CASE REPORT

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A recurrent solitary glomus tumor of the forearm

VALERIU ARDELEANU[1–3], CRISTIAN RADU JECAN[4,5], ALIN LAURENŢIU TATU[6,7], ANDREI GHEORGHE MARIUS MOTOC[8]

[1] *Arestetic Clinic, Galaţi, Romania*
[2] *Department of Surgery, Railways General Hospital, Galaţi, Romania*
[3] *Doctoral School of Medicine, Faculty of Medicine, "Ovidius" University of Constanţa, Romania*
[4] *Department of Plastic, Aesthetic and Reconstructive Surgery, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania*
[5] *Department of Plastic, Aesthetic and Reconstructive Surgery, "Prof. Dr. Agrippa Ionescu" Emergency Clinical Hospital, Bucharest, Romania*
[6] *Department of Pharmacology, Faculty of Medicine and Pharmacy, "Lower Danube" University of Galaţi, Romania*
[7] *Department of Dermatology, "Sf. Parascheva" Infectious Diseases Hospital, Galaţi, Romania*
[8] *Department of Anatomy and Embryology, "Victor Babeş" University of Medicine and Pharmacy, Timişoara, Romania*

Abstract

Glomus tumors account for 1.6% of all soft tissue tumors and the majority are localized at the level of the fingertips and do not exceed the size of 5 mm. They are usually solitary tumors, characterized by the following clinical triad – severe pain, pinpoint tenderness, and cold intolerance. We present the case of a 63-year-old patient with a fixed tumor located in the lower third of the right forearm with a long-axis diameter of 4 cm, with irregular borders and tenderness to palpation. The tumor had been surgically removed 15 years ago, but it redeveloped two months after surgery, and grew in size until the fourth month after the surgery when it stopped growing. The preoperative ultrasound showed an expansive mass suggestive of swelling/inflammation in the adjacent soft tissue and having a mass effect on the deep muscle structures. Intraoperatively, a 3/4/3 cm (antero-posterior/transversal/cranio-caudal) pink tumor was found subcutaneously, with well-defined borders, which was mobile on the deep planes, apparently encapsulated. The tumor was removed with safety margins of about 1 cm and hemostasis was performed. Postoperatively, immunohistochemistry confirmed the diagnosis of glomus tumor: alpha-smooth muscle actin (α-SMA) positive in the cytoplasm of malignant cells, type IV collagen positive in the basement membrane, cluster of differentiation 34 (CD34) negative in the malignant cells, CD34 positive in endothelial cells, Ki67 positive in the 1–2% of the cancer cells nuclei. The postoperative evolution was favorable, without complications and no recurrence at six months.

Keywords: glomus tumor, solitary tumor, upper extremity, vascular lesion.

Introduction

Glomus tumors are rare tumors, mostly benign, derived from the body of neuromuscular and arterial glomus. The glomus is a specialized arteriovenous anastomosis that ensures direct communication between an arteriole and a venule and plays a role in the thermoregulation of the reticular dermis [1].

The most common sites of glomus tumors are the subcutaneous or subungual tissue of the fingers [2]. Also, other sites have been reported – in the palm, wrist, forearm, foot, bone, stomach, colon, cervix and the mesentery, but their incidence is rare [3].

Clinically, glomus tumors are generally solitary tumors, described by the clinical triad: severe pain, pinpoint tenderness, and cold intolerance. Clinical diagnosis is often misleading, as it can be mistaken for hemangiomas, neurinomas, lymphadenitis, dermatofibromas, nevi, metastasis. The only investigative method that can make the diagnosis more accurate is magnetic resonance imaging (MRI) [4].

Glomus tumors account for 1.6% of all soft tissue tumors and they are more common in men aged between 40 and 60 years old [5]. They usually measure between 5–10 mm [6]. The treatment involves complete surgical excision; recurrences are rarely reported.

We present here a very rare case of recurrent glomus tumor.

Case presentation

A 63-year-old male patient presented in Aresthetic Clinic, Galaţi, Romania, in February 2019, for a tumor located in the lower third of the right forearm, on the inner face, about 6–7 cm from the radio-carpal joint, with a long-axis diameter of 4 cm, with irregular borders and tenderness to palpation. Macroscopically and clinically, it had the characteristics of a lipoma: mobile, well delimited, slightly reluctant to feel, painless, small in size and without accelerated growth in recent years.

Clinically, the manifestations include high intensity pain, accentuated by movement. A tumor had been surgically removed 15 years ago in the Department of Plastic Surgery, Emergency County Hospital, Focşani, Romania, but it reoccurred two months after surgery, it grew in size and it stopped developing at four months after the surgery. The

patient did not reveal any result of the histopathological (HP) examination and could not recall whether it was done 15 years ago. Until the date of this consultation, the tumor stagnated in evolution, the patient did not undergo any other surgery.

Preoperative ultrasound (US) revealed the following aspects: expansive solid tumor located on the internal side of the right forearm, discreetly hypoechogenic, with positive Doppler signal, with the following diameters: 114/18.6/18 mm (antero-posterior/transversal/cranio-caudal), which is suggestive of swelling/inflammation in the adjacent soft tissues and having mass effect on the deep muscular structures (Figures 1 and 2).

An incision of about 5–6 cm was made on the inner face of the right forearm, centered on the long axis of the forearm. The antebrachial fascia was then sectioned and the tumor was observed.

Intraoperatively, a 3/4/3 cm (antero-posterior/transversal/cranio-caudal) pink tumor was found subcutaneously, with well-defined borders, which was mobile on the deep planes, apparently encapsulated. The tumor was removed with safety margins of about 1 cm and hemostasis was performed (Figure 3).

The excised tissue was sent for a HP examination. The primary HP outcome revealed the following: solid type tumor formation, composed of blood vessels, smooth muscle fibers and a proliferation of tumor cells arranged in the form of beaches and trabeculae. The tumor cells are uniform, round, small, with eosinophilic cytoplasm and central nucleus, centrally located, homogeneous chromatin, no nucleus atypia and no mitotic activity. The tree has small areas of hyalinization. The presence of a fibrous capsule is observed in the periphery. Following the HP examination, immunohistochemistry was also decided.

At the immunohistochemical (IHC) examination, we discovered a well-circumscribed, partially encapsulated, connective and adipose tissue, with nodular proliferation, composed of cuboidal cells, with round, monomorphic, with glomus cell-like aspect, mixed with vascular spaces of different sizes with: alpha-smooth muscle actin (α-SMA) positive in the cytoplasm of malignant cells (Figure 4); type IV collagen positive in the basement membrane (Figure 5); cluster of differentiation 34 (CD34) negative in the malignant cells, CD34 positive in endothelial cells (Figure 6); Ki67 positive in the 1–2% of the cancer cells nuclei (Figure 7).

The postoperative evolution was favorable, without complications and without recurrence until the present.

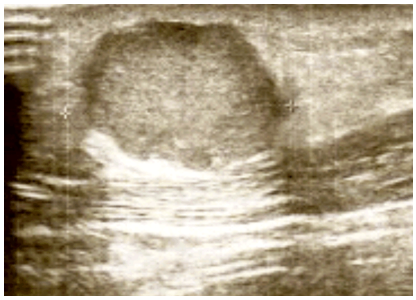

Figure 1 – ***Ultrasound image of the tumor before surgery, cranio-caudal orientation. It is observed a tumor formation, hypoechogenic, well delimited, with a clear contour, in the soft tissues of the forearm.***

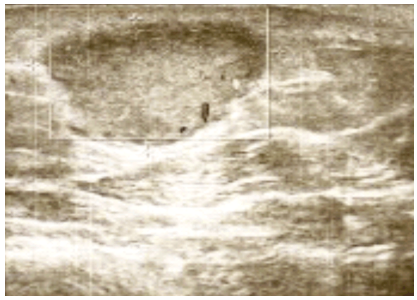

Figure 2 – ***Ultrasound image of the tumor in the transverse axis. The tumor seems to compress the muscle plane without destroying it.***

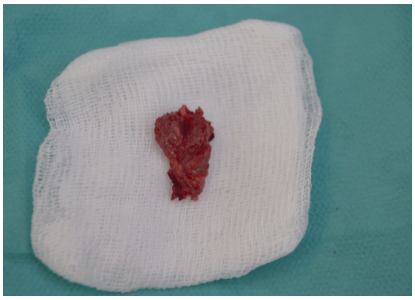

Figure 3 – ***Intraoperatory piece of the removed tissue.***

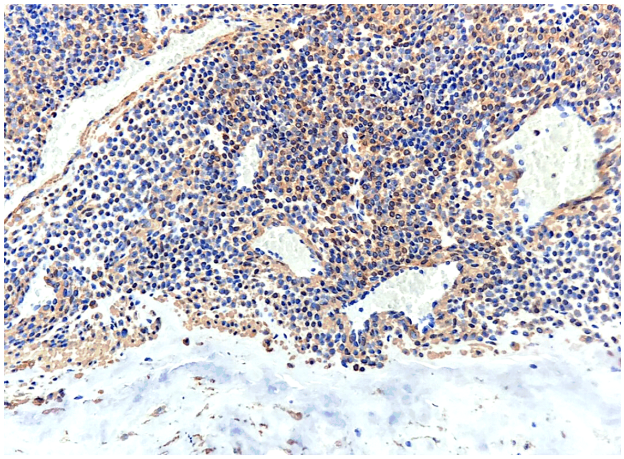

Figure 4 – ***Positive intracytoplasmic response of tumor cells to anti-α-SMA antibody. Anti-α-SMA antibody immunostaining, ×100. α-SMA: Alpha-smooth muscle actin.***

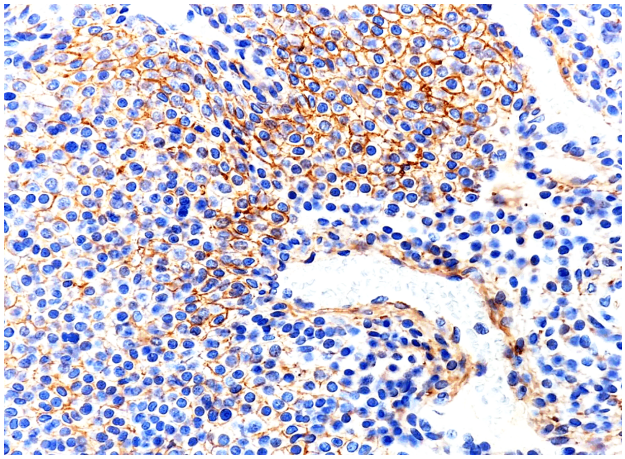

Figure 5 – ***Pericellular tumor stroma with positive reaction to anti-collagen IV antibody. Anti-collagen IV antibody immunostaining, ×200.***

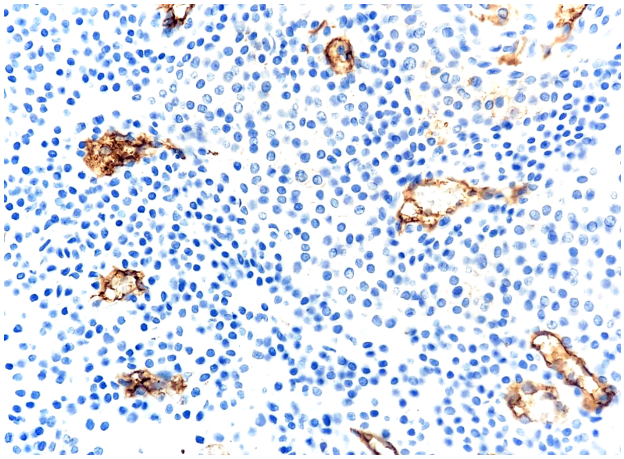

Figure 6 – ***Numerous blood vessels with endothelial cells positive for anti-CD34 antibody; tumor cells exhibit negative reaction to anti-CD34 antibody. Anti-CD34 antibody immunostaining, ×200. CD34: Cluster of differentiation 34.***

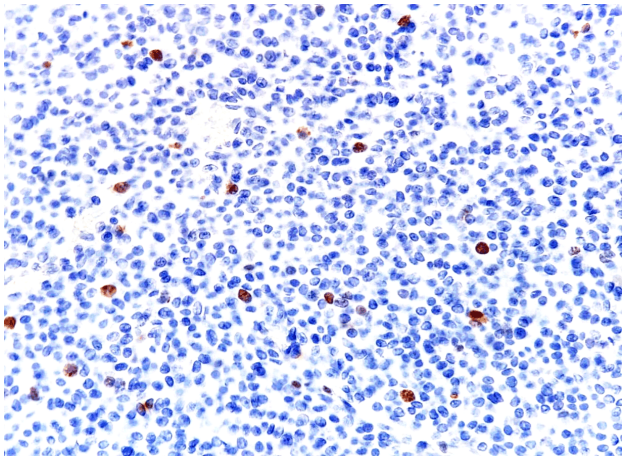

Figure 7 – ***Ki67 positive in 1–2% of the nuclei of tumor cells. Anti-Ki67 antibody immunostaining, ×200.***

Discussions

Glomus tumors are also known as glomangiomas or non-chromaffin paragangliomas. Electron microscopy and immunophenotyping studies indicate that probably glomus tumors are derived from smooth muscle cells located in the walls of blood vessels [7]. Consequently, we have reasons to believe that the tumor is formed from modified smooth muscle cells [8].

Glomus tumors represent less than 2% of all mesenchymal neoplasms [9]. They present as two clinical forms, solitary or multiple. Only 10% of them are multiple, being frequently observed at glomovenous malformations, under the name of glomangiomas. These tumors (glomovenous malformations) are rare lesions and are caused by a gene located on chromosome 1p21-22 [10].

Most glomus tumors present pain and cold intolerance, but they can also evolve without any clinical signs for years [11]. The tumors can also present with paresthesia, radiant pain or burning sensation, therefore in case of such symptoms, the diagnosis should not be missed [12].

Histologically, the glomus consists in an afferent arteriole, derived from small arterioles that supply the dermis that split in two or four preglomic arterioles.

These arterioles have muscle cells and an elastic internal blade, but they are gradually mixed into a thick, irregularly grown wall channel known as the Sucquet–Hoyer canal. This region is the actual arteriovenous anastomosis. It is covered with full cuboidal endothelial cells, which are surrounded by longitudinal and circular muscle fibers but without elastic tissue. Within the muscle fibers, we can found rounded glomus epithelial cells. These channels drain into a series of thin-walled collecting veins. The entire glomus complex is surrounded by laminated tissue and collagen, small vessels and nerves [13].

There are three HP types of glomus tumors: glomangioma (60%), solid glomus tumors (25%) and glomangiomyoma (15%) [11].

Glomangioma is a solid glomus tumor in which both smooth muscle fibers and condensation vessels are present [8]. When we talk about immunohistochemistry, the glomus tumor is positive for CD34, α-SMA, neuron-specific enolase (NSE) and vimentin, and it is negative for cytokeratin (CK) and S100 [14]. These markers are not only specific for glomal tumors, but they can also be found in many other conditions [15, 16].

These tumors may have a severe symptomatology, sometimes marked by pain and functional impotence of the hand, and 65% of these tumors are located at the fingertips [17]. The appearance of glomus tumors in other places than the hand may lead to diagnostic difficulties, in 50% of cases clinical examination being misleading leading even to false diagnosis [17].

Medical imaging is extremely important in diagnosing these tumors. US is useful in differentiating the tumor and identifying its location and size, but sometimes it can be misleading because it is not so accurate to make us think about a glomus tumor. Frequently, US reveals vascular tumors, such as hemangiomas or hypoechogenic or hyperechogenic vascular malformations, with posterior acoustic shadowing, often with imprecise edges compared to the surrounding structures.

There is a clinical maneuver that can help us in the differential diagnosis of these tumors: in vascular tumors, by compressing an area we can observe that the blood flow in the tumor decreases and after decompression, it returns to the initial form. In addition, according to Mulliken & Glowacki, hemangiomas usually occur after birth and follow a typical evolution: a rapidly proliferative phase that occurs in the first 9–12 months of life, followed by an involution phase that can end at the age of 3–5 years, but this may take until the age of 12 [18]. In addition, vascular malformations that are present at birth tend to increase their incidence proportionally with age of the patient.

At Doppler examination, a glomus tumor presents with hypervascularity and at compression, which becomes painful and does not lose blood flow [18].

For glomus tumors measuring less than 2 mm or in case of uncertainty, MRI is recommended. MRI reveals T1-weighted sequences with intermediate or low signal intensity, similar in degree to muscle; T2-weighted sequences show high signal intensity; and contrast-enhanced images shows high signal intensity [19].

US should be the first imaging investigation for soft tissue tumors of the hand. However, MRI should also be performed when the diagnosis continues to be obscure and suspected of malignancy [8].

Simple radiography and angiography tend to be normal and do not have an important role in determining the type of mass present [20, 21].

Definite diagnosis can be established based on IHC examination.

Other disorders, such as intradermal nevus, hemangioma, leiomyoma, epithelioid leiomyosarcoma, rhabdomyosarcoma and other vascular lesions, schwannoma, angiolipoma, angioleiomyoma should be considered in the differential diagnosis [8, 22–24].

There were also reports of superficial glomus tumors in the forearm, where the pain was caused by the compression of superficial sensitive branches and without the involvement of blood vessels [19].

Some cases of intravascular glomus tumors of the tumors have also been reported [25]. Also, in Martínez-Víllen *et al.* study, there were reports of glomus tumors of the forearm with major nerve blocking syndromes. They conducted a retrospective study on 541 patients who were operated for nerve compression syndromes of the forearm and hand. Two of these cases were due to the compression made by glomus tumors, one compressing the superficial branch of the radial nerve and another compressing the dorsal sensory branch of the ulnar nerve [26].

Jiga *et al.* reported a case of an intravenous glomangioma that applied compression to the sensitive branch of the radial nerve. Other cases of intravascular forearm tumors have also been reported, originating from intramural epithelial cells, with intravascular extension from the cutaneous glomus tumors of origin [4]. In literature, totally atypical localizations for glomus tumors were reported, such as ankle, foot, knee, thigh, hip, trachea [8, 27].

The treatment consists of widened surgical excision within the surrounding healthy tissue. If the excision is correctly performed, no recurrence occurs [11]. In case of incomplete resections, recurrence of up to 30% can be reported [28, 29].

Glomus tumors are generally benign lesions. However, rare cases of malignancy have been reported. In these cases, the excision should be much wider and the patient should be closely monitored to prevent and treat recurrences and/or metastasis [9, 14, 30].

Most authors who reported forearm glomus tumors noted the scarcity of these tumors and the lack of specialized information on this subject [31–33]; this is why we decided to publish this case report, which is part of a rare pathology, and the symptomatology and medical imaging were totally inconclusive. Most of these tumors were either intravascular or in deeper anatomical structures without lymphadenopathy involved [34–36].

In our case, the lesion was superficial and was not related to major blood vessels. The first case of intravascular forearm glomus tumor was described by Beham & Fletcher, in 1991 [37], followed by Acebo *et al.*, who described in 1997 a tumor that completely blocked the vein in which it had developed [38].

In the case presented by us, the recurrence was due to the incomplete resection at the first surgical procedure. As the literature also mentions and as seen in our case after the second surgery performed by us, relapse does not occur if the resection is correct and complete and the systemic treatment with its adverse reactions is not needed [5, 38, 39].

Conclusions

Extradigital glomus tumors can occur at the level of the hands and in the forearm, this tumor being the fourth most common hand tumor. A glomus tumor located in the forearm is very rare and often clinically overlooked and misdiagnosed. The quality of the patient's life deteriorates, and although the disease is rare, it can have long-term effects. Therefore, a quick diagnosis and appropriate treatment should be carried out as soon as possible. US remains a first-line investigation in the hands of an experienced radiologist. Both radiologists and surgeons should be informed about the clinical signs and the diagnosis of these tumors and should consider a differential diagnosis whenever necessary. We believe that the IHC examination is mandatory, on the one hand, because it is a good way to certify the diagnosis and, on the other hand, to rule out the suspicion of malignancy. In our case, the tumor reoccurred two months after first incomplete surgery, it grew in size and it stopped developing at four months after the surgery. After the second surgery performed by us, relapse does not occur due the fact that the resection was correct and complete.

Conflict of interests

The authors declare that they have no conflict of interests.

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Corresponding author
Alin Laurenţiu Tatu, Professor, MD, PhD, Department of Pharmacology, Faculty of Medicine and Pharmacy, "Lower Danube" University of Galaţi, 47 Domnească Street, 800008 Galaţi, Romania; Phone +40728–267 435, e-mail: dralin_tatu@yahoo.com

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