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Case Report

Malignant glomus tumor of the foot: a case report

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Abstract

Glomus tumors are rare lesions, representing approximately 2% of all soft tissue tumors, and are most found in the subungual region of the extremities. We present a rare case of a malignant glomus tumor located in the plantar region of the foot in a young adult, which was treated surgically through wide local excision.

Level of Evidence V; Diagnostic Studies; Expert Opinion.

Keywords: Orthopedics; Glomus tumors; Diagnosis; Treatment.

Introduction

Glomus tumors (GTs) are mesenchymal neoplastic lesions derived from cells of the neuromioarterial glome or glomus body, which has, among its functions, thermal control in the extremities[1,2]. They are extremely rare, representing approximately 2% of all soft tissue tumors, and are most found in the subungual region of the extremities[1,3]. The typical presentation of GTs is a purple-red skin nodule, usually causing pain disproportionate to the size of the lesion[4]. In addition, most TGs are benign and rarely demonstrate aggressive or malignant behavior and histological features[5]. Malignant cases represent less than 1% of all GTs[6,7].

Glomus tumors associated with bones and joints are frequently overlooked[8]. To date, just over 90 cases of bone and joint-associated GTs have been reported, likely due to the low incidence and high rate of misdiagnosis[4]. In most cases, clinical symptoms and physical signs are not specific[8].

We present a rare case of a malignant glomus tumor located in the plantar region of the foot in a young adult, which was treated surgically through wide local excision.

Case report

This study was approved by the Institutional Review Board under the number 6,974,015.

This is a 26-year-old female patient who was referred to the service due to a mass on the plantar surface of the left foot, with severe pain—rated 8 out of 10 on the visual analog scale—and difficulty walking for about six years. There was no history of previous trauma or incidents. Pain intensified when walking, standing, and upon manual pressure applied to the mass region. The patient noticed progressive but slow growth in this period.

On clinical examination, no deformities were observed in the weight-bearing feet; however, the patient presented with an antalgic gait pattern. Inspection revealed a visible mass in the plantar region of the midfoot and forefoot. Palpation of the mass elicited increased pain. The range of motion was within physiological limits across all examined segments. Neurological and vascular assessments of the affected limb showed no abnormalities.

A contrast-enhanced nuclear magnetic resonance (NMR) scan was performed, revealing an expansive lesion involving both the superficial and deep soft tissues of the left forefoot and, to a lesser extent, the midfoot. The lesion primarily affected the flexor muscles of the third, fourth, and fifth toes. It exhibited a hyperintense signal on T2-weighted images and an isointense signal on T1, with contrast enhancement (Figures 1-6). The lesion measured 7.5 cm × 2.7 cm × 3.5 cm.

An incisional biopsy was performed, confirming the diagnosis of a malignant GT. The patient subsequently underwent

Study performed at the Hospital das Clínicas Samuel Libânio, Pouso Alegre, MG, Brazil.

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a wide-margin resection of the neoplastic lesion (Figures 7 and 8). In the late postoperative period, wound dehiscence occurred but was successfully managed with second-intention healing (Figure 9). The patient experienced complete resolution of pain, regained normal gait function, and remains under follow-up with local and systemic staging, showing no signs of local recurrence or systemic disease.

Discussion

Glomus tumor, a rare condition arising from the abnormal proliferation of glomus body cells, is notable for its uncommon presentation and the diagnostic challenges it poses[4]. Early identification is crucial, as these tumors—although typically benign—can cause significant pain and negatively affect the patient's quality of life. In rare instances, they may exhibit malignant potential, with reported metastasis rates reaching up to 38%[6,7]. Treatment usually involves surgical excision, prioritizing the preservation of surrounding anatomical structures[3].

Doutrelon et al.[9] reported the case of a patient with a suprapatellar GT that caused painful claudication. The diagnosis was confirmed through magnetic resonance imaging (MRI), and the patient was submitted to complete surgical tumor resection, resulting in full resolution of the pain. According to the authors, GT located in atypical regions can easily go unnoticed, increasing the risk of delayed or incorrect diagnosis. However, their symptoms can often be effectively resolved with a simple surgical excision.

Kato et al.[10] reported the case of a 32-year-old male patient who presented with severe dorsal pain. Despite normal findings in initial clinical examinations, the MRI revealed an arthrosynovial cyst. Following surgical resection and histopathological analysis, the lesion was confirmed. The authors emphasized that an accurate differential diagnosis—supported by imaging tools such as ultrasound and MRI—is essential for determining the appropriate therapeutic approach. They noted that surgical resection is often the treatment of choice and highlighted the importance of a thorough and careful clinical evaluation to ensure effective management of GT cases.

In the largest published series of extradigital GT cases from the Mayo Clinic over the past 20 years, only 3.5% of tumors were in the foot. This rarity is attributed to the low concentration of glomus bodies in the feet, including in subungual regions. In the foot, common differential diagnoses include Morton's neuroma, hallucis flexor longus tendonitis, plexiform neurofibroma, plantar fibromatosis, and subungual exostoses[11].

A case series published in 2015 analyzed the characteristics of 11 GTs diagnosed in the feet at a North American center. The mean age at diagnosis was 45.4 years, ranging from 28 to 60 years, with a distribution of three men and eight women.

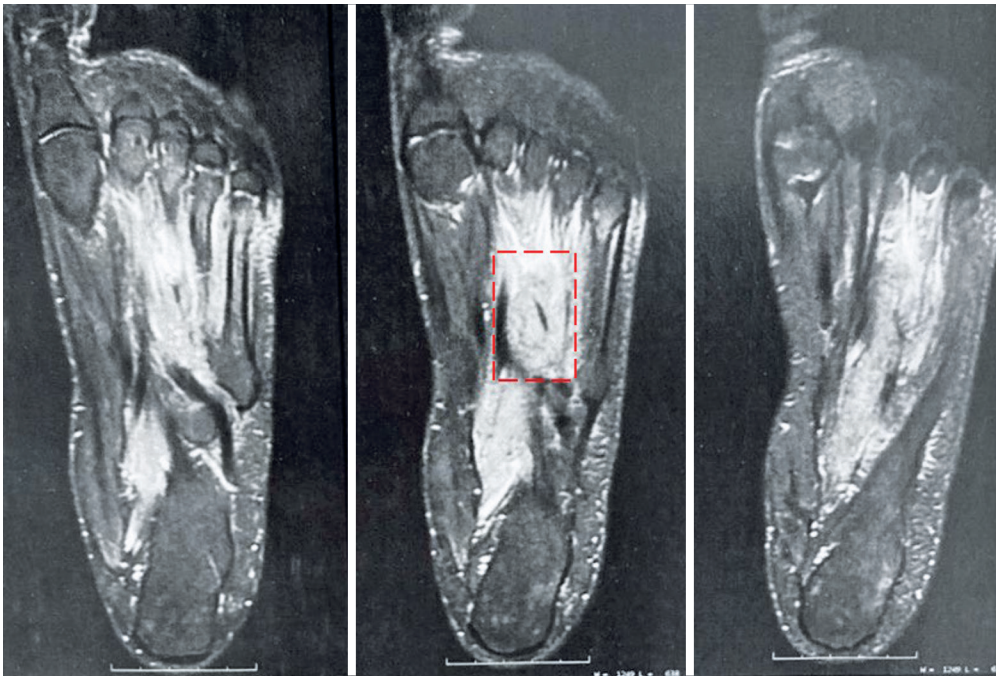

Figure 1. Expansive lesion of superficial and deep soft tissues of the left forefoot and, to a lesser extent, the midfoot, compromising mainly the flexor muscle of the third, fourth, and fifth toes, with hyperintense signal on T2-weighted and an isointense signal on T1 with contrast enhancement.

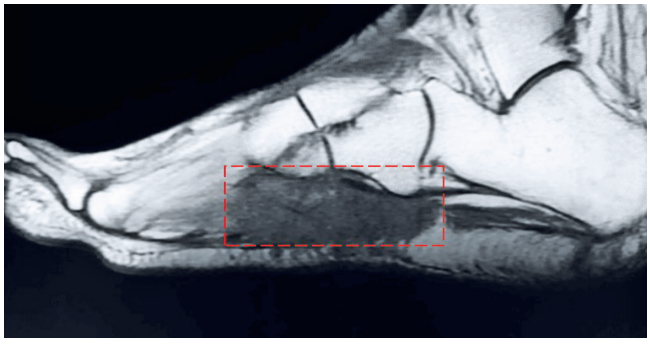

Figure 2. Image in the sagittal section of the foot showing mass (marking in the figure) in hyperintense signal on T1.

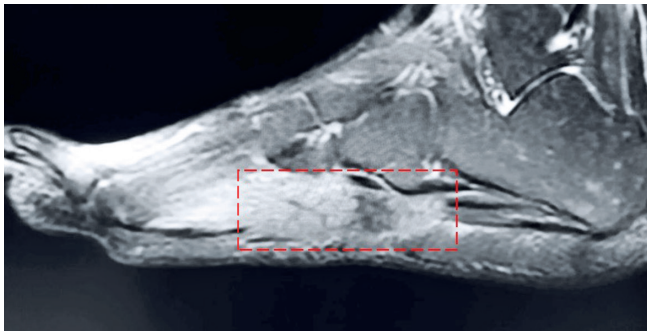

Figure 3. Image in the sagittal section of the foot showing mass (marking in the figure) in isointense signal on T2.

Figure 4. Axial section of the midfoot showing hypersignal image after contrast enhancement.

Of the 11 tumors, ten were in the dorsal subungual region of the toes, and only one was found in the plantar region of a toe. Specifically, eight tumors were in the hallux, one in the second toe, and two in the third toe. All cases were managed with extensive tumor resection, and no malignancy was found upon histopathological examination[12].

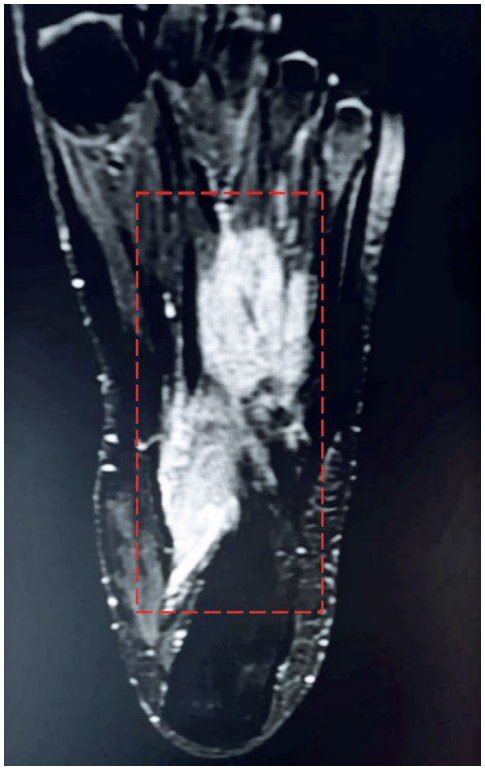

Figure 5. Coronal section of the foot showing mass (marking in the figure) in hyperintense signal after contrast enhancement.

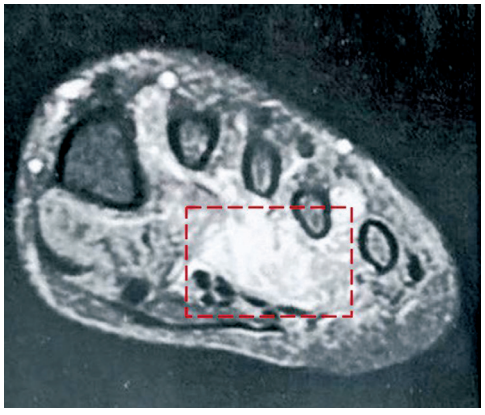

Figure 6. Sagittal section of the forefoot with mass (marking in the figure) in hyperintense signal on T2.

Figure 7. Intraoperative during resection, showing the dissection of the plantar fascia to establish the surgical margin.

Figure 8. Post-resection of tumor lesion, showing large soft tissue resection.

Rkiba et al.[13] published a case in 2021 involving a malignant GT of the foot. The patient was a 64-year-old woman who had noticed a growing and painful plantar mass in the right forefoot over a period of six months. The MRI revealed a large mass measuring 8 cm, centered in the plantar region with dorsal extension. An incisional biopsy confirmed a malignant GT with a high degree of anaplasia. Due to the tumor's aggressiveness and extensive local infiltration, wide local resection would be insufficient, and the surgical team opted for a transtibial amputation. As with the case presented in our report, staging did not reveal metastases, and therefore, no adjuvant oncologic treatment was indicated.

According to the authors, a thorough evaluation of any mass on the plantar surface of the foot is paramount, especially considering the possibility of tumors with atypical etiologies, such as GTs, beyond the more commonly encountered conditions like plantar fibromatosis. While plantar fibromatosis is typically benign, certain cases—such as GTs—may carry a risk of malignancy and metastasis, requiring a careful and precise diagnostic approach. Accurate differentiation between these conditions is essential for developing an effective treatment plan, as early detection of tumors with malignant potential can significantly improve patient outcomes and prognosis.

Figure 9. Plantar surface of the foot showing longitudinal access with dehiscence of the middle third of the wound and presence of ulceration on the lateral surface of the foot.

Conclusion

Glomus tumors in the feet pose significant challenges due to their rare occurrence and the complexity of diagnosis. The reported case aligns with the diverse clinical presentations of these tumors described in the literature. It is crucial to acknowledge the potential for atypical localization and the possibility of malignant transformation, reinforcing the need for a high index of suspicion and thorough diagnostic evaluation in cases of persistent, unexplained foot pain or masses.

Authors' contributions: Each author contributed individually and significantly to the development of this article: ECM *(https://orcid.org/0000-0002-8120-1888), and MCCMS *(https://orcid.org/0009-0008-7578-2250), and GJM *(https://orcid.org/0009-0000-0014-3325) Conceived and planned the activities that led to the study, interpreted the results of the study, participated in the review process; EASJ *(https://orcid.org/0000-0002-5054-874X) Approved the final version. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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