CASE REPORT

Multiple right schwannoma

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Abstract

We report a case of multiple schwannoma in a 63-year-old woman, with histopathological and ultrasound analyses, treated by surgical resection. Our patient presented two masses of ulnar nerve and one mass of superficial fibular nerve, both in the right side of the body. All tumors were encapsulated and the microscopic aspects were represented through two tissue types, cellular tissue (Antoni A) with areas of nuclear palisading (Verocay bodies) and more myxoid, less cellular tissue (Antoni B). A careful clinical examination usually determines the level of involvement without identifying the exact pathology. The tumors were easy to remove without affecting the nerves. Surgical exploration is necessary both as a diagnostic and therapeutic procedure. By presenting this case we wanted to emphasize that presence of schwannoma tumors in the peripheral nerves – ulnar and superficial fibular, and suggest a schwannomatosis case – a rare form of neurofibromatosis (a genetic disorder growths of Schwann cells and other cells that support peripheral nerves), that has only recently been recognized.

***Keywords*:** multiple schwannoma, peripheral nerve, schwannomatosis, sonography.

Introduction

Schwannomas or neurilemomas are the most frequent nerve sheath tumors and the most frequent benign sheath tumors in adults; 1% in the case of the upper limb [1].

These tumors may affect any nerve within the body and arise from a supporting cell within a nerve sheath that contains a basement membrane and resembles a Schwann cell [2].

Schwannoma grows slowly, sometimes has malignant transformation and rare symptomatic regrowth. All ages are affected, with a peak between 30 to 50 years [3].

The location of this tumor is one of the following: flexor surfaces of limb, main nerve trunks, solitary, often at origin of spinal or cranial nerves.

Pathological aspects are a well-circumscribed tumor, with elliptical or spherical shape, that may involve any nerve; location is beyond oligodendoglial Schwann cell junction; nerve fascicles are displaced around tumor capsule.

The tissue components are Antoni type A (highly cellular, tightly compact spindle-shaped cells which pallisade and produce Verocay bodies), Antoni type B (loose myxoid – loosely arranged cells in a mucinous-like matrix), degenerative changes (especially in large or deep tumors: cysts, calcification, hemorrhage, hyalinization), no intratumoral axons.

There were described some atypical types of schwannoma (ancient, psammomatous melanotic, cellular, benign epithelioid, neuroblastoma-like, plexiform) [2, 3].

Schwannomas are usually solitary, but multiple tumors have been reported. Multiple schwannomas may occur without other manifestations of neurofibromatosis [4, 5].

Multiple neurilemomas in a patient involving the same peripheral nerve is quite rare. In medical literature there were reported a few cases of multiple neurilemomas involving the ulnar nerve [6] and the sciatic nerve [7]. In both situations, the tumors were easy to remove without affecting the nerve.

Multiple schwannomas may occur as visible tumors or may occur as tumors *in situ*. The tumors *in situ* may be missed when the visible tumors are excised. In time, the schwannomas *in situ* grow and appear to be recurrent, while in fact, they are multicentric. The prognosis on multicentric schwannomas thus remains guarded [8].

The schwannoma usually presents as a painless mass and with a positive Tinel's sign. Occasionally, the schwannoma will protrude or extrude from the nerve, causing weakness, pain or sensory changes [2].

The treatment is resection (surgically removing), both in solitary or multiple schwannomas. When tumors are completely removed pain often subsides.

No neurologic alteration occurred at the postoperative period, which confirms the good prognosis of this tumor [6, 7].

Case report

History

A 63-year-old menopausal woman was admitted to the hospital complaining of a pain in her right limbs (forearm, medial part, hand and dorsum of the foot), numbness, weakness and paresthesias in the right forearm and hand, especially hypotenar region and in the 4th and 5th fingers. Our patient had a three-year-old evolution (progressive growth, pain and paresthesias in the forearm – ulnar region, decrease of the motor force of the deep flexors of the 4th and 5th fingers and intrinsic hand muscular group). The two swellings on the right arm and only one in the distal right calf were mentioned for last year. The previously recognized arm mass began to increase significantly in size and became uncomfortable for six months. Previous medical history showed primary arterial hypertension and osteoporosis.

Clinical exam

At clinical examination, she was presented with signs and symptoms caused by compression effect on the ulnar nerve (localized and referred pain, paresthesia, partial paresis of the intrinsic hand muscle). Two painful spherical masses were palpable along the course of the ulnar nerve, in the posterior and medial distal part of right arm, suprajacent of the medial epicondyle of the elbow, first of 4 cm diameters and the second of 1.5 cm diameters. The masses were mobile along the course of the ulnar nerve in the right arm. The neurologic exam found an incipient claw hand deformity, paresthesias and a sensory deficit in the 5th digit and medial half of the 4th digit; the 5th digit abductor and interosseous muscles were weak and hypotrophied.

In the lower limb, a fusiform mass (1 × 2 cm) was palpable in the distal third of the right calf, above at lateral malleola. No signs of superficial fibular nerve palsy were presented.

The basic laboratory tests (peripheral blood and blood chemistry findings) were within normal limits.

Electro-neuro-myography exam was not performed.

We performed X-rays of the patient's right arm and calf/ankle. The obtained images were normal. The ultrasonography of the arm, elbow (Figures 1 and 2) and calf (Figure 3) was helpful for the diagnosis. All palpable masses could be confirmed by the ultrasound exam (using a 7.5 MHz high-resolution transducer LA13A, ESAOTE AU5).

These examinations suggested that the two tumors of ulnar nerve were probably caused by the anatomical nerve compression at the elbow.

The clinical history and the age the patient were not in favor of the chronic compression (trauma and arthritic changes, leaning on elbow, prolonged immobilization) of the ulnar nerve at the elbow [9]. Surgical excision (microsurgical technique) was performed for definite diagnosis and treatment.

Grossly, the tumors of ulnar nerve were encapsulated, smooth-surfaced masses, 4×5 cm and 1×2 cm diameter, with firm consistency. The greater tumor had irregularly lobulated and secondary degenerative changes (Figure 4).

The macroscopically appearance of fibular schwannoma was an 1.5×2 cm ovoid mass, well delimitated, grayish in color, with nerve fibers spread over its surface (Figure 5).

Histological examination of the tumor biopsy (Hematoxylin–Eosin stained section) showed the following aspects:

- the great tumor of ulnar nerve (4 cm in diameter) consisted of areas that showed a compact, dense spindle cell pattern with nuclear palisading and interlacing fascicles (Antoni A type) and areas that were less cellular and showed myxomatous changes (Antoni B type). Another aspect was the presence of vessels with hyaline walls (Figure 6).
- the small tumor of ulnar nerve consisted of areas that showed cellular areas with nuclear palisading; defined capsulated limits the tumor can be observed (Figure 7).
- the tumor of fibular nerve was characterized by two basic tissue types – Antoni type A (fascicles of spindle-shaped schwann cells streaming around numerous acellular, eosinophilic areas surrounded by palisaded spindled cells with elongated nuclei) and Antoni type B (less cellular and more randomly arranged spindle cells in a loose, myxomatous stroma) (Figures 8 and 9).

In all histological examination, the cells of Antoni type A tissue had oriented their long axes toward the acellular area, and the areas themselves are oval, linear or serpiginous in shape.

The histopathological diagnosis was schwannoma of ulnar and superficial fibular right nerves.

We took into consideration for histologic differential diagnosis the following tumors: neurofibroma, palisaded encapsulated neuroma, cutaneous leiomyoma and palisaded myofibroblastoma.

The evolution was satisfactory, the motor and sensitive functions of the superficial fibula nerve were preserved and the functions of the ulnar nerve were not aggravated. The symptoms disappeared and the patient could perform her daily activities four weeks after the operation. Her neurological signs had a favorable evolution. On clinical follow-up, one year later, a partial recovery of hand muscle strength and function could be noted and the patient had no pain in forearm, hand and foot.

The particular aspect of our case was the multiple schwannoma: two of the ulnar nerve and one of the superficial fibular nerve, both nerves of the right side of the body.

Discussions

According to the revised World Health Organization classification of tumors of the nervous system, Schwann cell tumors are classified as schwannoma or neurilemoma, neurofibroma and malignant schwannoma.

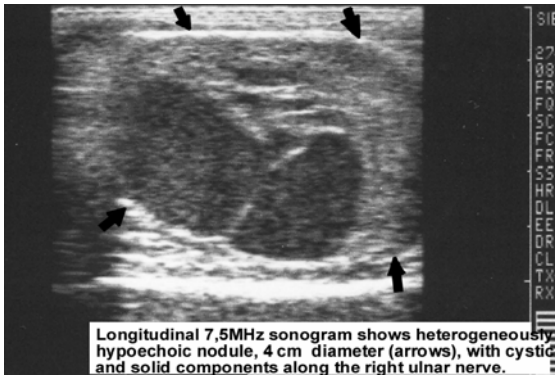

Figure 1 – ***Ultrasound aspect of ulnar nerve great mass***

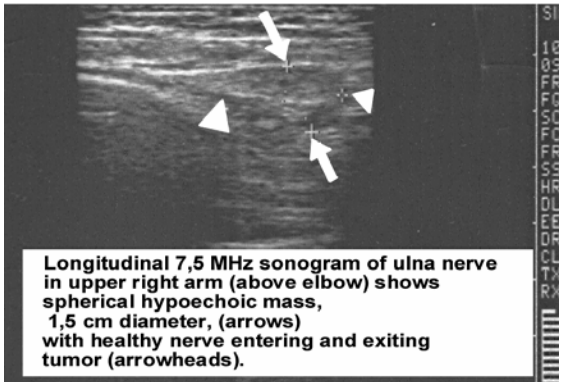

Figure 2 – ***Ultrasound aspect of ulnar nerve small mass***

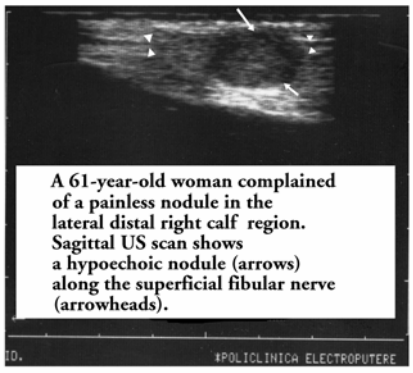

Figure 3 – ***Ultrasound aspect of right superficial fibular nerve mass***

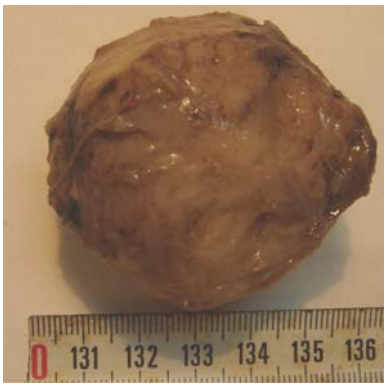

Figure 4 – ***The tumor of ulnar nerve: encapsulated, irregularly lobulated smooth-surfaced masses, 4×5 cm diameter, with firm consistency***

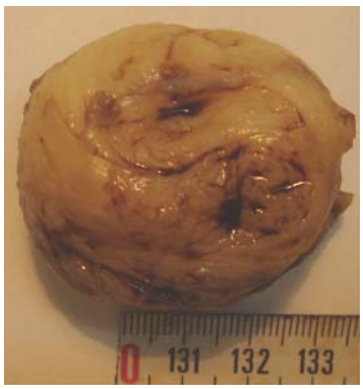

Figure 5 – ***The fibular schwannoma: an 1,5 × 2 cm ovoid mass, well delimitated, grayish in color***

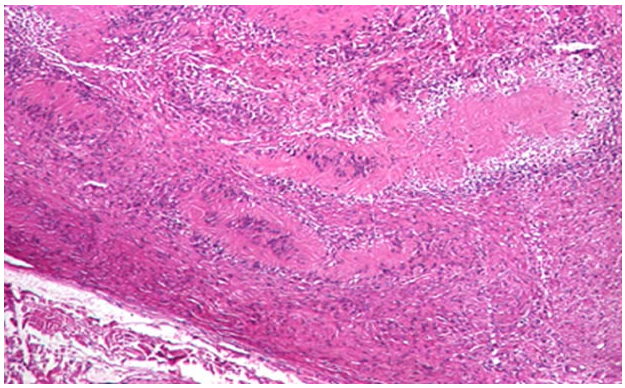

Figure 6 – ***Schwannoma (small mass) of the right ulnar nerve (HE stain, ×40)***

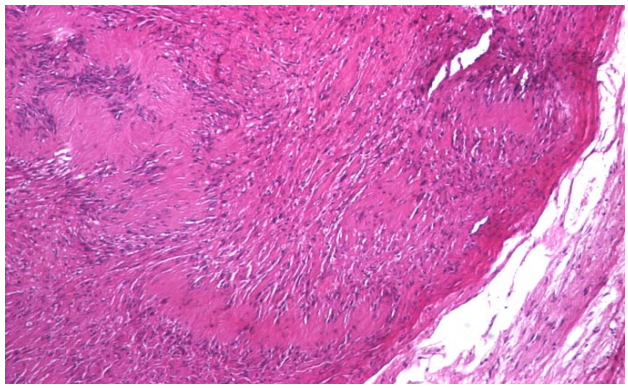

Figure 7 – ***Schwannoma (great mass) of the right ulnar nerve (HE stain, ×40)***

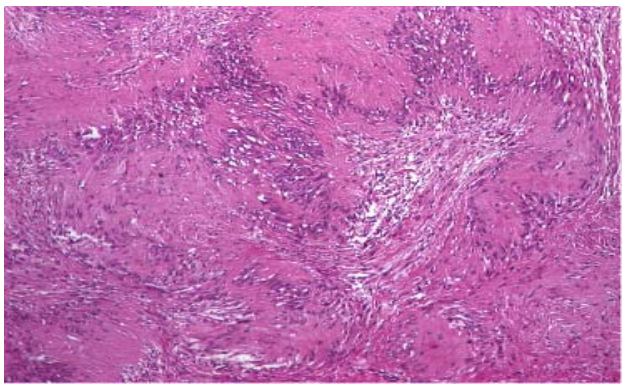

Figure 8 – ***Schwannoma of the right superficial fibular nerve (HE stain, ×40)***

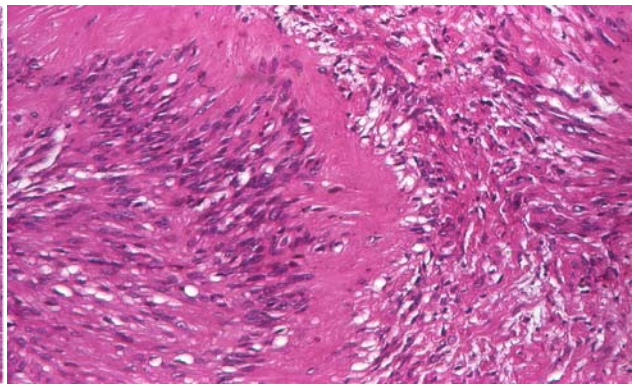

Figure 9 – ***Schwannoma of the right superficial fibular nerve (HE stain, ×100)***

Schwannoma is a benign tumor of nervous origin, with localization intraneural and eccentric and constitutes one of the two most common benign peripheral nerve sheath tumors, along with neurofibroma [3, 10]. Schwannomas or neurilemomas are well-capsulated benign tumors and are very homogenous tumors consisting only of nerve sheath cells or Schwann cells [11].

The correct diagnosis is established by taking a biopsy sample from the tumor and microscopic examining of the tissue areas. Since 1935, microscopically, two types of cell arrangements, Antoni A and Antoni B, have been found in typical schwannomas [5]. In our case, predominantly type A areas were reported, composed of closely packed, spindle cells arranged in bundles and cords. The nuclei of these cells are arranged in palisading rows, forming so-called Verocay bodies (formed by two compact rows of well-aligned nuclei and cell processes that are arranged in a roughly oval shape). Type B areas have also been described, which are composed of Schwann cells arranged in a haphazard fashion and separated by a loose myxoid stroma. Tumor cells are strongly immune-positive for the S-100 protein [12].

The evaluation of peripheral nerve disorders has relied primarily on accurate clinical history, thorough physical examination, and electro-diagnostic testing. In our case, the tumors appeared like a nerve enlargement that can be easily palpated: the ulnar nerve in the medial upper arm above the elbow and the terminal springs of the fibular nerve [13]. Only the enlarged tumor of ulnar nerve caused radiating pain on percussion (Tine sign), suggesting a lesion of a peripheral nerve. The clinical (neurological) aspects of our patient were in accordance with medical data; schwannoma may grow up to 4 cm in diameter before symptoms arise due to nerve compression [5]. These tumors growth slow and can be a defined tumor when lesion measures 5–8 cm diameter [14]; may push the nerve aside or against a bony structure causing damage [15], as in our case.

While electro-diagnostic studies are sensitive, they lack specificity and do not display the anatomic detail needed for precise localization and treatment planning. Recent technical improvement in magnetic resonance and ultrasound imaging has resulted in improved visualization of both normal and abnormal peripheral nerves [16].

Taken into consideration the wide availability and relatively low cost of sonography and the localization of the tumors (connecting with two superficial nerves), we applied ultrasound exams for peripheral nerve assessment. Ultrasound exam represents an optimal imagistic method for evaluating peripheral nerves because of its high spatial resolution, its ability to follow nerve structures over long distances in a limb and its dynamic nature that allows movement of patient and transducer [17].

The present case illustrates a multiple schwannoma presented in the two right peripheral nerves: ulnar nerve and superficial fibular nerve. The studied woman patient had not an ulnar nerve entrapment because there was no compression of the ulnar nerve into cubital tunnel. The two tumors were located above, at the elbow.

A review of medical literature indicates a little frequent incidence of ulnar nerve or fibular nerve schwannoma into all schwannomas of the trunk or limbs. The most frequently peripheral involved nerve was the median nerve [18].

The exact prevalence of schwannomas of all anatomic sites is unknown [3]. In 1985, Adams mentioned only 65 cases of schwannoma of peripheral nerves form a series of 1500 primary neurological tumors [15]. In 1976, Whitaker WG and Droulias C reported only 76 schwannomas of peripheral nerves in 1.5 million hospital admissions [19]. A greater incidence of schwannoma was reported in the upper limb, a 2 : 1 ratio in upper to lower limbs. This ratio may relate to the more prominent function of the nerves in the upper limb [20]. Multiple schwannomas have been observed in peripheral nerves in rare situations [7], some in association with neurofibro-matosis 2 (NF2) or without acoustic tumors (may be misdiagnosed as having neurofibromatosis 1 – NF1). A group of 12 patients with multiple peripheral schwannomas without other stigmata of NF1 or NF2 [4] was reported; a case of multiple schwannoma at the sciatic nerve was described [7].

By presenting this case we wanted to highlight that the presence of schwannoma tumors in the peripheral nerves – ulnar and superficial fibular suggests a schwannomatosis case – a rare form of neurofibromatosis (a genetic disorder growths of Schwann cells and other cells that support peripheral nerves), that has only recently been recognized.

Schwannomatosis is a rare form of neurofibromatosis that has only recently been recognized. It is a distinct, non-hereditary condition, but an autosomal dominant disorder with full penetration. A few reports suggest that schwanno-matosis is likely to be a variant of NF2 [21, 22]. Persons with this disorder develop multiple schwannomas on cranial, spinal and peripheral nerves, but they do not develop vestibular tumors and do not go deaf. Once a subject is found to have multiple schwannomas, the possibility of NF2 must be excluded before a diagnosis of schwannomatosis is given. Although very few familial cases of schwannomatosis have been reported, most (90%) tumors in this setting have been multiple, encapsulated and located in the subcutaneous tissue, while 10% have been plexiform, involving the neck, trunk and extremities.

Affected subjects have more important problems with pain than with neurological disability, although a schwannoma tumor may vary greatly between patients. Our patient main complaints were pain in right forearm, hand and ankle, numbness and paresthesias in right forearm and hand, without any hand or foot affirmative dysfunction [15]. For reasons not yet understood, persons with schwannomatosis have problems with chronic pain that often exceed their neurological problems. The studied patient had gone through three years before the source of her forearm and hand pain

was identified, because she had few non-special neurological symptoms. In addition, this patient can be included in the 2/3 of patients with schwannomatosis that have tumors not limited to a single part of the body.

Our patients had no family members with pain syndrome or neurological syndrome. This particular biographic aspect confirms the medical literature date about schwannomatosis as a particular genetic disorder (schwannomatosis may often skip generations so that more distant family members with unexplained neurological symptoms and/or unexplained pain should be evaluated for the possibility that they are also affected) [15, 23].

In patients with tumors that involve outlying nerves, like schwannoma, optimal treatment is microsurgical conservative intervention [14]. We did not perform a preoperative biopsy of tumor. We made local excisions due to macroscopic aspects of tumors: a well-encapsulated lesion.

Conclusions

In conclusion, our patient was diagnosed with multiple schwannomas, a rare case in medical literature, but this abnormal pathological nerve condition can suggest a schwannomatosis case. The correct diagnosis can be made through genetic exam. Ultrasound exam is an inexpensive, non-invasive quick and repeatable technique that can be used as an imaging modality for primary assessment of nerve tumor.

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