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Ultrasonographic appearance of glomus tumors: A retrospective study

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Abstract

Background: The glomus tumor is a rare neoplasm and can be easily misdiagnosed. Patients with glomus tumor may present nonspecific symptoms such as long-term pain, temperature intolerance, and history of injury. It is common for such patients to be examined by physicians from various specialties such as orthopedics, family medicine or plastic surgery. They may undergo multiple imaging studies such as plain film X-ray, ultrasonography, or magnetic resonance imaging depending on the location of the nodule.

Objective: In this paper we present the first study in the Gulf Cooperation Council (GCC) region to address a retrospective institutional review of all ultrasonography studies of glomus tumors in a single medical center in the Kingdom of Bahrain between January 2013 and December 2018.

Results: Out of 31 patients with glomus tumors, 11 patients underwent an ultrasonography imaging study. The sex ratio (male: female) in the group of 11 patients was 0.56:1. 63.63% (7/11) of the ultrasonography requests were done by orthopedic surgeons, whereas 27.27% (3/11) were requested by a primary care physician (PCP), and 9.09% (1/11) of the patients were referred by an emergency physician. Glomus tumors were more common in patients aged 30–39 years and 50–54 years with a mean age of (mean $\pm$ SD, 47.818 $\pm$ 12.408) years. Ultrasonography results showed that 100% (11/11) were hypoechoic. The majority of the studies showed 90.90% (10/11) with a well-defined border. Doppler US showed that 72.72% (8/11) had visible hypervascularization in the tumor, 18.18% (2/11) had moderate visible blood in the tumor, and 9.09% (1/11) had no comments on vascularity in the report. The tumor size ranged from 2.2 to 6.5 mm (mean $\pm$ SD, 4.081 $\pm$ 1.470 mm) $\times$ 1 to 4 mm (mean $\pm$ SD, 2.690 $\pm$ 1.135 mm). 90.90% (10/11) of glomus tumors were located in the fingers. 90.90% (10/11) of the lesions were located in the left hand, whereas 9.09% (1/11) were located in the right hand and 9.09% (1/11) in the left toe.

Conclusion: The results of this study were similar to those of other studies described in the literature. A well-defined, hypoechoic lesion with a hypervascular mass in the nail bed were the most common ultrasonography findings associated with subungual glomus tumors.

Keywords: Glomus tumor, hand, neoplasm, fingers, ultrasonography

Introduction

Glomus tumors are rare and benign tumors ^[1, 2]. They account for up to 5% of all soft tissue tumors of the hand ^[2]. Such vascular neoplasms arise from the glomus body, which is a contractile neuromyoarterial structure found in the reticular dermis ^[3]. The role of the glomus body is to adjust blood pressure and temperature by regulating blood flow within the cutis ^[3]. Patients present with the classic triad of symptoms: paroxysmal pain, localized tenderness, and sensitivity to cold temperatures ^[4]. For accurate diagnosis, clinicians may request imaging studies such as computed tomography (CT), magnetic resonance imaging (MRI), and ultrasonography (US) ^[5, 6]. In such cases, ultrasonography can be the better option, considering the time and cost required ^[5, 6]. The aim of this study is to present the preoperative ultrasonography characteristics of pathologically confirmed glomus tumors in a single medical center in the Kingdom of Bahrain.

Methods

A list of patients with confirmed histopathological diagnosis of glomus tumor (N = 31 patients) between January 2014 and December 2019 was generated via SNOWMED codes using I-SEHA, which is the official EMR (Electronic Medical Record) adopted at the hospital.

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We looked into the preoperative ultrasonography reports of those patients, identifying 11 patients with ultrasonography imaging studies done between January 2013 and December 2018. Data obtained from the patients' medical records included demographic information, pathological diagnoses, radiological reports, and outpatient clinic visit information.

Results

Out of 31 patients with glomus tumors, 11 patients underwent ultrasonography imaging. The sex ratio (male: female) in the group of 11 patients was 0.56:1 (Figure 1). 63.63% (7/11) of the ultrasonography requests were done by orthopedic surgeons, whereas 27.27% (3/11) requested a primary care physician (PCP), and 9.09% (1/11) of the patients were referred by an emergency physician. Glomus tumors were more common in patients aged 30–39 years and 50–54 years with a mean age of (mean $\pm$ SD, 47.818 $\pm$ 12.408) years (Figure 2). Ultrasonography results showed that 100% (11/11) were hypoechoic. The majority of the studies showed 90.90% (10/11) with a well-defined border. Doppler US showed that 72.72% (8/11) had visible hypervascularization in the tumor, 18.18% (2/11) had moderate visible blood in the tumor, and 9.09% (1/11) had no comments on the vascularity in the report. The tumor size ranged from 2.2 to 6.5 mm (mean $\pm$ SD, 4.081 $\pm$ 1.470 mm) $\times$ 1 to 4 mm (mean $\pm$ SD, 2.690 $\pm$ 1.135 mm). 90.90% (10/11) of glomus tumors located in the fingers. 90.90% (10/11) of the lesions were located in the left hand, whereas 9.09% (1/11) were located in the right hand and 9.09% (1/11) in the left toe. The diagnostic results of glomus tumors by Doppler ultrasonography are summarized in Table 1. The classic ultrasonography findings of glomus tumors are shown in Figures 3 and 4.

Fig 1: Gender distribution of patients with Glomus Tumor

Fig 2: Age groups of patients with Glomus Tumor

Table 1: The diagnostic results of Glomus Tumors by Doppler ultrasonography (n=11)

Case No.	Size (mm)	Size (mm)	Margin	Echogenecity	Vascularity
1	6	5	Well Defined	Hypoechoic	Hypervascular
2	3	3	Well Defined	Hypoechoic	Hypervascular
3	4.8	3.1	Well Defined	Hypoechoic	Hypervascular
4	5	3	Well Defined	Hypoechoic	Hypervascular
5	6.5	4	Well Defined	Hypoechoic	Mild Vascularity
6	2.2	2.8	Well Defined	Hypoechoic	N/A
7	4	1	N/A	Hypoechoic	Hypervascular
8	5	2	Well Defined	Hypoechoic	Hypervascular
9	3	2	Well Defined	Hypoechoic	Hypervascular
10	2.4	1.5	Well Defined	Hypoechoic	Hypervascular
11	3	2.2	Well Defined	Hypoechoic	Mild Vascularity

Discussion

Glomus tumors are difficult to diagnose because patients usually present with non-specific symptoms such as pain and sensitivity to cold [7]. Although its etiology is still unknown, the cause may be attributed to various factors such as past injury, trauma, sex, age, and genetics [8]. Glomus tumors can occur in various parts of the body; the most common site reported in the literature is solitary extra digital distribution along the upper extremity; the finger or toe were the most common sites reported in the literature [8]. The use of high-frequency ultrasound in the preoperative examination of

glomus tumors can accurately locate the position and show the characteristics of the nodule in real time [6]. Chiang *et al.* described in their study 11 cases of the tumor with rich intratumoral blood flow signal with ultrasonography [9]. Not all glomus tumors were rich in blood; a study done by Zhina *et al.* shows little visible blood and no intratumoral blood flow in their study samples [6]. Wortsman and Jemec reported seven cases with hypoechoic lesions with clear borders [10, 11]. The exact internal hemodynamics of glomus tumors are still underreported in the literature, and their influence on surgical treatment and prognosis needs to be further assessed [6, 8].

Fig 3: US image shows well defined, rounded and hypoechoic lesion measuring 6.5x4mm in size located beneath the nail of the left second toe causing focal scalloping of the underlying distal phalynx

Fig 4: US image shows lobulated, solid appearing and hypervascular mass dorsal to the base of the distal phalynx of the right thumb

Conclusion

The results of this study were similar to other studies described in the literature. A well-defined, hypoechoic lesion with a hypervascular mass in the nail bed were the most common ultrasonography findings associated with subungual glomus tumors. Although the sample size of this study is small and considering the glomus tumor low incidence rate, we believe that understanding the common ultrasonography features may be helpful in the diagnosis of such nodules.

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