Surgical management of the glomus tumors of the fingers: a single center experience

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INTRODUCTION: *Glomus tumors are rare neoplasms arising from the subcutaneous glomus apparatus. They account for 1 – 5% of the soft tissue tumors of the upper extremity, occurring in most cases in the nail bed. The typical clinical presentation includes paroxysmal pain and hypersensitivity to cold which limit the use of the affected hand causing practical, professional and often emotional discomfort for the patient.*
MATERIALS AND METHODS: *Four patients with finger glomus tumor were treated in our institution in the last 30 years. Three patients had a right hand tumor (1st, 3rd and 4th finger) and one patient a left hand tumor (2nd finger). Three tumors were placed in the nail bed and one in the finger tip. In all cases duplex ultrasonography was employed preoperatively and during surgery to ensure complete resection of the tumor. All patients underwent surgical excision of the tumor with local block anesthesia.*
RESULTS: *Intense point pain and hypersensitivity to cold was observed in all cases (100%). Two out of 4 patients (50%) presented an irradiation of the pain at the ipsilateral arm and shoulder. Surgical procedure was performed successfully in all cases, with total excision of the tumor and no intraoperative or postoperative complications. No recurrences occurred.*
CONCLUSIONS: *Diagnosis of glomus tumors of the fingers is generally easy when manifested with the classical clinical picture and duplex ultrasonography is employed. Complete surgical excision is curative, providing immediate relief of symptoms and improvement of eventual professional or psychological discomfort.*

KEY WORDS: Glomus body, Glomus tumors, Nail bed tumors, Soft tissue tumors.

Introduction

Glomus tumors are rare neoplasms arising from the subcutaneous glomus apparatus. They account for 1 – 5% of all soft tissue tumors of the upper extremity [1], occurring in the hand in 75% [2] and in the nail bed in 50 – 90% of cases [2,3]. This favourite anatomical location and the intense pain proper of these tumors, constrict the patient to limit the use of the affected hand, causing practical, professional and often emotional discomfort. The typical clinical presentation with paroxysmal point pain and hypersensitivity to cold and the benign nature makes generally easy their diagnosis and treatment. However the long duration of unexplainable pain, the absence of a visible or palpable lesion, an atypical clinical picture and the possibility for recurrence after incomplete surgical excision, can provide difficulties in the management of such tumors.

Materials and methods

Four patients with glomus tumor of the fingers were treated in our institution in the last 30 years. We retrospectively reviewed their clinical reports and demo-

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graphic, clinical, diagnostic and therapeutic data were collected. The mean age of the patients was 42 years (range 20 – 50). Two patients were males and the other 2 females; all of them presented a single tumor. Three patients had a right hand involvement (1st, 3rd and 4th finger) and 1 patient a left hand tumor (2nd finger). Three tumors were placed in a subungual location and one in the finger tip. One patient with a subungual lesion underwent three previous surgical interventions in other hospital and presented deformity of the fingertip and partial absence of the nail.

Diagnostic procedures employed to achieve diagnosis and preoperative planning included radiography, duplex ultrasonography and angiography. No magnetic resonance imaging (MRI) was employed. Plain radiography was employed in 2 cases preoperatively and in the patient previously operated it was performed a selective angiographic study of the hand.

All patients underwent surgical excision of the tumor. Surgery was performed with local block anesthesia, with a tourniquet applied at the base of the finger. In 3 cases the nail was removed to access the tumor which was subsequently excised sharply. Particular attention was paid to completely remove the lesion without leaving residual fragments. The nail bed was repaired finally. Duplex ultrasonography was used in all cases intraoperatively to control the tumors (removing the tourniquet) and postoperatively to assess their complete excision. Clinical and ultrasonographic evaluation were performed approximately 1 year after surgery in the first 3 cases and after 3 months in the last case.

Results

Clinical history revealed in all cases the arise of point paroxysmal pain in the finger several years before surgical evaluation. The mean time between pain onset and surgical evaluation was 8.6 years (range (0.5 – 20 years). In one case surgical examination and surgery were unsuccessfully performed in a different hospital. No history of prior traumatic events was registered but all patients reported the employment of medical treatments, particularly with systemic or topic analgesics, without consistent results.

Table I summarizes the demographic data of our patients and the initial clinical findings registered. Intense point pain and hypersensitivity to cold was observed in all cases (100%). Two out of 4 patients (50%) referred an irradiation of the pain at the ipsilateral arm and shoulder. No anatomical alterations nor colour or trophic changes of the nail and the skin were found, making exception for the patient who underwent surgery elsewhere. This patient presented a deformity of the finger tip and of the nail caused by the repeated surgical operations.

Plain radiography was employed in two cases preoperatively revealing an osteitis of the distal phalanx, without specific findings regarding the tumor. In all cases duplex ultrasonography was employed preoperatively, during the surgical procedure and once the tumor was excised. Before and during the surgical intervention it was able to appreciate the persistent vascular murmur, characterized by high and completely uneven tone and to register the typical high frequency and low impedance waves related to the presence of a glomus tumor. The abolition of such findings was ascertained once the tumor was excised.

Surgical procedure was performed successfully in all cases, with total excision of the tumors and in absence of any intraoperative or postoperative complication. No recurrences occurred and pain disappeared rapidly after surgery in all cases and for the overall duration of the follow – up. Patients satisfaction was absolute. Histological examination of the specimens confirmed the clinical suspect in all cases.

Discussion

Glomus tumors of the fingers were first described in 1812 as "painful subcutaneous tubercles" by Wood[4]. In 1878 Kolaczek reported the typical involvement of the subungal bed [5] and in 1924 Masson described their histological features [6]. Since that time numerous studies have been published and consequently our knowledge is growing. These tumors arise from the glomus bodies allocat-

TABLE I - *Demographic data and clinical presentation of finger glomus tumors in our patients.*

	Sex	Age	Location	Symptoms' duration	Pain	Cold sensitivity	Nail – skin alteration
Pt. 1	M	20	Distal phalanx, 2° finger, left hand	10 years	Yes	Yes	Yes, previous surgery
Pt. 2	F	48	Distal phalanx, 3° finger, right hand	20 years	Yes	Yes	Nil
Pt. 3	F	50	Distal phalanx, 1° finger, right hand	4 years	Yes	Yes	Nil
Pt. 4	M	49	Distal phalanx, 4° finger, right hand	6 months	Yes	Yes	Nil

ed in the subcutaneous tissue. A glomus body is a capsulated vascular reticulum, alimented from an afferent arteriole, containing an anastomotic channel (Suquet – Hoyer) and deputed to the control of peripheral blood pressure and temperature through the regulation of blood flow. The amount of blood that achieves the glomus body defllows through an efferent venule in dependence on the contractile activity of special actin - containing cells (*glomus cells*), which surrounds the canals of the reticulum [7]. Several stimuli (environmental, local, endocrine and neural) determine physiological responses in terms of peripheral blood flow through the activity of the glomus bodies. Their concentration is particularly high in the tips of the fingers, especially under the nail.

Glomus tumors are considered to be hamartomas arising in one of the structural components of a glomus body. Their exact incidence is unknown, however it is estimated that they represent less than 2% of all primary soft tissue tumors and 1.6% of soft tissue tumors of the extremities [8,9]. They have been also estimated to account for 1-5% of the overall soft tissue tumors of the upper extremity [1]. Women are more frequently involved and the average age at presentation ranges from 30 to 50 years [2]. The location of a glomus tumor is extremely variable; several extradigital anatomic districts may be involved [7] but the 75% approximately arises in the hand [2]. About 50 - 90% of these tumors arises in a subungual location [2,3]; other sites of origin are the bones of the fingers (intraosseous forms), the joints and the nerves. This anatomic distribution reflects the distribution of glomus bodies throughout the human body. There have been also described multiple and even familial forms [10]. In our series all cases were solitary tumors of vascular origin predominantly concerning the subungual tissue. We didn't have any evidence of involvement of other patient's family members.

Clinical presentation generally occurs with intense pain, sensitivity to cold and point tenderness and is presumed to enable diagnosis in 90% of cases [11]. Pain is the most frequent symptom, arises spontaneously in general, without any apparent cause and worsens as the tumor grows. Palpation is often impossible due to exacerbation of pain and sometimes patients complain irradiation at the ipsilateral arm and shoulder. Pain may be present for long time as patients often defer seeking medical evaluation or have had erroneous diagnosis and treatment. The mean duration from onset of pain to surgery it has been estimated to be approximately 7-8 years [12,13]; in our experience was 8.6 years. From a pathophysiological point of view, it is believed that tactile or thermal stimuli excite the contractile activity of glomus cells triggering pain.

Hypersensitivity to cold has been reported to be referred in 42-100% of cases[14]. In our study it was present in all cases. Point tenderness, discoloration or nail deformity have been also reported to occur in several large series, but they were not observed in our patients.

Diagnosis can be difficult in patients with small lesions where typical clinical presentation lacks. Several clinical test's have been proposed (Love's test, Hildreth's test, cold test, transillumination) to aid in diagnosis, demonstrating good sensitivities and specificities[15]. In particularly the cold test, consisting in the provocation of pain with the application of cold water or ethyl alcohol, has sensitivity and specificity reported of 100%[16]. Even in our study cold test resulted positive in all cases.

In addition to clinical tests, ultrasonographic and imaging techniques can be useful. In our experience, as we reported in a previous pubblication [17], duplex ultrasonography has a primary diagnostic role. It offers numerous advantages being a simple and low cost ambulatory procedure, without exposure risks for the patients and with excellent sensitivity and specificity, which avoids employing of other expensive techniques. Plain radiographs may be useful in order to demonstrate osseous involvement; cortical thinning or erosions can be seen especially in long standing lesions as in two patients in our study. Magnetic resonance or selective angiography of the hand can aid diagnosis in difficult cases [18,19]. In our experience it was not necessary to employ these procedures, except of the angiographic study of the finger in the patient who underwent surgery previously. At that time MRI was not available in our hospital.

The treatment of choice for glomus tumors is surgical excision. Several techniques have been proposed for subungual lesions as transungual, lateral-subperiostial and Keyser-Litter approach [15]. We used the subungual approach in all cases, with excellent results and without any complication. The removal of the tumor was followed by rapid remission of symptoms. Recurrences have been described in 5-50% of cases [20]; early recurrences are due to incomplete extirpation of the lesion while late recurrences are attributed to the arousal of a new glomus tumor. We did not observe any recurrence in our patients within the follow up time.

Conclusions

Diagnosis of glomus tumors of the fingers is generally easy when manifested with the classical clinical picture and duplex ultrasonography is employed. Small tumors, asymptomatic or poorly symptomatic, and recurrent tumors can be difficult to diagnose. In these cases advanced diagnostic examinations, as MRI should be used. Surgical excision of the tumor is curative, providing early relief of symptoms and eventual psychological or professional discomfort caused by the inability to use the hand freely.

Riassunto

I tumori glomici delle dita sono rare neoplasie che insorgono sul tessuto glomico sottocutaneo e rappresentano

il 1-5% di tutti i tumori dei tessuti molli. Decorrono nel 75% dei casi nella mano e nel 50-90% in corrispondenza del letto ungueale. Clinicamente sono in genere caratterizzati dalla presenza di dolore intenso e ipersensibilità al freddo e costringono il paziente a limitare l'uso della mano interessata.

Negli ultimi 30 anni abbiamo trattato 4 pazienti con tumore glomico delle dita. Due pazienti erano maschi e 2 femmine e l'età media era di 42 anni. Tutti presentavano una singola lesione, in 3 casi in corrispondenza del letto ungueale in un caso nel polpastrello. Uno dei pazienti con tumore subungueale era stato operato 3 volte in passato in altro ospedale senza beneficio. In tutti i pazienti la diagnostica strumentale è stata effettuata con ecografia doppler, in 2 casi è stata impiegata la radiografia convenzionale ed in 1 caso l'angiografia selettiva della mano. Tutti i pazienti sono stati sottoposti ad intervento chirurgico di asportazione della lesione in anestesia loco-regionale.

Dal punto di vista clinico è stato osservato dolore intenso e ipersensibilità al freddo in tutti i casi. Metà dei pazienti lamentava irradiazione del dolore al braccio ed alla spalla omolaterale. L'ecografia doppler è stata in grado di porre diagnosi in tutti i casi ed è stata inoltre impiegata durante l'intervento per constatare la totale asportazione delle lesioni. Tutti i pazienti hanno riferito precoce abolizione del dolore dopo l'intervento chirurgico.

La diagnostica dei tumori glomici delle dita è relativamente semplice quando si presentano con il quadro sintomatologico tipico e quando è impiegata l'ecografia doppler. In casi asintomatici o con quadro clinico attenuato, assenza di lesioni visibili, lunga durata dei sintomi e recidive post-chirurgiche la diagnosi può essere difficile e si può avvalere di metodiche più avanzate come la risonanza magnetica e l'angiografia. Una volta individuata la lesione, l'asportazione chirurgica rappresenta il golden standard terapeutico.

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