral side and plantar aspect of the hallux proximal phalanx, right foot (Figure 20).

A Mayo block with 1:200,000 mixture of Lidocaine with epinephrine and Marcaine plain was performed. A midline linear dorsal incision was than created over the hallux. A multi-lobulated solid mass of a green hue was dissected free along the lateral margin of the toe extending plantarly at the hallux. Next, the long extensor tendon was reflected proximally and the interphalangeal joint was inspected without any cartilage damage seen (Figure 21). There was a soft tissue mass underneath the tendon that was removed (Figure 22). A rectangular cortical window was created at the dorsal distal aspect of the proximal phalanx (Figure 23). The bone was taken off the field and placed in a cup with saline. Intraosseous inspection revealed continuation of the soft tissue mass into the bone (Figure 24). The mass was removed from the bone and the cortex was eroded on the plantar side resulting in a plantar cortical defect (Figures 25-27).

Curette debridement was performed intraosseously with lavage. Since the dorsal window was rectangle and the plantar defect was round, the window was placed from dorsal-to-plantar into the proximal phalanx to act as the "new floor" of the phalanx. Next, Trinity bone graft material was used to pack the void (Figures 28, 29). No cortical bone was placed on top (Figures 30, 31). The long extensor tendon was closed back over the surgical area and wound was closed in layers.



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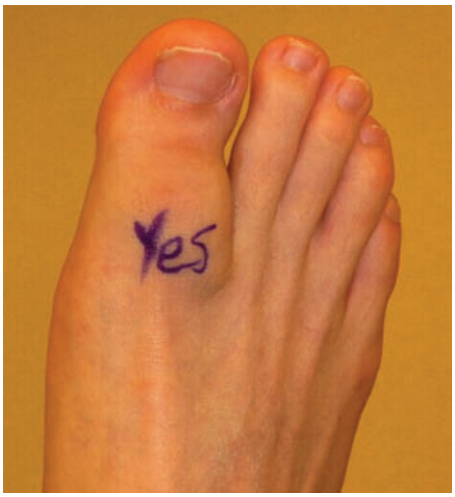

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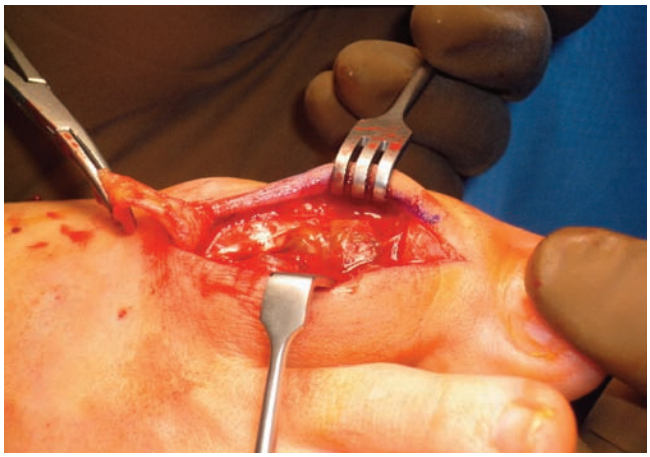

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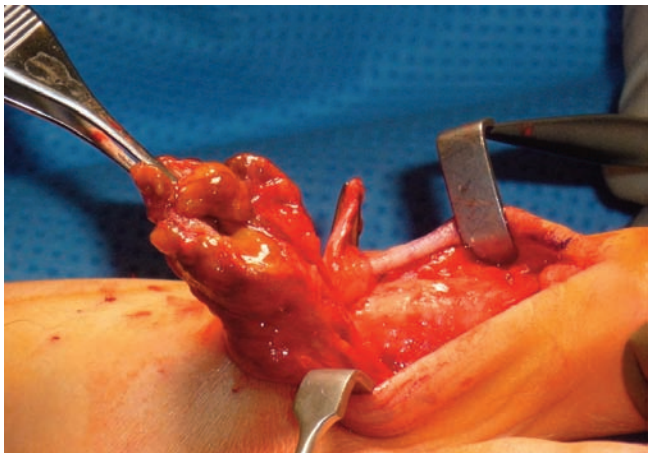

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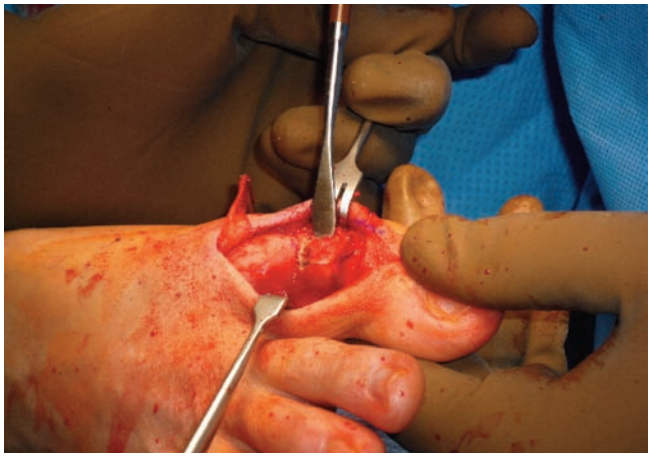

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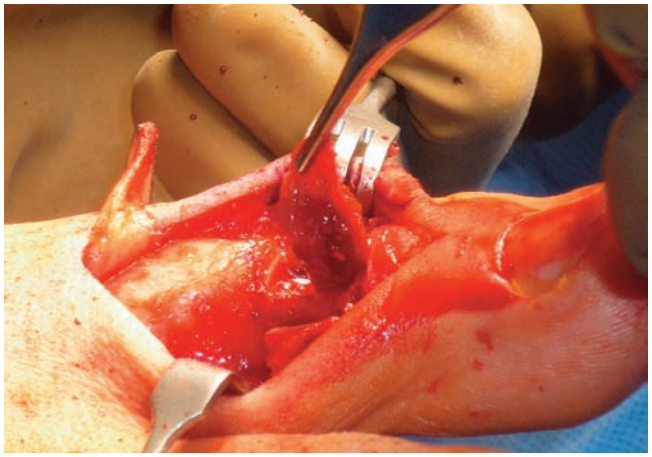

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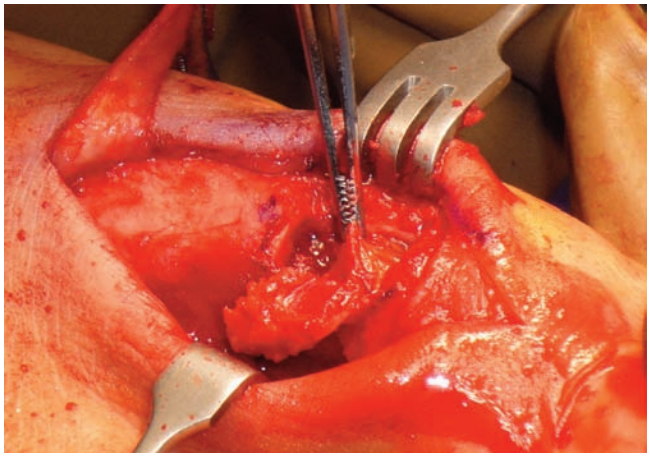

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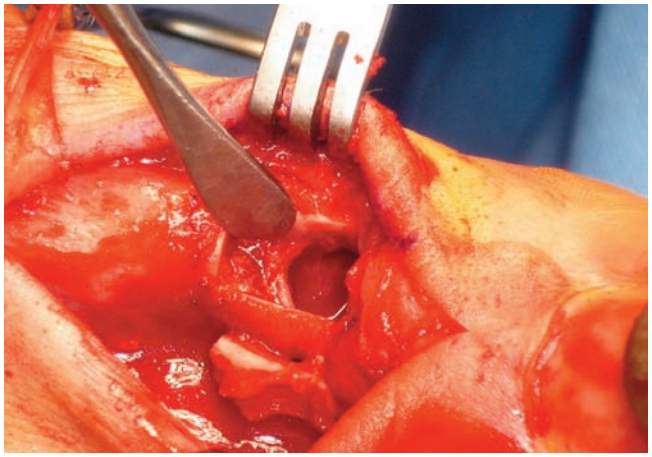

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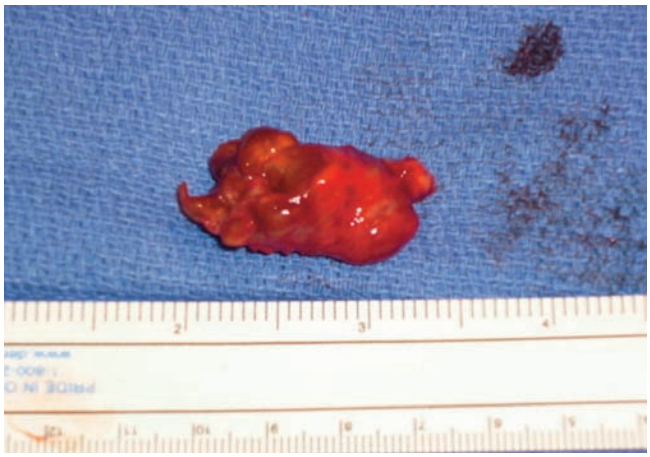

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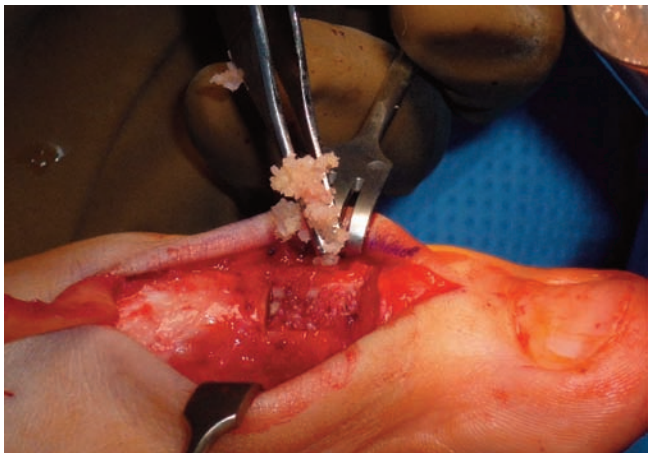

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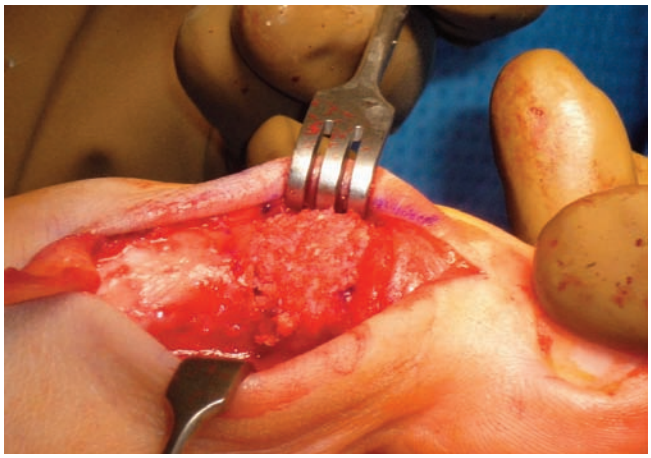

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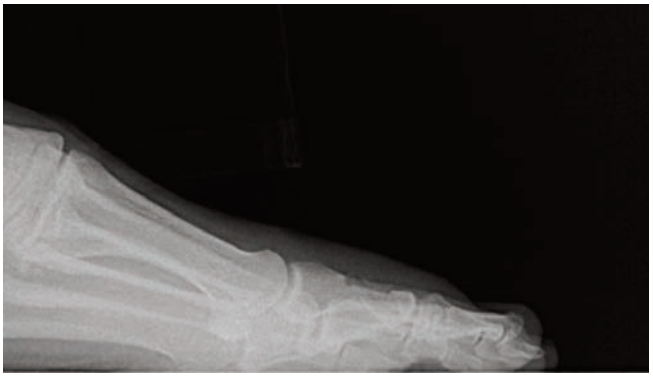

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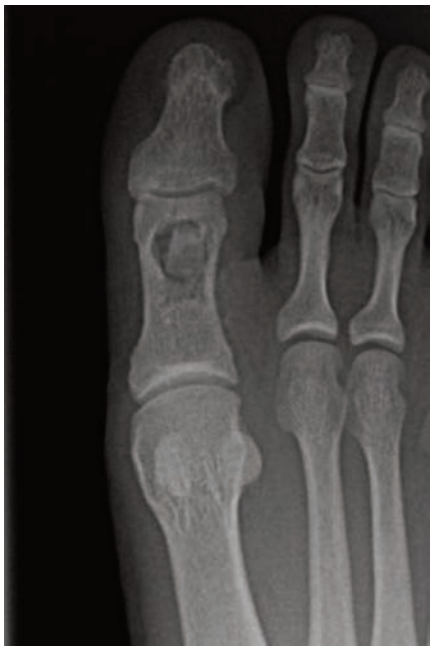

Figure 31.

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