Simultaneous Solitary Glomus Tumors in Nonadjacent Digits

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The glomus tumor is a rare tumor that arises from the glomus apparatus of the dermal retinacular layer of the skin. This tumor has solitary and multiple forms. Solitary tumors are commonly found in the distal phalanx in a paraungual or subungual location. They present with a classic triad of paroxysmal pain, pinpoint tenderness, and cold hypersensitivity. Multiple tumors are extremely rare, are inherited in an autosomal-dominant pattern, and can have involvement outside the hand. Multiple tumors are commonly asymptomatic, but the multiple form can have mixed symptomatic and asymptomatic tumors. Histopathologic characteristics can be used to differentiate the solitary and multiple forms.

To our knowledge, simultaneous solitary glomus tumors in nonadjacent digits have not been reported in the literature. In this article, we describe the case of a woman in her early 40s with clinical, radiographic, and histologic findings for simultaneous solitary glomus tumors in nonadjacent digits of the hand. The authors obtained the patient’s written informed consent for print and electronic publication of her case report.

CASE REPORT

A woman in her early 40s presented to our general orthopaedic clinic with painful masses on her left index and left ring fingers. The mass on the left index finger had been present for 20 years and had slightly increased in size. The mass on the left ring finger had been present for 5 years and had remained stable in size. The woman presented to our clinic because her paroxysmal pain had become more severe. She had no significant past medical or surgical history. She had no family history of glomus tumor. On examination, she had an 8x5-mm oval blue mass at the ulnar paraungual region of the distal left index finger. The left ring finger had a smaller, 4x2-mm blue mass at the radial paraungual region. At both masses, there was extreme pinpoint tenderness but minimal cold intolerance.

Plain radiographs of the left hand showed the index soft-tissue mass with minimal thinning of the shaft of the distal phalanx. Contrast-enhanced magnetic resonance imaging (MRI) revealed the index and ring finger masses (Figure 1). The masses were bright on T2-weighted images and isointense to muscle on T1-weighted images with vigorous enhancement on postcontrast images. No extension into the bone or flexor tendon was observed.

"The treatment for a symptomatic glomus tumor is marginal excision. When the tumor is excised with negative margins, this treatment is curative."

The patient elected surgical excision of both masses. They were excised through a transungual approach by removing the entire nail and making a longitudinal incision through the nail bed. Both tumors were encapsulated. The index finger mass measured 1.4x0.5x0.4 cm, and the ring finger mass measured 0.6x0.3x0.2 cm (Figure 2). Histology confirmed the diagnosis of solid glomus tumor. The tumor was encapsulated with compact cords of round cells with...
rounded nuclei without atypia and relatively few vessels (Figure 3). The patient returned to the clinic for a final follow-up 6 months after surgery. By then, her incisions had healed, her fingernails had returned without deformity, and her preoperative symptoms had resolved. There were no clinical signs of recurrence.

**Discussion**

Glomus tumors arise from the glomus body in the dermal layer of the skin. The glomus body is a myoarterial apparatus that regulates the temperature of the skin. These tumors are rare. They make up less that 2% of all primary soft-tissue tumors and approximately 4% of all tumors in the hand. Forty-five percent of these tumors occur in the hand; a majority, 75% to 90%, occur in the classic subungual location. Glomus tumors can also occur throughout the musculoskeletal, respiratory, urologic, and gastrointestinal systems. The exact etiology of the pain is unknown. One hypothesis is that vasodilation of the Sucquet-Hoyer canal can cause pain directly or indirectly as it compresses the local sensory nerve plexus.

**Diagnosis**

The typical glomus tumor occurs as a solitary lesion in the hand. The tumor presents with the classic triad of pain, point tenderness, and cold insensitivity. Glomus tumors are more common in women, with a mean age of 30 to 40 years at presentation. Clinically, these tumors are small, less than 1 cm in size, blue, and extremely painful to palpation.

**Clinical Diagnostic Testing.** Clinical tests that aid in the diagnosis of a glomus tumor include the Love test, the Hildreth test, the transillumination test, and the cold insensitivity test. The Love test is a pain localization test in which a pinhead is used to test the most painful area. The Hildreth test involves modulating the pain produced by the Love test by exsanguinating the digit. The Hildreth test is positive when there is reduction in pinpoint tenderness on exsanguination and ischemia of the digit. The transillumination test reveals an opaque, reddish-bluish mass and allows differentiation from any other masses in the digit. The cold immersion test involves applying an ice cube or ethyl alcohol spray to the mass. The pain associated with a glomus tumor increases with cold application. This test has been found to be highly sensitive and specific.

**Imaging Options.** Radiographic analysis of glomus tumors includes plain radiography, MRI, magnetic resonance angiography (MRA), high-resolution ultrasonography, and contrast computed tomography (CT). Plain radiographs may show cortical thinning and erosion of the distal phalanx with large tumors. However, positive radiographs have been seen in only 40% of cases. With high-resolution ultrasonography, the tumors appear hypoechoic and have prominent vascularity. However, ultrason sound evaluation is limited because of ultrasonographers’ lack of experience with glomus tumors and the artifact created by the nail plate. Contrast CT is more commonly used in extradigital locations; the glomus tumors have strong homogenous enhancement in the arterial phase and prolonged enhancement in the delayed phase. MRI is probably the most widely used radiographic study after plain radiography. Glomus tumors have low signal intensity on T1-weighted images and high signal intensity on T2-weighted images. They enhance brightly with gadolinium or with MRA.

**Solitary and Multiple Tumors.** Glomus tumors have solitary and multiple forms. Solitary tumors are more common. Multiple glomus tumors make up only 10% of cases. Solitary glomus tumors have been shown to occur at multiple locations within the same digit and in adjacent digits. Our case report demonstrates that solitary glomus tumors can occur simultaneously in nonadjacent digits. Compared with solitary glomus tumors, multiple tumors usually occur at an earlier age and are more common in males. Multiple glomus tumors are inherited in an autosomal-dominant pattern with incomplete penetrance and have been associated with neurofibromatosis type 1. Clinically, multiple tumors are less likely to be painful and usually occur on the trunk and upper extremities. The malignant form of glomus tumor is glomangiosarcoma. Glomangiosarcomas are extremely rare and can arise within a typical glomus tumor or can arise de novo. De novo glomangiosarcomas are the only type that has been shown to metastasize.

**Histology.** The histologic diagnosis of glomus tumor is based on the types of cellular tissue present and the degree of vascularity within the tumor. Type I, mucoid...
hyaline, has hyalinized cartilage within islands of glomus cells. Type II, solid, consists of masses of glomus cells with very little vascularity; type II is commonly referred to as glomus tumor and is most common in solitary glomus tumors. Type III, angiomatous, has increased vascularity and is referred to as glomangioma; type III is usually present in patients with multiple glomus tumors, though these patients can have several tumors of different histologic types at the same time.\textsuperscript{19}

of all the fingers to determine if multiple solitary glomus tumors are present. This is particularly important in patients who are undergoing surgical excision of a glomus tumor. Larger case studies are needed to determine the exact incidence of multiple solitary glomus tumors.

\textbf{Authors’ Disclosure Statement}

The authors report no actual or potential conflict of interest in relation to this article.

\textbf{References}