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Research Paper

Epidemiologic Characteristics, Presentation and Management Outcomes of Glomus Tumor: A Retrospective Study

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ABSTRACT

Background: Glomus tumors are benign perivascular neoplasms generally located in distal limbs, particularly in the nail bed, which present a classic triad including pain, tenderness, and cold hypersensitivity. This study described the epidemiologic characteristics, clinical presentation, diagnosis, management, and post-operative complications of glomus tumors.

Methods: Medical profiles of patients with a glomus tumor who underwent surgical excision at Shafa Yahyaeian Hospital, Tehran, Iran, between 2009 and 2021, were retrospectively reviewed. A senior hand surgeon at the same orthopedic center managed all patients with surgical excision. The collected information included demographic characteristics, clinical presentation, tumor characteristics, recurrence, and post-operative complications.

Results: The study included 38 females (76%) and 12 males (24%), with a mean age of 38.9±14.3 years (range: 16-75 years). The symptoms at presentation included pain (100%), local tenderness (98%), and cold sensitivity (66%). In all patients, Hildreth's test was positive. The mean symptom duration was 51.2±53.7 months. Of 50 cases, 47 lesions (94%) were in the fingers. The subungual region was the most frequent site of finger involvement (n=35, 74.5%). At a mean follow-up of 6.4±4.5 years, tumors recurred in two patients (4%). Seven patients (14%) had surgical complications, including persistent pain (n=2), numbness (n=2), paresthesia (n=1), limited range of motion (n=1), and nail separation (n=1).

Conclusion: Glomus tumors present as painful lesions, most commonly in the fingertips, and are generally associated with long symptom duration. The lesions are more common in females. Surgical excision is an efficient treatment for the local control of glomus tumors.

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Journal of Research in
Orthopedic Science

1. Introduction

Glomus bodies are normal structures composed of glomus cells, smooth muscle cells, and vasculature highly concentrated in the digits and are involved in regulating skin temperature [1]. Glomus tumors are benign perivascular neoplasms in the distal limbs, particularly in the nail bed [2, 3].

Patients generally present with long periods of pain. Clinically, a glomus tumor is a discoloration of the nail plate into bluish or pinkish red, with a classical triad of severe pain, localized tenderness, and cold sensitivity. Classic symptoms might not be present in all patients, necessitating differential diagnosis of other tumors. Diagnosis is generally based on clinical tests, including Love's pin test, Hildreth's test, and trans-illumination test, combined with imaging studies, such as magnetic resonance imaging (MRI), ultrasonography, and radiography [4]. However, mismanagement and delayed diagnosis are common [2].

When the glomus tumor is diagnosed, complete surgical excision is required to improve symptoms. Various surgical approaches could be selected depending on the anatomical location of the lesion. Incomplete excision can cause local recurrence; thus, a recurrence rate of up to 15% has been reported following the surgical excision [2, 4].

In this study, we described epidemiologic characteristics, clinical presentation, diagnosis management, postoperative complications, and recurrence of glomus tumors.

2. Methods

Patients who underwent surgical excision at Shafa Yahyaeian Hospital, Tehran, Iran between 2009 and 2021, were retrospectively reviewed. Inclusion criteria were histologic confirmation of glomus tumor diagnosis and a minimum follow-up of 12 months. Patients presented with a recurrence and lost to follow-up were excluded from the study. Of 66 patients with glomus tumors, 50 cases met the study criteria and were included in the analysis.

A senior hand surgeon managed all patients at the same orthopedic center. Digital nerve blocks were used for all patients with hand involvement. The translingual approach was used for patients with subungual involvement. The nail plate was removed using fine artery forceps in a standard fashion and carefully lifted off to prevent damage to the nail bed. After exposing the tumor, a longitudinal incision was made, and the tumor was completely excised under magnification. For tumors located in the volar pulp, the lesion was excised through a direct incision made over the volar pulp skin. Post-operatively, limb elevation was advised to prevent edema and swelling. Lesions in less frequent locations were excised as appropriate. Stitches were removed ten days after the operation.

Demographic characteristics, including age, sex, affected digit, dominant side, and clinical characteristics such as symptoms, pain duration, Hildreth's sign, and tumor characteristics (size, location, and post-operative complications such as deformity, pain, numbness, oncologic outcomes), were collected. The largest diameter of lesion in gross histopathology was regarded as the tumor size. The detection of recurrence relied on clinical suspicion (recurrent pain), plain radiography, and MRI studies if necessary.

Statistics

Data were analyzed using SPSS software, version 22. Qualitative data were presented as numbers and percentages. Quantitative data were presented as Mean±SD. The mean values between the two groups were compared by an independent t-test or Mann–Whitney U test. A $P \leq 0.05$ was considered statistically significant.

3. Results

The study included 38(76%) females and 12(24%) males, with a mean patient age of 38.9±14.3 years (range: 16-75 years). There was no significant difference in mean age between male and female populations (36 years vs 40 years). The dominant side was affected in 24(48%) patients, while it was the non-dominant side in 26(52%) patients. Symptoms included pain in all patients (100%), local tenderness in 49 patients (98%), and cold sensitivity in 33 patients (66%). Hildreth's test yielded positive results in all patients. The mean duration of symptoms was 51.2±53.7 months (range: 0.5-192 months), with no significant difference between males and females (55 months vs 50 months, P=0.73).

Ninety-four percent (47 cases) of the lesions were located in the fingers, while the remaining four were found in the wrist, forearm, and thigh. Among the 47 finger glomus tumor cases, 35(74.5%) were in the subungual region, 9(19.1%) were in the volar pulp, and 3(6.4%) were in other locations such as the intermediate pha-

Table 1. Demographic characteristics of patients with a glomus tumor

Variables		Mean±SD/No. (%)
Age (y)		38.9±14.3
Sex	Male	12(24)
	Female	38(76)
Hand dominancy	Dominant	24(48)
	Non-dominant	26(52)
Lesion location	Finger	47(94)
	Other	3(6)
Tumor size (mm)		6±3.4
Symptom duration (m)		51.2±53.7
Symptoms	Pain	50(100)
	Local tenderness	49 of 50(98)
	Cold sensitivity	33 of 50(66)
Follow-up (y)		6.4±4.5

Journal of Research in
Orthopedic Science

lange, proximal phalange, or web space. The first and fourth fingers were the most frequently affected (n=12 and n=13, respectively), while the fifth finger was the least frequently involved finger (n=4). The mean size of the tumor was 6±3.4 mm (range: 1-20 mm). The demographic characteristics of the patients are summarized in Table 1.

Post-operative complications

At a mean follow-up of 6.4±4.5 years (range: 1-16 years), tumor recurrence was observed in two patients (4%) in the finger. One recurrence occurred one year post-operation, while the other occurred three years post-operation, both of which underwent revision surgery. No further complications were recorded during the two-year follow-up of these patients. Seven patients (14%) experienced post-operative non-oncologic complications, including persistent pain in two patients, numbness in two patients, paresthesia in one patient, limited range of motion in one patient, and nail separation without replacement. Since the post-operative complications were minor, no intervention was required.

4. Discussion

This study evaluated the epidemiological characteristics and outcomes of surgical excision in a retrospective cohort of 50 patients. The frequency of glomus tumors in women was about 3.2 times higher than in men. Fingers were the most commonly affected site (94%), with the subungual region being the most common location (74.5%). Pain and tenderness were present in almost all patients, while cold sensitivity was present only in 66% of patients. Two recurrences occurred during the average 6.4-year follow-up. Seven patients experienced surgical complications, most of which were minor. The epidemiological characteristics and outcomes of glomus tumors have been reported in earlier studies as well. Chou et al. reported their experience with 50 patients diagnosed with glomus tumors over 20 years. The mean age of patients was 42.3 years, ranging from 9 to 61 years, with a female-to-male ratio of 3.2. Pain and tenderness were the main symptoms, while cold hypersensitivity was present in only 30% of patients [5]. Saaiq et al. reported on glomus tumors of the hand in 17 patients with a mean age of 41.2 years, a female-to-male ratio of 2.4, and the mean symptom duration of 18.9 months. Pain and tenderness were present in all patients, while cold sensitivity was present in 76.5%. Nail change was only present in two patients (11.76%) [6]. Fazwi et al. retrospectively reviewed their experience with 15 patients diagnosed over 15 years, reporting a female-to-male ratio of 1.5 and a mean age of 49.6 years. Tenderness, pain, and cold hypersensitivity were present in 63-100% of patients [2]. Geertruyden et al. reported glomus tumors of the hand in 51 patients with a mean age of 44 years and the female-to-male ratio of 6.2 [7].

This study's mean age was 38.9 years (range: 16-75 years), with a female-to-male ratio of 4. Therefore, the epidemiologic characteristics of patients in the present study were similar to those reported in earlier studies. Similar to earlier studies, pain, tenderness, and cold hypersensitivity were the main symptoms at presentation in the present study. However, nail deformity was not observed in any patients. The mean symptom duration was 51.2 months, comparable to earlier reports. Since the classic triad of glomus tumors may not manifest in all patients, it is essential to differentially diagnose glomus tumors from other conditions, such as leiomyoma, hemangioma, neuroma, and osteochondroma, which can also cause severe fingertip pain [4]. Previous studies have reported recurrence rates for glomus tumors ranging from 5% to 15% [2, 8-10]. This variation can be attributed to factors such as location, size, and the possibility of complete excision [11-15]. Malignant transformation of glomus tumors can also increase the risk of local recurrence [5]. In the present study, two recurrences (4%) were observed, both in the subungual region. However, no instances of malignant transformation were recorded, and the rate of extradigital glomus tumors was significantly lower in the present study (6%). Surgical complications following glomus tumor excision vary depending on the tumor's location. Nail deformity is a common post-operative complication in finger tumors, with reported incidences ranging from 3.3% to 26.3%, and nail deformity was recorded in two patients (4%) [4, 5]. In contrast, in a study, no post-operative nail deformity was recorded [6].

In this study, only one patient had a nail-related complication (nail separation), and complications, such as paresthesia, persistent pain stiffness, and limited range of movement occurred at a lower frequency, similar to another survey [16]. The epidemiologic characteristics and outcomes of glomus tumors in the present study were almost consistent with those reported in earlier studies, with minor differences in some characteristics, such as the incidence of extradigital glomus tumors [11-15].

5. Conclusion

Considering the incidence of glomus tumors, more awareness is required regarding its epidemiologic characteristics, clinical presentation, diagnosis, management, post-operative complications, and recurrence. According to our experience, glomus tumors are often found in the finger and are more prevalent in females. The diagnostic triad of glomus tumor, including pain, tenderness, and cold hypersensitivity, is present in most patients. Surgical excision is an effective treatment for local control, although recurrence may occur in a small subset of patients .

Study limitations

A limitation of this study was its retrospective design, which limited the scope of comprehensive outcome investigations, such as assessing pain improvement.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by review board of Iran University of Medical Sciences (Code: IR.IUMS.FMD.REC.1402.346).

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Authors' contributions

Conceptualization: Farid Najdmazhar, Hooman Shariatzadeh, and Reza Torab; Study design and manuscript preparation: Farid Najdmazhar, Hosein Hamadian, Behnam Jafari, Seyed Morteza Motevallian Sajadi; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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