Median nerve schwannoma. A case report

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Case Report

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Background

Schwannomas, also known as neurilemomas, represent the prevailing non-malignant neoplasms affecting the peripheral nervous system. Benign neoplasms affecting the peripheral nerves of the upper extremity are infrequent in occurrence. Typically, these neoplasms arise from Schwann cells situated within the peripheral nerve sheaths. Schwannomas, which are benign tumors found in peripheral nerves, are observed to be the prevailing type, accounting for approximately 5% of all tumors occurring in the upper extremity. Schwannomas involving the median nerve are observed at a frequency ranging from 0.1% to 0.2% among the entirety of hand tumors. Schwannomas typically manifest as a source of patient discomfort. The observed edema has the potential to be erroneously identified as a ganglion, lipoma, or lymph node. Neuromas manifest as a hyperplastic and disorganized growth of cells, which arises as a response to nerve injury, signifying an endeavor towards nerve regeneration. These neuromas can be categorized into two types: terminal neuromas and in-continuity neuromas. Magnetic resonance imaging (MRI) and ultrasound imaging techniques have proven to be valuable tools in the diagnostic process. The curative approach typically involves the implementation of surgical removal.

Keywords: Schwannoma, Bening tumor, Median nerve, Hand surgery, Neuroma, nerve, Nerve injury, Nerve repair.

The composition of peripheral nerves primarily consists of axons, which are elongated structures responsible for transmitting nerve impulses. These axons exhibit two distinct characteristics in terms of their myelination status. Some axons possess a myelin sheath, a protective covering that enhances the speed and efficiency of nerve signal conduction. Conversely, other axons lack this myelin sheath and are considered non-myelinated. Surrounding both myelinated and non-myelinated axons are specialized cells known as Schwann cells, which provide support and insulation. Additionally, the axons and Schwann cells are enveloped by a connective tissue layer called the endoneurium, which further contributes to the structural integrity of peripheral nerves. The organization of nerve fibers involves their arrangement in fascicles, which are encased by the perineurium. Additionally, the peripheral nerve sheath is formed by the epineurium encompassing the nerve trunk. Partial and complete tears can potentially lead to the formation of post-traumatic neuromas, which are characterized by a hyperplastic and disorganized proliferation of cells. These neuromas are considered as an adaptive response by the body in an attempt to regenerate the damaged nerves. These neoplasms are infrequent in occurrence and arise from Schwann cells. Typically, they exhibit a predominantly benign clinical course. Schwannomas, initially documented by Virchow and Verocay in 1910, were officially designated as such by Masson in 1932. Schwannomas, also known as neurilemomas, are the prevailing non-malignant neoplasms observed in peripheral nerves, accounting for approximately 5% of the total tumor burden affecting the upper extremity. Schwannomas involving the median nerve are observed at a frequency ranging from 0.1% to 0.2% among all tumors affecting the hand. Neuromas can be categorized into two distinct types: terminal neuromas and in-continuity neuromas. Terminal neuromas are predominantly located at the proximal stump, whereas in-continuity neuromas manifest when both nerve stumps remain interconnected. The observed entities are frequently identifiable through clinical palpation as diminutive, rigid, and sensitive formations that can frequently induce localized discomfort and abnormal sensations. The primary method of diagnosis primarily relies on clinical assessment. Ultrasound imaging serves as a valuable adjunctive tool in cases where the findings from the clinical examination are inconclusive. The median nerve is susceptible to trauma at two distinct anatomical sites, namely the wrist and the elbow, where it resides in a relatively superficial position.

Clinically, it has been observed that this particular condition may result in the impairment of nerve function, leading to the manifestation of incapacitating pain. Furthermore, it has been noted that these symptoms can significantly impact the patient's daily activities and overall quality of life. In some cases, there is a potential for the condition to

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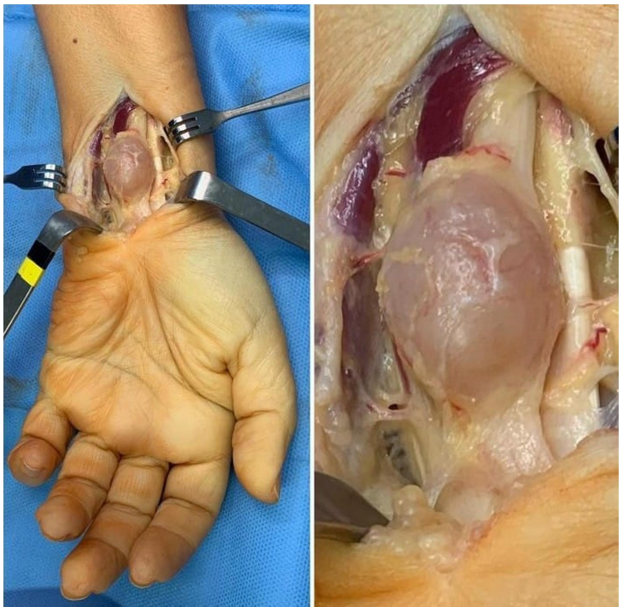

Figure 1. Median nerve schwannoma at wrist / Anterior View

advance into chronic pain syndromes. Clinical examination reveals the presence of the Tinel sign, characterized by localized tenderness over the affected nerve accompanied by tingling sensations radiating distally. Additionally, there is observable denervation atrophy of the muscles, as well as sensory or trophic changes.

Case report

The following report details the case of a middle-aged male individual, aged 50, who sought consultation at our esteemed department specializing in plastic and reconstructive surgery. The patient's medical history revealed a prolonged duration of untreated carpal tunnel syndrome, characterized by escalating pain localized at the wrist and the medial nerve territory. The Tinel sign elicited a positive response, indicating potential nerve involvement. Furthermore, a distinct palpable mass was observed, exhibiting a soft consistency and exhibiting clear boundaries within the wrist region. Additionally, a reduction in both motor strength and sensory perception was observed in the thumb, index finger, and middle finger. Additionally, a notable decline in muscular strength and sensory perception was observed in the thumb, index finger, and middle finger. The confirmation of distal perfusion through the ulnar and artery was achieved via the administration of an Allen test. Preservation of both the radial and ulnar nerve territories was observed. The comprehensive evaluation of the left hand revealed no discernible anomalies or irregularities. In light of the severity of the injury, a surgical intervention involving decompression and resection of the neuroma was performed.

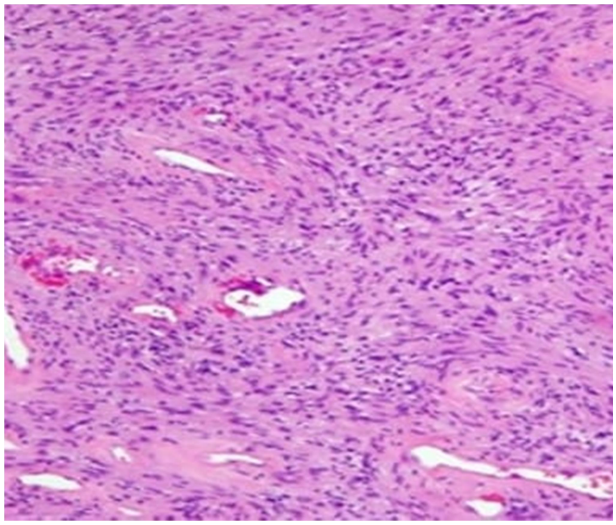

Figure 2. Hematoxylin and eosin stain showing median nerve histology.

Discussion

Schwannomas, which are frequently encountered in clinical practice, exhibit a characteristic pattern of gradual growth and are typically enclosed within a protective capsule. These neoplasms arise from the nerve sheath and maintain a distinct separation from the adjacent tissues. The observed tumors exhibit a pliable texture, displaying a propensity for movement and occasionally lacking discomfort, thereby potentially leading to erroneous identification as lipoma, fibroma, ganglion, or xanthoma. Peripheral nerve tumors affecting the upper extremity are infrequently observed in benign cases. Schwannomas, which are benign tumors originating from the nerve sheath, exhibit degenerative nuclear alterations and vascular hyalinization when examined under histological analysis. The occurrence of malignant transformation in peripheral nerve schwannomas remains exceedingly rare. Peripheral nerve tumors, commonly referred to as neurogenic tumors, are the prevailing type of tumors originating from the peripheral nerves. These tumors account for a minority, specifically less than 5%, of the overall tumor burden affecting the upper extremity. These neoplasms are infrequent in occurrence and originate from Schwann cells. Typically, they exhibit a predominantly benign clinical course. The initial documentation of these entities dates back to the year 1910, when Virchow and Verocay provided the first comprehensive description. However, it was not until the year 1932 that Masson introduced the nomenclature "schwannomas" to designate these particular neoplasms. Schwannoma occurrence was most frequently observed in the median nerve, with subsequent prevalence noted in the tibial nerve, radial nerve, brachial plexus, sciatic nerve, ulnar nerve, femoral nerve, digital nerve, peroneal nerve, and

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superficial branch of the radial nerve. In the context of sensory nerves, it was observed that digital nerves exhibited the highest prevalence, followed by the superficial branch of the radial nerve, the saphenous nerve, and so forth. In the context of pure motor nerves, it is noteworthy to mention that the obturator nerve, a branch originating from the radial nerve, the posterior interosseous nerve, and a branch originating from the tibial nerve are frequently observed as prevalent locations. Schwannomas predominantly manifest as sporadic occurrences, although they can potentially exhibit associations with type 2 neurofibromatosis, schwannomatosis, or Carney's complex. Typically, these lesions manifest as solitary formations characterized by a gradual and incremental increase in size, seldom surpassing a diameter of 2.5 cm. The observed edema has the potential to be erroneously identified as a ganglion, lipoma, or lymph node. In instances where the clinical characteristics deviate from the norm, it becomes imperative to eliminate the possibility of sarcomas, necessitating a more extensive surgical removal procedure. The age group most frequently impacted by this condition spans from 20 to 70 years of age, with an equitable distribution observed among both genders. The diagnostic process primarily relies on a comprehensive assessment of the patient's medical history and a thorough clinical examination. Key indicators include a documented history of limb amputation, surgical intervention, or traumatic incidents involving the affected limb. Additionally, the patient typically presents with intense burning pain, frequently exceeding the anticipated level of discomfort associated with the specific injury, and persisting for a duration that surpasses the expected recovery period. The presence of potential concomitant edema and muscular debilitation is conceivable. The application of external force to the wound or affected area may induce a sensation of discomfort, commonly referred to as pain. The typical anatomical positioning of these structures is commonly observed on the volar surface of the extremities. The occurrence of sensory or motor impairment during the initial presentation is atypical, likely due to the gradual progression of the tumors. Nevertheless, as the tumor expands in size, patients may experience symptoms such as pain, numbness, and fatigue. The observed neoplasms exhibit a spherical or ellipsoidal shape, displaying an off-center distribution, and are characterized by a distinct and intact outer layer. The observed tumor exhibits a chromatic spectrum ranging from grayish to pink, yellow, brown, or white hues. Solitary entities are observed to be present in a unipartite manner, specifically localized along the anterior aspect of the extremities in close proximity to the neural pathways. Various imaging modalities, such as ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), have been extensively examined for their efficacy in the evaluation of soft tissue swellings located at the wrist. These modalities have demonstrated their utility in aiding the diagnostic process. The management approach for peripheral schwannomas primarily revolves around the alleviation of pain while minimizing the risk of exacerbating any existing neurological impairments. Pharmacological interventions, such as the administration of antidepressants, oral analgesics, anticonvulsants, and opioids, have demonstrated potential effectiveness in the therapeutic approach to neuropathic pain associated with neuromas. The curative approach typically involves the surgical excision of the affected area. The surgical excision procedure is typically uneventful due to the fact that the tumors originate from the nerve sheath, which exhibits a distinct plane of separation from the underlying nerve fibers, thereby facilitating the process.

Conclusion

Schwannomas affecting the median nerve present treatment options that encompass both conservative and surgical approaches. The chosen course of action is contingent upon the specific type of schwannoma and the extent to which the distal motor and sensory functions need to be preserved. Neuromas in continuity exhibit a diminished threshold for surgical intervention, particularly when accompanied by compromised functionality, sensory impairment, or inadequate symptom management. In instances where there is observed preservation of neurological function, it is plausible to consider the isolated implementation of neurolysis. In instances where there is a manifestation of sensory or motor function impairment, or a decline in compound action potentials along the median nerve, the recommended course of action involves the excision of the affected nerve segment and subsequent restoration through the utilization of nerve grafts.

Conflicts of interest

The authors would like to declare that there is no conflict of interest.

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