Schwannoma of the Ulnar Digital Nerve of a Ring Finger: A Rare Case Report

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Abstract

Schwannomas are non-malignant tumors that develop from Schwann cells, and their incidence in the hand and fingers is relatively low. Specifically, the manifestation of these tumors in the ulnar digital nerve of the ring finger is exceedingly rare. This report details the case of a 35-year-old male diagnosed with a schwannoma located in the ulnar digital nerve of the right ring finger by outlines the clinical features, imaging attributes, surgical treatment approaches, and histopathological findings.This case highlights the necessity of including schwannoma in the differential diagnosis of slowly enlarging, painful digital masses and explains the surgical approach to treat this condition while preserving nerve functionality.

Introduction

Schwannomas are encapsulated benign tumors of the peripheral nerve sheath, which arise from Schwann cells. They are considered the most common benign neoplasm affecting the peripheral nerves[1,2]. Schwannomas present in 95 % of cases as solitary, slowly growing masses. They may be associated with pain or a neurological deficit. They present as multiple lesions in conditions like Schwannomatosis or neurofibromatosis type II [2,4].

Extremely uncommon, as less than 5% of upper limb soft tissue tumors are considered to be primary neural tumors and 19% of them were schwannomas[3,5]. Often misdiagnosed as tendon tenosynovitis, ganglion cyst, or other soft tissue neoplasms, Patients usually present with paresthesia and a positive Tinel sign[4]. The age group ranges between thirty to sixty years old with no gender or race differences [5].

We report an unusual case of solitary schwannoma confined exclusively to the ulnar digital nerve in a 35-year-old medically free male patient.

Case presentation

Patient history and physical examination

A 35-year-old male, medically free, right-handed, presented with a painful to touch, slow-growing mass on the palmar aspect of the metacarpophalangeal joint of the right ring finger for 4 months. The patient reported experiencing a mild discomfort when gripping objects and sensitivity to cold weather. He denied any history of trauma or systemic disease. Physical examination revealed a

firm, well-circumscribed mass, tender and sensitive to touch, located along the course of the ulnar digital nerve of the right ring finger (Figure 1.0). A positive Tinel's sign was elicited over the mass. Both motor and sensory functions are intact in the right ring finger.

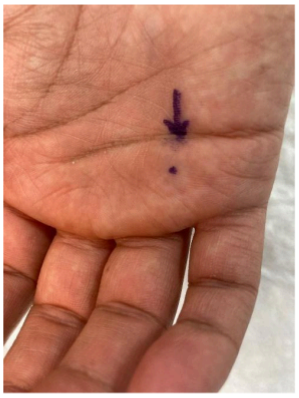


Figure 1.0

Preoperative right-hand mass on the palmar aspect between the 4th and 5TH MCP joints.

Imaging Studies

The X-ray of the right hand was unremarkable. Ultrasound examination of the right hand demonstrated a 9x7 mm rounded hypoechoic lesion between the base of the 4th and 5th fingers. Magnetic resonance imaging (MRI) without contrast of the right hand revealed a spindle-shaped lesion noticed at the palmar aspect of the 4th web space in between the bases of the proximal phalanx of the ring and little fingers, seen in continuation with the course of the digital branch of the ulnar nerve(Figure 1.1 a,b) .

(Figure 1.1 a,b)

Mri axial(left) and coronal (right) cuts show a spindle-shaped lesion noticed at the 4th web space of the palmar aspect.

Surgical Management

Surgical excision was performed under general anesthesia with the application of a tourniquet in the right arm. An oblique incision was executed on the palmar side of the metacarpophalangeal joint area between the fourth and fifth fingers. A soft tissue mass was identified, originating from the ulnar digital nerve of the fourth finger (Figure 1.2 a).

A meticulous microsurgical dissection started with opening the epineurium to separate the tumor from the surrounding nerve fascicles. The tumor was completely excised with its related fascicle while preserving the rest of the fascicles of the nerve. At the end, the epineurium was repaired. The wound was irrigated with normal saline, and the skin was closed with 5-0 Prolene suture (Figure 1.2 b).

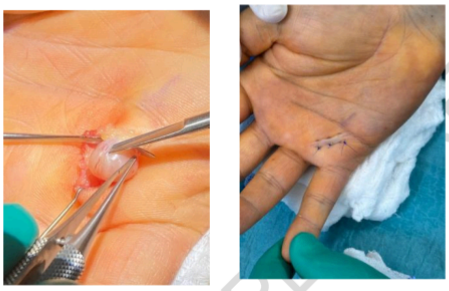


Figure 1.2 a, b

Intraoperative: Figure A (left) shows an oblique incision executed on the palmar side of the metacarpophalangeal joint located between the fourth and fifth fingers of the right hand. Figure B (right) highlights the suture following the excision used to close the incision.

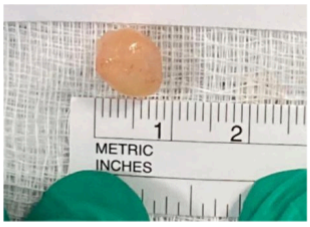


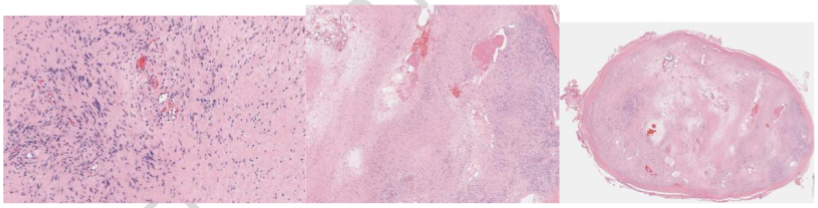
Figure 1.3

Single irregular yellowish-white rubbery mass measures 0.7 x 0.7 x 0.5.

Histopathology

Histologic sections contain an encapsulated neoplasm composed of cytologically bland spindle cells arranged in short fascicles, containing more densely cellular areas with nuclear palisading (Antoni A), alternating with paucicellular areas (Antoni B). No histologic features of malignancy are identified.

Histopathological diagnosis: Schwannoma (Figure 2.1.a,b,c).



(Figure 2.1.a,b,c) (a) far right picture, showed Low-power hematoxylin and eosin stain (H&E) view of an encapsulated schwannoma demonstrating alternating hypocellular and hypercellular areas; (b)middle, intermediate magnification revealing spindle-shaped Schwann cells arranged in fascicles with scattered hemorrhage;

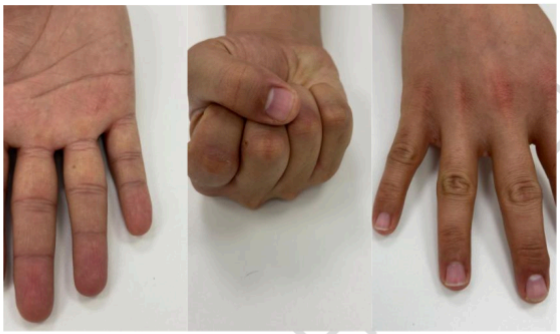
(c) The far left showed a high-power view highlighting elongated, wavy nuclei in a collagenous matrix with occasional inflammatory cells.

Postoperative Course

The patient had an uneventful recovery without any postoperative complications. However, five days after the operation, the patient reported a complete resolutionof preoperative symptoms with minor residual numbness over the ulnar side of the right ring finger but retained a full range of motion and showed no functional limitations.

Follow up

The patient was seen in the clinic 8 months later, doing fine, with normal sensation at the digits, complete resolution of post-operative numbness, full range of motion, and no sign of recurrence. (Figure 2.2 a,b and c)



(Figure 2.2a,b, and c) from left to right

8 months post op, healed scar, no sign of recurrence, full range of motion, normal digit sensation, normal skin.

Discussion

A comprehensive understanding of the differential diagnosis of hand tumors is critical for providing optimal patient care. Conducting a detailed patient history and thorough physical examination is indispensable in the diagnostic process. The differential diagnosis for soft-tissue masses in the hand encompasses a wide range of pathologies, including ganglions, epidermal inclusion cysts, foreign-body granulomas, fibromas, tophaceous pseudogout, vascular aneurysms, vascular malformations, giant cell tumors of the tendon sheath, fibroma of the tendon sheath, lipomas, extraosseous chondromas, leiomyomas, granular cell tumors, malignant peripheral nerve sheath tumors (MPNST), and schwannomas. Notably, ganglions represent the most frequently

encountered soft-tissue masses in the hand, whereas enchondromas are the most common primary bone tumors in this anatomical region[9].

Few cases of upper limb schwannomas have been reported over the years, In Adani et al. 34 patients diagnosed with upper limb schwannoma were treated between 1995–2011 (4). In fifteen patients the tumor was located in the ulnar nerve, eight in the median nerve, two in the radial nerve, one in the anterior interosseous nerve, one in the musculocutaneous nerve, and the remaining seven in the digital nerves. All patients were treated surgically using a microsurgical approach [4].

In twelve cases, mass enucleation was possible without a fascicle lesion. In twenty-two cases, resection of the indissociable fascicles was performed. Postoperative paraesthesia was present in 28 out of 34 treated patients, and it improved in a mean period of 1 year in 27 patients [4].

In Azaditalab et al. clinical series 12 cases of confirmed Schwannoma were in treated surgically between 2011 - 2022 , with a mean age of 44 years. 7 patients (58.3%) were men and 5 patients (41.66%) were women. The mean follow-up period was 45 months (range: 6-135) [6].

The hand was the most common location, and the digital nerve was the most frequent origin of Schwannoma. No tumor recurrence was reported, and pain resolved in all patients (100%) seen in Postoperative evaluation [6]. Sensory dysfunction resolved completely in five out of eight patients who reported sensory impairment preoperatively (62.5%) and no motor function improvement was seen in the patient with motor deficit [6].

In Pertea et al. a retrospective study of schwannomas appearing in the upper limb involved 17 patients who were diagnosed with and treated for an upper limb schwannoma. The location of these tumors varied, of the 17 cases only five were present at the level of the wrist and of these five only three were present in the digits. When divided based on the nerve involvement seven of the 17 cases had schwannomas present in the ulnar nerve however none of them were at the level of the digits. Ultrasonography played a key role in pre-operative diagnosis which led to surgical excision[7].

Magnetic resonance imaging (MRI) is the preferred imaging modality for preoperative evaluation of hand tumors [11]. Surgical excision remains the definitive treatment for these tumors [12]. The primary goal of surgery is to achieve complete tumor removal while preserving the structural and functional integrity of adjacent nerves [13]. Given the encapsulated nature of schwannomas, meticulous dissection typically facilitates successful excision with minimal functional compromise [13]. However, inadvertent injury to nerve fascicles during the procedure may lead to postoperative sensory deficits, underscoring the necessity of employing microsurgical techniques [14].

paresthesia found to be the most common postoperative complication; therefore, both motor and sensory branches must be preserved during surgery, and unnecessary sacrifice of functional nerves must be avoided. Different factors may cause neurologic deficits after excision of a Schwannoma[6].

Conclusion

When encountering a discernible mass in the digits, it is essential to consider the potential presence of a nerve tumor. One should be vigilant for characteristic indicators of schwannomas, including a positive Tinel sign and peripheral paraesthesia. in our case report, we indicate the clinical presentation and the imaging modalities, both magnetic resonance imaging (MRI) and ultrasonography, which were crucial for identifying the tumor's origin and the specific nerve involved. Moreover, we illustrate the surgical management for the tumor resection while preserving the nerve function.

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