

Case Report

Glomus tumors in the foot: two case reports

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Abstract

Glomus tumors are rare, benign neoplasms arising from components of the glomus apparatus. They are uncommon in the foot, often leading to misdiagnosis or a delay in diagnosis. This can have a significant impact on a patient's quality of life and may result in incorrect surgical procedures being performed. Correct recognition leads to timeous diagnosis and marginal excision, which is curative. A glomus tumor should be considered in patients with no obvious cause for localized, severe foot pain. We report two different presentations of a glomus tumor in the foot.

Level of Evidence V; Therapeutic Studies; Expert Opinion.

Keywords: Glomus tumor; Neoplasm; Foot; Diagnosis.

Introduction

The glomus apparatus is a component of the reticular dermis and is found throughout the body. It is a thermoregulatory arteriovenous shunt controlled by sympathetic activity to regulate blood flow when exposed to cold or hot temperatures. It thus helps regulate temperature by increasing or decreasing blood flow⁽¹⁾.

A glomus tumor is a painful, benign neoplasm arising from components of the glomus apparatus. It accounts for only 1.6% of all soft tissue tumors. It occurs most commonly in women aged between 30 and 50 years and is frequently associated with delayed diagnosis. The peripheries are most affected with up to 75% of cases involving the hand. Less than 30% of tumors are found in extradigital locations, including head, limbs, tongue, trachea, lungs, mediastinum, stomach, and rectum, but a predominance is noted in thigh, leg, and forearm⁽²⁾. Extradigital glomus tumors are more common in men⁽³⁾.

The largest series of glomus tumors not located in the hand was published by the Mayo Clinic. Out of 56 cases, they described only 2 cases in the foot⁽⁴⁾. Trehan et al.⁽¹⁾ described a large series of 11 patients with glomus tumors in the foot. Ten of these were subungual and one was in the plantar pulp of the terminal phalanx. Due to such a low incidence, a glomus tumor in the foot is often misdiagnosed. A high index of sus-

picion and good clinical acumen are required to make the diagnosis.

We report two different presentations of a glomus tumor in the foot.

Case reports

This study was approved by the Institutional Review Board at the authors' institution.

Case 1

A 33-year-old man presented with recent development of excruciating pain and sensitivity on top of his right foot. On examination, he had an exquisitely tender 1x1-cm bluish mass on the dorsolateral aspect of the midfoot. He also had a 2x2-cm mass on the plantar aspect of the foot. It was soft and completely asymptomatic.

Magnetic resonance imaging (MRI) revealed an ellipsoid lesion on the plantar foot surface under the fourth metatarsal and a lobulated lesion anterior to the lateral malleolus. These demonstrated increased T2 signal and contrast enhancement. The margins of the lesions were well defined. A provisional diagnosis of multifocal neuromas was made. Consent was obtained for an excisional biopsy.

Study performed at the Netcare Linksfield Clinic; Johannesburg, Gauteng, South Africa.

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At surgery, an incision was made in the dorsolateral aspect of the foot over the underlying mass. A pigmented, lobulated tumor resembling a hemangioma was excised. Then a lazy-S incision was made on the plantar aspect of the foot, and a large pigmented tumor was excised. These specimens were sent for histology.

Histology reported a vascular neoplasm in keeping with a glomus tumor. Both lesions were well circumscribed but had no fibrous capsules. The lesions consisted of tightly packed capillary-sized vessels surrounded by sheets of glomus cells.

All preoperative symptoms resolved at 10 weeks post-surgery. The patient returned 1 year later with a history of developing similar symptoms posterior to the initial dorsal glomus tumor. Clinically, he had sensitivity over the new mass suggestive of a glomus tumor. He again underwent an excisional biopsy. An obvious glomus tumor was excised and sent for histology, which showed no evidence of malignancy and confirmed the diagnosis.

The patient made an uneventful recovery with complete relief of symptoms at 12 weeks and no recurrence at 1-year follow-up.

Case 2

A 63-year-old man presented with intense sensitivity over the tip of the left second toe for a few years with cold intolerance. He had seen several specialists who were unable to give him a diagnosis and was told he needed to live with it.

Clinically, he had boggy over the cuticle with extreme sensitivity to touch but no nail changes. Radiography was unremarkable, but MRI did show hyperintense signal in the medial nailbed of the second toe (Figure 1). This measured approximately 5 mm in diameter. A glomus tumor was suspected, and the patient consented to an excisional biopsy.

Intraoperatively, the toenail was removed and the cuticle elevated (Figure 2). A purplish lesion, approximately 5 mm in circumference, was identified within the germinal layer of the nailbed (Figure 3). This was excised and sent for histology (Figures 4 and 5). As the lesion involved the germinal layer of the nailbed, the entire germinal layer was excised using a Zadek procedure.

Histology reported a well-circumscribed mass consisting of vascular channels surrounded by cuboid epithelioid cells and confirmed a benign glomus tumor (Figure 6). The patient had complete resolution of symptoms at 8 weeks.

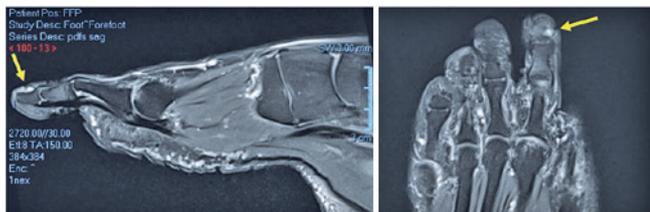


Figure 1. Sagittal and coronal magnetic resonance images showing a dorsomedial hyperintense lesion on the second toe.

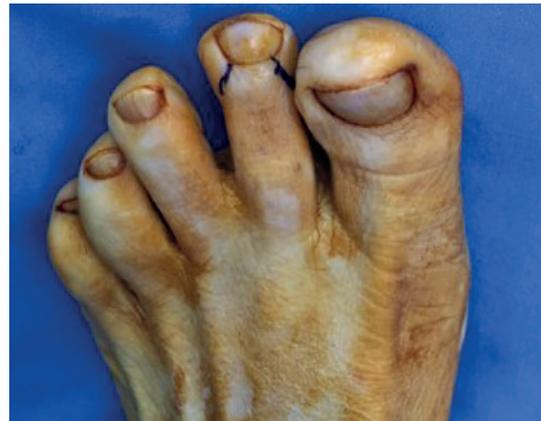


Figure 2. Planned skin incisions for elevation of cuticle.



Figure 3. Appearance of glomus tumor in the germinal layer of the nailbed.

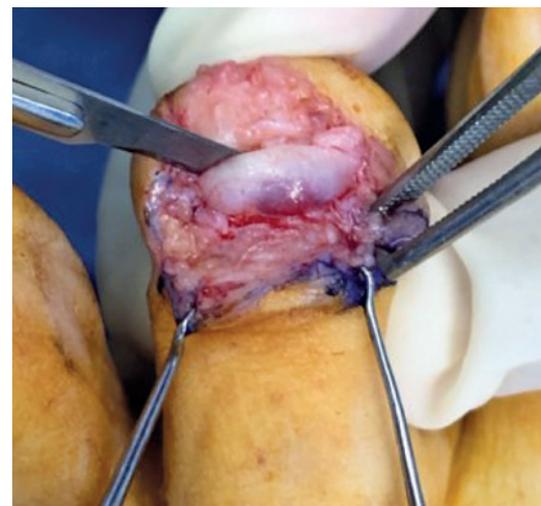


Figure 4. Excision of glomus tumor together with ablation of the nailbed.



Figure 5. Excised specimen from nailbed of second toe.

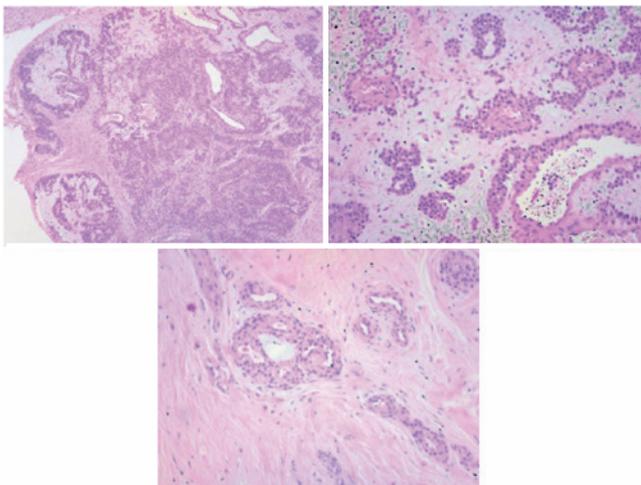


Figure 6. Histology slides showing fibrofatty connective tissue with vascular channels. Vascular channels are surrounded by cuboidal epithelial cells. There is mild edema between these islands.

Discussion

Glomus tumors are usually solitary, although there are several reports of multiple lesions. These occur more commonly in the lower limbs. Patients with multiple lesions have been known to have similarly affected family members, and these tumors have sometimes been found simultaneously with

neurofibromatosis type 1 and multiple endocrine neoplasia⁽⁴⁾. Multiple glomus tumors tend not to be painful, which explains why the plantar tumor in case 1 was not painful. This may delay diagnosis. Case 1 shows an atypical presentation of a glomus tumor in the foot, multiple in type, with recurrence. Case 2 highlights the more typical presentation of a patient with the classical clinical triad and delayed diagnosis.

Pathology

These tumors usually measure about 5 mm in diameter. Four histological subtypes have been described, namely angiomatous, paucivascular, neuromatous, and mucoid-hyaline, but there is often a mixture of these. These variants are not known to influence recurrence or metastatic potential⁽²⁾. They may, however, result in atypical presentations. For example, an angiomatous predominance is often multifocal, as in case 1. This variation in presentation can make diagnosis challenging. Malignant glomus tumors are exceedingly rare and occur in less than 1% of cases. A risk of malignancy correlates with deeper location, size greater than 2 cm, atypical mitotic figures, and moderate-to-high nuclear grade. Six examples have been reported in the hand literature⁽⁵⁾.

Clinical examination

Diagnosis of a glomus tumor is primarily clinical. A patient may present with the triad of severe pain, point tenderness, and cold hypersensitivity. There may be an associated mass with blue-purple discoloration below the nail. The nail may be curved or ridged⁽⁵⁾. The Hildreth test is 92% sensitive and 91% specific for diagnosing glomus tumors. It is performed by inflating a tourniquet to just above systolic blood pressure proximal to the tumor. It is considered positive if there is immediate pain relief. The Love test induces pain when pinpoint pressure is applied over the lesion using a pencil or toothpick, while using the same device in adjacent tissues does not elicit pain. According to Giele, the Love test is 100% sensitive and 0% specific⁽⁶⁾. Application of ice or cold water results in pain due to increased cold sensitivity. Netscher et al.⁽⁷⁾ reported this test to be 100% sensitive and 100% specific.

Radiography

Radiographs are usually normal, but cortical depressions may uncommonly occur due to pressure from an adjacent tumor. On rare occasions, radiography may show bony erosion. This occurs with intraosseous glomus tumors, which are extremely rare⁽⁸⁾.

Ultrasound

Ultrasound is often the first imaging modality used for investigating these lesions. The lesion is typically hypoechoic, circumscribed, and oval. It is usually firm and not compressible. There is variable vascularity, with tortuous vessels seen internally, with blood flow. Fan et al reported 88% accuracy in diagnosing glomus tumors with ultrasound⁽⁹⁾.

MRI

MRI assists with location, sizing, and diagnosis of glomus tumors. A glomus tumor appears as a well-delineated dark mass on T1-weighted images and a bright white mass on T2-weighted images. Some glomus tumors may be better visualized on T2-weighted fat-suppressed images with contrast or angiography. Al Qattan et al found MRI to be 90% sensitive but only 50% specific for glomus tumors. Similar findings may be found in cysts and other tumors of the hand⁽¹⁰⁾.

Histology

Histopathological examination is essential for definitive diagnosis. The macroscopic appearance is a well-encapsulated grey-pink mass. Microscopically, glomus tumors are comprised of uniform epithelial cells with abundant vasculature. Glomus cells are small, uniform cells with round, monomorphic nuclei and eosinophilic cytoplasm⁽⁹⁾.

Treatment

Because most glomus tumors are benign, the treatment of choice is wide local excision⁽⁵⁾. This is usually curative with

Trehan et al reporting complete resolution of symptoms with no recurrences in their series⁽¹⁾. As most occur in the nailbed, ablation of the nailbed may be required, as in case 2. It is important to explain to the patient that the surgery may result in nail defect or loss. Less than 10% of cases recur. Local recurrence may represent persistent tumor following inadequate excision or missed multiple glomus tumors. Very infrequently, a benign glomus tumor growing in a diffuse or infiltrative pattern may result in recurrence⁽¹⁾.

Conclusion

Glomus tumors are rare, small, and painful benign neoplasms. They are often associated with delayed diagnosis. A high index of suspicion and good clinical acumen are necessary for successful diagnosis. A history of misdiagnosis and/or surgical procedures combined with the triad of severe pain, point tenderness, and hypersensitivity to cold should prompt MRI investigation. Excision of the tumor is curative.

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