

Fibrolipomatous Hamartoma of the Median Nerve of the Hand: A Case Report and Literature Review

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Case report

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Abstract

Introduction: Fibrolipomatous Hamartoma (FLH) is a rare tumor-like disease, mainly occurs in benign tumors of the peripheral nerves of the upper limbs, which characterized by the overgrowth of neuronal fat and fibrous tissue.

Case presentation: A patient had numbness of fingers in the left hand for more than 5 years. Three years ago, the superficial sensation at the metacarpophalangeal joint of the hypothenar of the left hand was weakened. Two years later, the distal ulnar side of the index finger and the distal radial side of the middle finger were secondary to weakened superficial sensation and megalodactyly symptoms of the middle finger and index finger of the left hand were developed. Physical examination showed a mass on the left palm side. MRI showed an abnormal subcutaneous fusiform signal at the palmar side of the left wrist: T1W1 isointensity, T2W1 inhomogeneous slightly hyperintense signal. The clinical features, radiologic presentations, treatment choice, and pathologic characteristic were illustrated. During the operation, the appearance of the nerve was hypertrophic and variant, without obvious masses, the proliferated fibrous tissues were showed a fusiform change, and the nerve fibers were degenerated and atrophied. Immunohistochemical results showed S-100 (+), NSE (focus +), EMA (portion +), GFAP (-), ERG (blood vessel +), SMA (blood vessel +), Ki-67 (1%+), NF (small region +). The patient's finger numbness symptom improved obviously and the condition was stable when paying a return visit 3 months after the operation.

Conclusions The clinical symptoms of FLH of median nerve mainly include gradually enlarged painless mass, macrodactyly, pain, numbness, paresthesia and carpal tunnel syndrome. The diagnosis mainly depends on ultrasonic examination and MRI. The pathological sections of FLH sometimes show perineurioma-like changes, which need to be identified by clinical and MRI features. The treatment methods include prophylactic carpal tunnel release (CTR) and nerve transplantation after the whole nerve resection. CTR, has been proven to be helpful for many patients suffering from carpal tunnel symptoms and can relieve most of the symptoms, is the main method. However, the pathogeny needs to be further explored.

Introduction

Fibrolipomatous hamartoma (FLH), also known as nerve fibrolipoma or nerve lipomatosis, is a rare tumor-like disease that mainly occurs in benign tumors of the peripheral nerves of the upper limbs. It is characterized by the overgrowth of neuronal fat and fibrous tissue. The cause of this disease is unknown. It is more common in young people under the age of 30, more common in men than in women, and more common in left hands than in the right hands. And asymptomatic soft tissue swelling and related nervous lesions are the main clinical manifestations^{1,2}. B-scan ultrasonography and magnetic resonance inspection are the main methods for diagnosing the disease, and clinicians will also misdiagnose it as a simple lipoma because of the rarity of this disease.

This article reports a case of FLH of median nerve with left hand finger nerve entrapment symptom and a literature review.

1. Case Presentation

1.1 History, Physical and Laboratory Examinations

The patient is a 46-year-old male, admitted to the hospital with the chief complaint of "numbness in the fingers of his left hand for more than 5 years". Five years ago, the patient had numbness in the fingers of his left hand with no obvious predisposing causes, and he came to the hospital. The hospital considered that the condition was caused by cervical spine disease, so he was treated with oral nutritional nerve drugs (the specific situation is unknown), but it did not improve, and the patient did not pay attention to it. Three years ago, the superficial sensation at the metacarpophalangeal joint of the hypothenar of the left hand was weakened. One year ago, the distal ulnar side of the index finger and the distal radial side of the middle finger were secondary to weakened superficial sensation and megalodactyly symptom of the middle finger

and index finger of the left hand were developed. It can be found that a mass on the left palm side, which is soft, movable when pushed, with clear borders, no tenderness, and no fluctuation. Then he admitted to the hospital again.

The physical examination showed obvious swelling in the index finger and middle finger of the left hand, normal body temperature, grade V muscle strength, and no tenderness, the superficial sensations at the hypothenar of the left hand, the metacarpophalangeal joint, the distal ulnar side of the index finger and the distal radial side of the middle finger were weaker than that of the right hand, and the peripheral circulation was normal. Tinel sign(+), Phalen test (+). The upper limb electromyography report showed the electrophysiological feature of severe injury of the median nerve below the left wrist, the B-scan ultrasonography of the left wrist showed that the median nerve showed a typical hamartoma change at the outlet of carpal tunnel 5cm above the left wrist. The digital nerves on the adjacent surfaces of the index finger and middle finger were thicker than other finger nerves. The patient was recommended to undergo operative treatment and admitted to the hospital for surgical treatment. And the related inspections were improved after admission.

Laboratory studies revealed normal white blood cell count, C-reactive protein level, neutrophil count, hemoglobin level and erythrocyte sedimentation rate. Tumor makers were normal. The safety indexes such as liver and kidney function electrolyte were all normal.

1.2 Imaging Findings

Preoperative plain radiographs, X-ray examination of the left hand showed a mild ulnar deviation of the distal interphalangeal joints of the second and third fingers, hyperplasia of osteophyte on the articular surface, cystic sclerosis lesions, and swelling of surrounding soft tissues (Fig. 1). MRI examination of the left hand showed no obvious abnormality in the joint space, normal bone marrow structure signal, and no obvious abnormal signal after fat suppression, and no obvious effusion in the joint, an abnormal subcutaneous fusiform signal at the palmar side of the left wrist, T1W1 isointensity, T2W1 inhomogeneous slightly hyperintense signal (Fig. 2). The radiologic appearance suggested a hamartoma.

1.3 Surgical Treatments And Pathologic Findings

Under brachial plexus block anesthesia, the patient underwent left-hand mass incision and exploratory extraction + median nerve release in a supine position (Fig. 3). After the anesthesia was successful, the patient was routinely disinfected and draped. A longitudinal S-shaped incision was made centered on the mass. The separation to the median nerve found that the transverse carpal ligament showed hypertrophic and variant appearance of the distal nerve, the color of the outer membrane turned white, the color of the outer membrane from the distal end to the trunk along the nerve to the nerve thenar branch returned to light yellow, but still hypertrophic. After incision and separation of the outer membrane, no obvious masses were found, and proliferated fibrous tissues were found to grow along the epineurium and endoneurium, showing a fusiform change, and the nerve fibers were degenerated and atrophied (Fig. 4). The surrounding tissues were fully released and the proliferated fibrous tissue was separated and sent for pathological examination.

The postoperative pathological report showed: (left wrist excision) nervous tissue proliferation, the proliferated perineurium cells in some areas were arranged in concentric circles, combined with HE morphology and immunohistochemical marker results, we considered perineurioma, please combine with the clinic (Fig. 5). Immunohistochemical results showed: A: S-100 (+), NSE (focus +), EMA (portion +), GFAP (-), ERG (blood vessel +), SMA (blood vessel +), Ki-67 (1%+), NF (small region +) (Fig. 6).

1.4 Follow-up

At the time of hospital discharge, the patient felt that the numbness in the fingers of the left hand is improved. Three months after the operation, the patient was followed up by telephone. He complained that he had not received other treatments after discharge. At present, the condition of the disease is stable, and there is no aggravation of numbness.

2. Literature Retrieval And Result

We searched Pubmed and Medline comprehensively by computer, and manually searched related journals and conference papers with search keywords of "hamartoma", "FLH", "FLH of median nerve", which were included in clinical literature and excluded basic researches such as biomechanics. After rigorous screening, a total of 10 articles were included in this study^{1,3-8}. (Table 1)

Table 1
Basic data of included research literature

Case	Author	Age (years)	Gender	Clinical presentation	duration	location	Macroductyly	Treatment
1	Jyoti R KINI	30	F	Carpal tunnel Syndrome, Swelling left forearm	Five years	Left median nerve	-	Carpal tunnel decompression
2	Jyoti R KINI	18	F	Pain and diffuse Swelling of the Ventral aspect of the right forearm and hand	Since childhood	Right median nerve	+, ring finger	Surgical exploration Fasciotomy with biopsy
3	Jyoti R KINI	28	F	Swelling in the Right hand, forearm	Since birth	Right median nerve	+, Thumb and Index finer	Median nerve Decompression And excision of the index finger digital nerve mass
4	Jyoti R KINI	16	F	Progress-ively Increasing Swelling in the right hand, forearm	Since birth	Right median nerve	+, thumb	Surgical debulking and Biopsy taken
5	Jyoti R KINI	30	M	Swelling right forearm	Six years	Right median nerve	-	Decompression and excision
6	Jenna-Lynn Senger	3	M	Incessant crying Swelling Bilateral hand	Three months	Bilateral Median nerve	-	Carpal tunnel Decompression and incisional biopsy
7	Taketo Okubo	17	M	Swelling in the Right hand, numbness	Since childhood	Right median nerve	-	Carpal tunnel Decompression and biopsy

Case	Author	Age (years)	Gender	Clinical presentation	duration	location	Macroductyly	Treatment
8	Taketo Okubo	15	M	numbness in the middle finger of his right hand	Six Months	Right median nerve	-	Carpal tunnel Decompression and biopsy
9	Taketo Okubo	56	F	a mass-like protuberance in the palmar aspect of right hand	Six months	Right median nerve	-	Surgical debulking and Biopsy taken
10	Jennifer Fong Ha	55	F	medial right elbow swelling, tingling sensations in right thumb	Four years	Right median nerve	-	Surgical debulking and Biopsy taken
11	Haris N. Shekhani	8	M	a mass-like protuberance in the palmar aspect of right hand	Since birth	Right median nerve	-	conservative treatment
12	Anthony Gilet	33	F	a slowly enlarging mass	Since birth	Right median nerve	-	conservative treatment
13	Muhammad Azeemuddin	31	M	swelling over the wrist, reduced mobility of the middle finger	Since childhood	Right median nerve	+, Middle finger	Excision of the middle finger digital nerve mass, sural nerve transplantation and biopsy

Among the 13 case reports, 7 were women, 6 were men, and 11 were adolescents. All 12 patients had the clinical symptoms of hand mass and affected side upper limb swelling. 5 patients had hand numbness, paresthesia, pain and other symptoms. 7 patients had these symptoms from infancy and even at birth. The diseased parts of the 11 patients were on the median nerve of the right hand, only one patient had a diseased part on the median nerve of the left hand, and the other one patient had a diseased part on the median nerves of both hands. Four patients developed a macroductyly. 7 patients underwent prophylactic carpal tunnel release, 2 patients underwent conservative treatment, and only one patient underwent sural nerve transplantation.

3. Discussion And Conclusion

FLH is a rare, slow-growing, and benign peripheral nerve tumor. The origin of FLH is still obscure, and it is more common in adolescents, which indicates that there may be a congenital cause, although there are a few cases reported in the elderly⁹. This disease was first reported by Mason in 1953 and was first described as having a painless and rare benign slow-growing lesion¹⁰. Subsequently, in 1964, Mikhail published 2 cases of diffuse fibrous fat overgrowth involving the median nerve fatty tissue¹¹. In the same year, Yeoman reported 3 cases of patients with fatty infiltration of the median nerve and pointed out that the tight junction of the intraneural fibrous fatty tissues prevented the extraction of the swelling¹².

Johnson and Bonfiglio reviewed the literature in 1969, and presented their cases, and gave a detailed histological description of the lesion, which was officially named as FLH¹³.

In our research on limited literature reports, we found that the median nerve and its branches were the main involved parts, followed by the radial nerve, ulnar nerve, dorsal pedal nerve, brachial plexus, and cranial nerve; the involved parts in the median nerve were usually located in the wrist or hand, and rarely in the elbow⁶. This disease is more common in young people under the age of 30, including several cases of infants and young children reported by some scholars as a congenital disease¹²⁻¹⁴, the ratio of male to female is about 2:1¹⁴, with more left hands than right hands. The main symptoms of clinical manifestations were gradually enlarged painless masses, and pain, numbness, paresthesia and carpal tunnel syndrome usually appeared in the later stage^{15,16}. One-third of FLH patients had related macrodactyly symptoms in the innervation area of the affected area, which is called "seborrhic lipodystrophy", which was first described by Feriz in 1925¹⁷. For patients with hand hypertrophy or macrodactyly, especially if the patient has signs or symptoms of nerve entrapment, FLH should be considered in the diagnosis¹⁸. In the case we reported, the patient was accompanied by painless masses, macrodactyly, and paresthesia and numbness along the median nerve of the hand, which mainly affected the ulnar side of the index finger and the radial side of the middle finger.

Neural fibrolipoma is an orange-yellow, fusiform, sausage like or ropelike enlargement of the nerve^{19,20}. As seen in the case of this study, the appearance of the nerve was hypertrophic and variant, and it showed a fusiform change, the color of the outer membrane turned white, the color of the outer membrane from the distal end to the trunk along the nerve to the nerve thenar branch returned to light yellow, but still hypertrophic.

X-ray is not sensitive to FLH detection, and the X-ray film may show normal or thickening of soft tissue, which is not diagnosable²¹. Due to the special features of B-scan ultrasonography and magnetic resonance imaging of FLH, the B-scan ultrasonography shows that the hypoechoic sound beam is surrounded by the hyperechoic fibrous fat structure, showing a typical "snakeskin-like" change. MRI shows fat with high signal strength on T1-weighted and T2-weighted images, a characteristic coaxial cable appearance on axial images, and a "spaghetti-like" appearance on sagittal images^{21,22}. Transverse sections may show the 'lotus sign' that occurs due to the thin hypointense septa within the fat tissue that separates the fat bundles. This is consistent with the characteristic pathological findings seen in FLH of the thickened perineurium due to perineural fibrosis with septation of nerve fascicles^{5,23}. Therefore, visualization of the coronal and axial characteristics obviates the need for a biopsy to make the diagnosis of FLH²⁴⁻²⁶. However, it should be differentiated from traumatic neuroma, neurofibroma, neuroma, schwannoma, ganglion cyst, lipoma, hereditary hypertrophic interstitial neuritis, vascular malformation and the like during diagnosis^{27,28}.

In limited literature reports, patients with FLH of median nerve basically choose to undergo mass resection and pathological examination. Gross pathological specimens show that the involved nerve is thickened in spindle shape, with yellow fibrous fatty tissue infiltration, which is generally confined to the nerve sheath. Histology shows that there is a mixed infiltration of mature fatty tissue and fibrous tissue in and around the involved nerve sheath, which separates the nerve bundles, one of its remarkable features is that the fibrous tissue around the nerve is concentric²⁹. Other changes in the involved nerve include the formation of the separated micro nerve bundles and the pseudo-onion skin-like structure, similar to the intraneural peripheral nerve tumor, as shown in this case; occasionally osseous metaplasia.

Jose A. Plaza²⁹ once mentioned that there were 3 cases of FLH of median nerve whose pathological sections showed perineurioma-like changes, as seen in this case report. Because the pathological results cannot guide the clinic well, very few hospitals will continue to perform immunohistochemistry of pathological sections. Jenna-Lynn Senger⁴ once reported a case of bilateral acute carpal tunnel syndrome in a 3-year-old child, of which the pathological immunohistochemistry showed: CD34(+), S-100(+), vimentin(+), epithelial membrane antigen(-), desmin(-), glial fibrillary acidic protein antibodies(-). Jose A. Plaza²⁹ proposed S-100 (+), EMA (+ -), fibrous cells (-).

There is no clear and best treatment recommendation in the limited number of cases of FLH reported in the literature. Therefore, the current clinical treatment is mainly based on the presence or absence of symptoms and the severity of symptoms to determine the treatment plan. It is very important to understand the degree of nerve involvement of FLH for the preoperative plan. Prophylactic CTR is the main treatment for the disease. It has been clinically proven that CTR can relieve most of the symptoms of patients with carpal tunnel symptoms. Most scholars advocate early carpal tunnel decompression and fibrous lipid sheath decompression, anatomical and microsurgical resection is usually reserved for those patients who have undergone carpal tunnel decompression but still have progressive and disabling median nerve damage. However, this method may lead to permanent loss of motor and sensory functions, and the effect is not obvious³. Some scholars believe that the progressive worsening of neurological symptoms after decompression may be related to the direct compression of individual nerve bundles by massive fibrosis around the nerve rather than the compression of the median nerve in the carpal tunnel. Therefore, some scholars have achieved satisfactory functional results through large-scale resection of diseased tissue and sural nerve transplantation³⁰⁻³³.

In summary, the onset age of FLH is usually under the age of 30, and often at birth. while in this case, the patient was attacked by FLH at the age of 41-year-old, showing his rarity,the clinical symptoms of FLH of median nerve mainly include gradually enlarged painless mass, macrodactyly, pain, numbness, paresthesia and carpal tunnel syndrome, and the diagnosis mainly depends on B-scan ultrasonography and magnetic resonance inspection. The pathological sections of FLH sometimes show perineurioma-like changes, which need to be identified with clinical and MRI features. The treatment methods include CTR and nerve transplantation after the whole nerve resection. CTR has been proven to be helpful for many patients suffering from carpal tunnel symptoms and can relieve most of the symptoms. It is the main method of treatment of the disease, and the cause of the disease needs to be further explored.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent to publish

Participants signed informed consents prior to the study.

Availability of data and materials

All supporting data can be provided upon request to the authors.

Competing interests

We declare that we have no competing interests.

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Authors' contributions

YY and MC Yin designed the study. HX collected the data. YY and YZ Yang wrote the manuscript. JH Ge, CW, TW and ZX Fan carried out the operation. YW Xue done the pathological examination. QS revised the manuscript. QS decided to submit the manuscript for publication.

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Figures

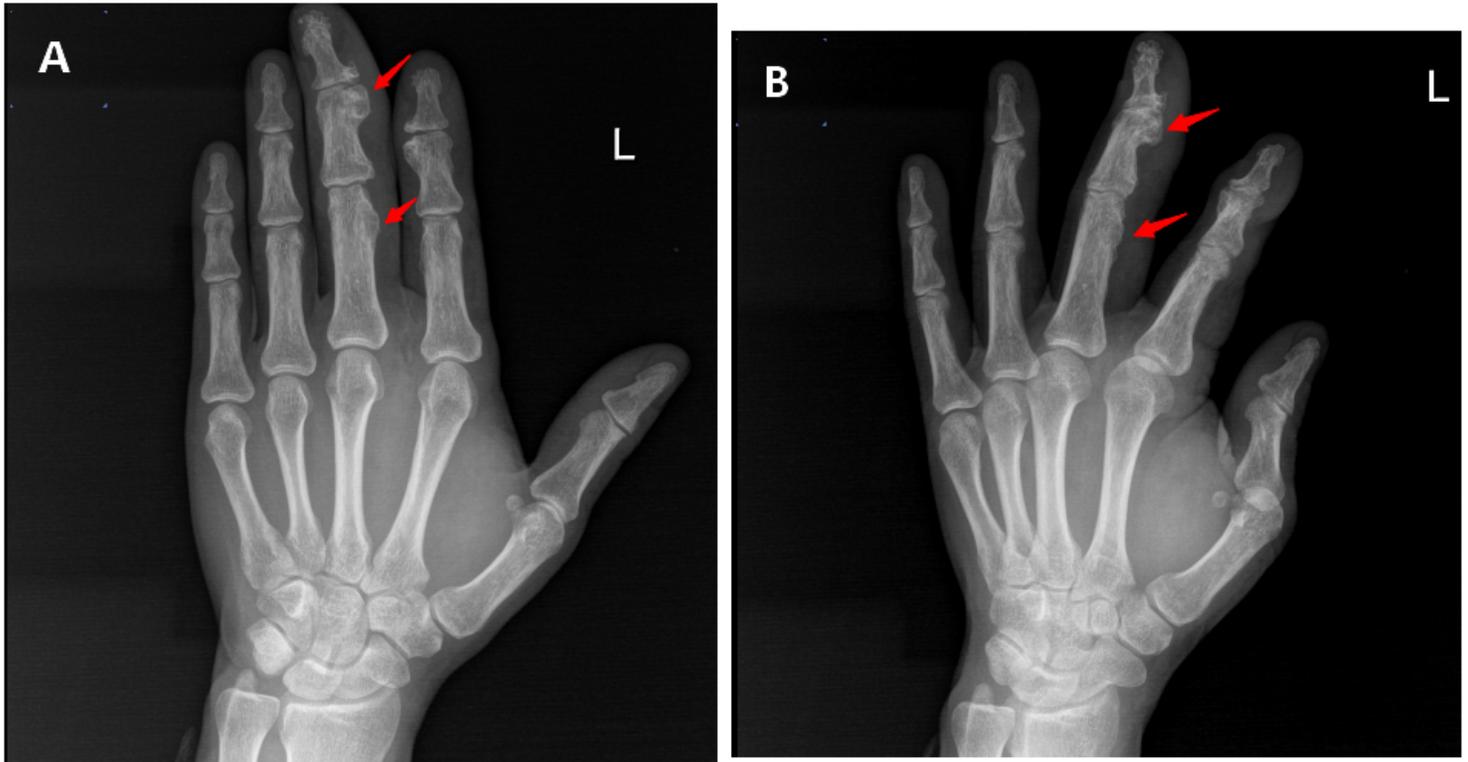


Figure 1

A-B: The preoperative left hand radiograph showed a mild ulnar deviation of the distal interphalangeal joints of the second and third fingers, hyperplasia of osteophyte on the articular surface, cystic sclerosis lesions, and swelling of surrounding soft tissues.

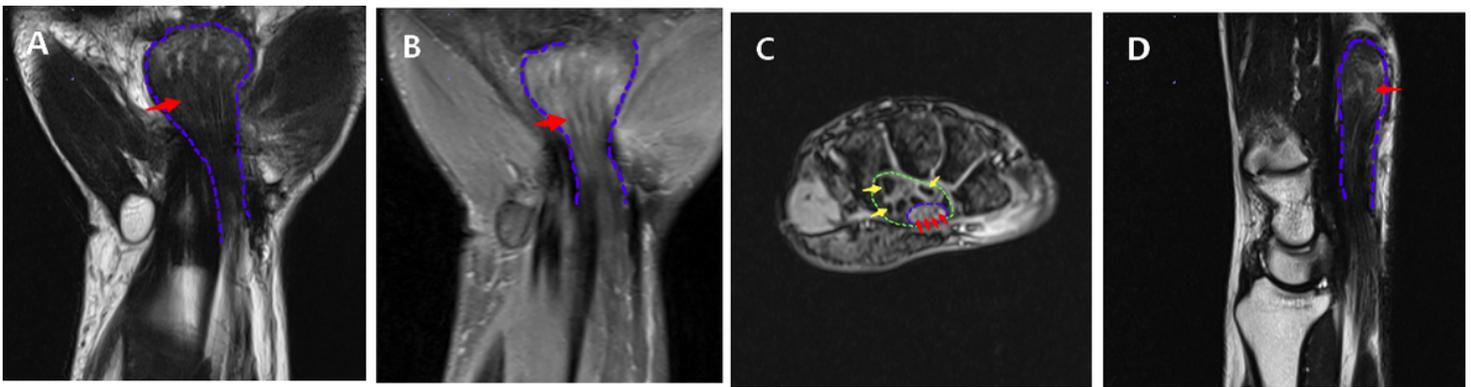


Figure 2

A-B: The preoperative wrist MRI showed a "spaghetti-like" appearance on sagittal images; C: The preoperative wrist MRI showed a characteristic coaxial cable appearance on axial images and the 'lotus sign' on transverse sections; D: The preoperative wrist MRI showed a mass on the left palm side.



Figure 3

A: The preoperative picture showed megalodactyly symptom of the middle finger and index finger of the left hand; B: The preoperative picture showed a mass on the left palm side and megalodactyly symptom of the middle finger and index finger of the left hand.

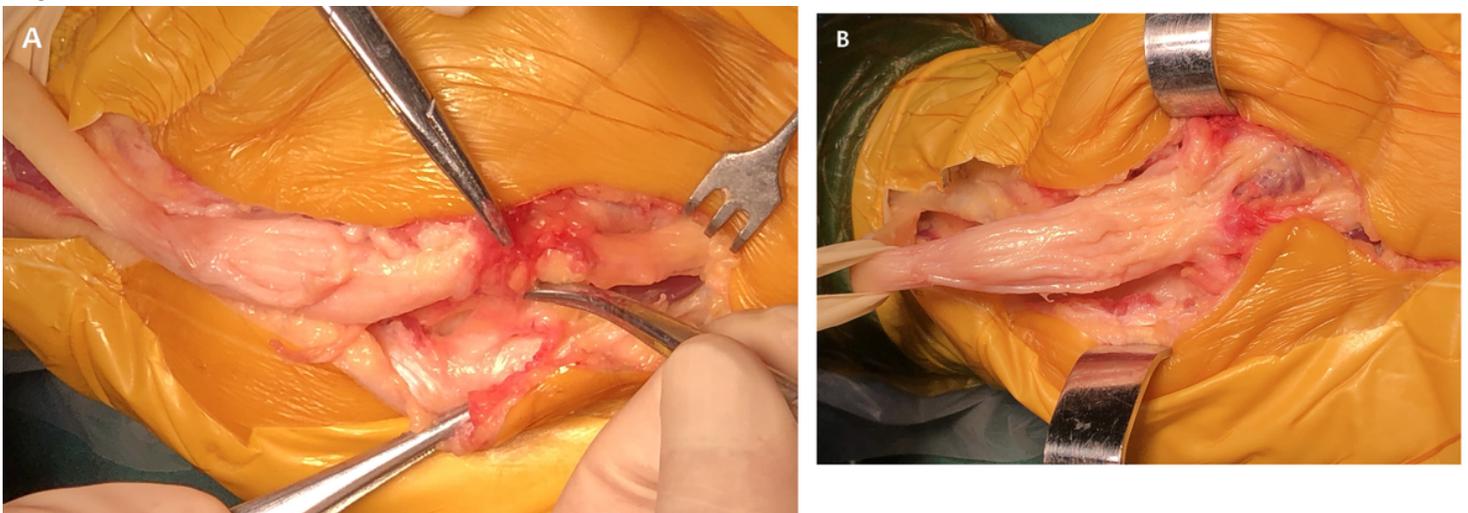


Figure 4

A-B: The picture during the operation showed the appearance of the nerve was hypertrophic and variant, and it showed a fusiform change, the color of the outer membrane turned white, the color of the outer membrane from the distal end to the trunk along the nerve to the nerve thenar branch returned to light yellow, but still hypertrophic.

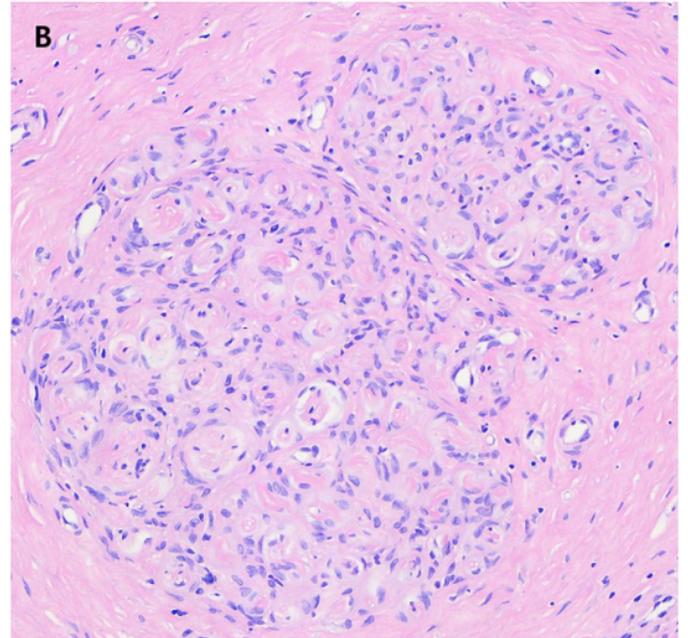
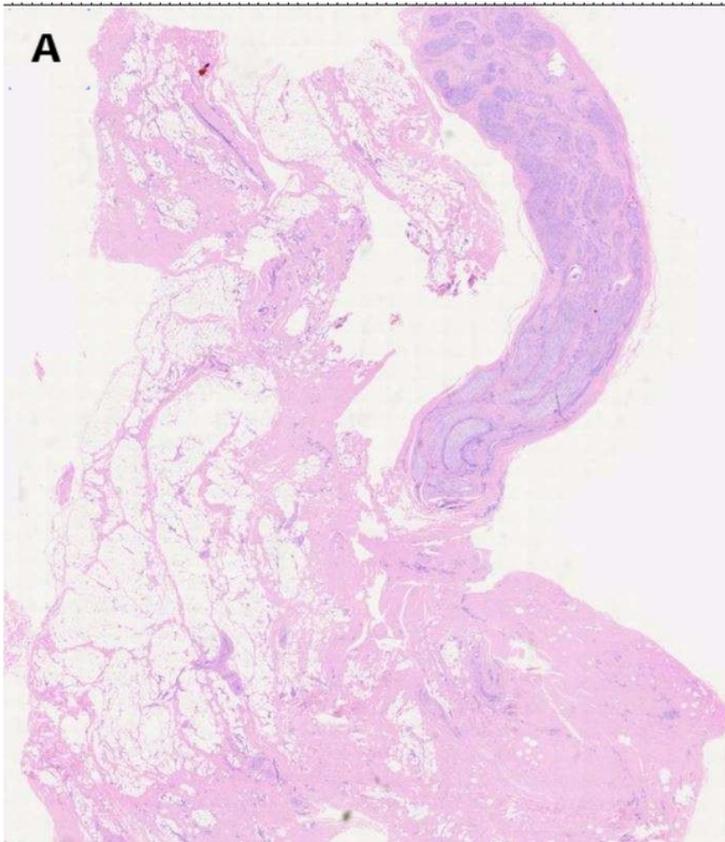


Figure 5

A: The pathological section showed mixed infiltration of mature fatty tissue and fibrous tissue in and around the involved nerve sheath; B: The pathological section showed the proliferated perineurium cells in some areas were arranged in concentric circles, and the formation of the separated micro nerve bundles and the pseudo-onion skin-like structure.

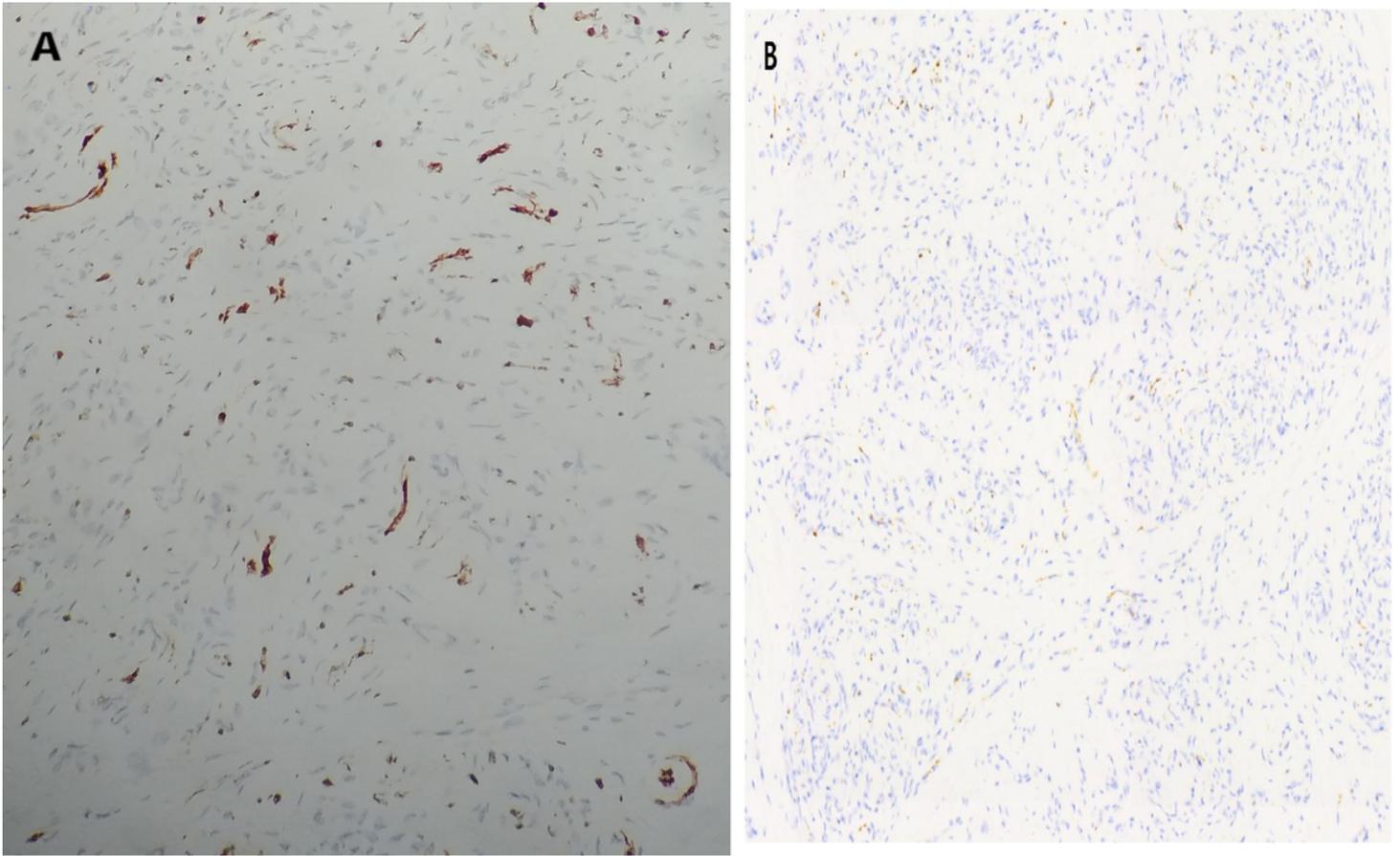


Figure 6

A: The immunohistochemical image showed s-100 protein was positive; B: The immunohistochemical image showed some focus of NSE was positive.