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SURGICAL TREATMENT METHODS FOR CARPAAL TUNAL STENOSIS

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Abstract:

We have observed 60 patients with carpal tunnel stenosis since 2015. until 2022 , surgical treatment in the emergency traumatology department of the Russian Research Center for Medical Physics and Families doctors Tashkent. Of these, there are 21 men, 39 women. At the age of 30 – 40 years – 20 patients, 41-50 years – 21 patients, 51-60 years – 15 patients and 61 and above years – 4 patients. The patients were divided into 2 groups : The main group of 30 patients who underwent surgery using a surgical treatment method developed by us. A control group of 30 patients who underwent traditional methods of surgical treatment.

We studied the results of treatment before and after surgical treatment. Before treatment in both groups, there were no excellent and good results, satisfactory in the main group was 33.5%, in the control group 25%, after treatment 12 months. the main group had excellent and good results 87%, the control group 77%, improvement in treatment results shows the effectiveness of this treatment method.

Keywords: Carpal canal stenosis , surgical treatment, degree of disease, median nerve , reduction of compression of the median nerve , regression of clinical symptoms.

RELEVANCE : There is a known method of non-invasive treatment of carpal tunnel syndrome, which consists of kinesiotaping of the hand, wrist joint and forearm, characterized in that with the help of bandages a plastic base is fixed on the back surface of the hand and forearm, the shape repeating the surface of the hand and forearm, while pins are attached to the base , which are connected by jumpers attached to the studs with nuts and forming a rectangle, on the front surface of the hand and wrist joint, apply a layer of glue to fix the tape and glue the tape crosswise in the form of longitudinal and transverse strips, pre-fastening the strips at the point where they intersect with the tape strips, secure the ends of the longitudinal and transverse tape strips to the jumpers, then move the jumpers along the pins in the direction from the forearm and hands until the skin is visually pulled anteriorly, the wrist joint is extended and separated from bases, after which the position of the jumpers is fixed with nuts and the resulting device is worn in courses for 7 days, repeating the courses 3 times with a break of 2 days; while wearing the device, the patient performs an exercise in the form of flexion and extension of the fingers 10 times a day, repeating the action 100 times (RU, patent No. 2739277, A61H 1/00, 12/22/2020).

However, the method is technically complex, can lead to an inflammatory process due to the use of special fixatives, and prolongs the rehabilitation period .

A method of treating tunnel syndromes, including the introduction of Actovegin into 4-6 biologically active points located along the affected nerve, characterized in that over the tunnel area, by infiltration anesthesia with a solution of novocaine or lidocaine , the needle is passed into the compression zone, where, after preliminary administration of an anesthetic solution, to to the site of nerve damage, without removing the needle from the tunnel, Actovegin is administered at a dose of 80-200 mg, for a course of 3-6 procedures carried out daily or every other day, while 16-40 mg of Actovegin is injected into biologically active points , for a course of procedures carried out daily or every other day (RU, patent No. 2249447, A61H39/08, A61K31/245, 35/14, 04/10/2005).

However, the therapeutic effect of the method is short-term; the course of procedures requires repetition after 6 months.

There is a known method of treating carpal syndrome, which involves applying electric current to the area where the median nerve is located in the carpal canal, characterized in that the effect is carried out by placing a cathode in the form of a needle at a depth of 2 mm in the periosteum of the lateral distal radius and cutaneous fixation of the anode above the

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transverse ligament wrists, followed by passing a monophasic electric current with a force of 5 to 10 mV with a duration 100-200 μs with a frequency of 1-2 Hz, the amplitude and duration of the pulses are selected to the level of painless sensations in the patient, the duration of one passage of electric current is 1 minute, after which a break is taken for 30 seconds, a total of 10 impacts are carried out per session with the number of sessions per a course of treatment of at least 15, carried out every other day (RU, patent No. 2595749, A61N1/32, 08/27/2016).

However, the therapeutic effect of the method is short-term; the course of procedures requires prolonged repetition.

Also known: 1. A method for decompressing the median nerve in carpal tunnel syndrome, including an incision of the skin, subcutaneous fat along the skin fold of the wrist joint, dissection of the carpal ligament, isolation of the median nerve and closure of the wound, characterized in that planning is carried out before surgery volume of decompression using ultrasound and electroneuromyographic (ENMG) examination of the median nerve, while determining and marking the levels of the entrance to the carpal tunnel on the skin and the exit of the median nerve from it, as well as the area of its maximum compression, and under ENMG control, surgical access is performed along the skin fold of the wrist joint in the projection of the passage of the median nerve through the proximal part of the carpal canal, and the skin incision is made along the skin fold transversely to the carpal canal with a length of 10- 15 mm, then, focusing on the tendon of the palmaris longus muscle, an isolation and blunt transverse spreading the fibers of the carpal ligament and longitudinal dissection of the proximal part of the fibers of the carpal ligament until the median nerve is visualized in the proximal direction; in the distal direction, soft tissues from the carpal ligament are separated using a tupper and surgical scissors with blunt ends, then, focusing on skin marks and under ENMG control, carry out a longitudinal dissection of the distal part of the carpal ligament and release the median nerve along its entire length, immediately after isolation of which, ENMG monitoring of the restoration of its conductive function is carried out and, if there is restoration of the diastasis of the edges of the carpal ligament, the previously isolated fragments of the palmar ligament are placed on the median nerve along its entire length, subcutaneously fatty tissue, after which the edges of the wound are compared and sealed with surgical glue; 2. The method according to claim 1, characterized in that to visually determine the completeness of the dissection of the carpal ligament along the median nerve, a rigid endoscope with constant irrigation with 0 degree optics and a diameter of 3 mm is inserted into the created space in the distal and proximal directions (RU, patent no. 2615905, A61B 17/56, A61B 5/0488, A61B 8/06, 04/11/2017).

However , when the median nerve is exposed, adhesions form with the formation of a neuroma. In addition, the availability of an endoscope and ENMG machine, as well as relevant specialists, is not always available to district clinics.

The closest in technical essence is a method of surgical treatment of neuropathy of the median nerve in the carpal tunnel, including an incision of the skin, subcutaneous fat, superficial fascia in the radiocarpal region in the projection of the median nerve, abduction of the palmaris longus tendon laterally , isolation of the median nerve, characterized in that form a defect of the carpal ligament, for which the carpal ligament is excised in the projection of the median nerve until the trunk of the median nerve is completely visible from the ulnar and radial sides, a quadrangular fragment is cut out from the subcutaneous fat, the shape of which is congruent with the configuration features of the carpal ligament defect, and the dimensions of each of its sides are 1.5-2 mm larger than the linear dimensions of the corresponding sides of the carpal ligament defect, using a suspension of the drug Kenalog 40 with a volume of 1 ml, a fragment of subcutaneous fat is infiltrated, placed on the trunk of the median nerve, completely covering the defect of the carpal ligament , after which the wound is sutured (RU, patent No. 2708978, A61B 17/56, 12/12/2019).

However , when excision of the carpal ligament before complete visualization of the trunk of the median nerve on the ulnar and radial sides, the median nerve is exposed, which subsequently leads to adhesions. Cutting out a fragment from subcutaneous fat often leads to inflammation.

MATERIALS AND METHODS OF RESEARCH.

We have observed 60 patients with carpal tunnel stenosis since 2015. until 2022 , surgical treatment in the emergency traumatology department of the Russian Research Center for Medical Physics and Families doctors Tashkent. Of these, there are 21 men, 39 women. At the age of 30 – 40 years – 20 patients, 41-50 years – 21 patients, 51-60 years – 15 patients and 61 and above years – 4 patients. The patients were divided into 2 groups : The main group of 30 patients who underwent surgery using a surgical treatment method developed by us. Control group, which underwent traditional methods of surgical treatment. Patients underwent dynamometry, MRI and ultrasound examinations before and after surgery . SKK (syndro carpal tunnel) is considered a common disease, affecting people of working age. In the development of CTS as a result of overstrain of the

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muscles and tendons of the hand and fingers when performing prof. duties or physical exercises. CTS has characteristic clinical signs that are classified according to severity, from mild to severe. This disease has certain methods of diagnosis and surgical treatment. Surgical treatment is carried out when conservative treatment is ineffective and when patients present late, depending on the degree of the disease. Having methods of surgical treatment of decompression of the median nerve and increasing the volume of the carpal tunnel during dissection of the transverse carpal ligament without its subsequent suturing, which generally leads to normalization of the active state and strength of the hand and fingers within 6 months after surgery . Taking into account the above, we have developed a new method of surgical treatment, which gave good and better immediate treatment results. "Method of surgical treatment of neuropathy of the median nerve in the carpal tunnel" positive decision on IAP 2023 0070

The invention relates to medicine, namely to traumatology and orthopedics, neurosurgery, and can be used for surgical treatment of neuropathy of the median nerve in the carpal tunnel .

The objective of the proposed method is to restore the functions of the upper limb, relieve pain, reduce the cicatricial adhesive process, minimize the volume of surgical intervention, eliminate the risks of surgical complications and insufficient decompression, reduce the time of hospital stay, the cost of treatment, and the period of temporary disability.

To solve these problems, a method of surgical treatment of neuropathy of the median nerve in the carpal tunnel is proposed, including an incision of the skin, subcutaneous fat, decompression of the carpal ligament in the projection of the passage of the median nerve, abduction of the palmaris longus tendon laterally , isolation of the median nerve, while visually determining and mark on the skin the levels of entry into the carpal canal and the exit from it of the median nerve, as well as the area of its maximum compression, the skin incision is made in a semi-oval shape 15-20 mm long in the area of the distal epimetaphysis of the forearm longitudinally to the carpal ligament until it is completely visualized, after abduction of the long palmaris tendon the muscles laterally isolate the median nerve without exposing it; for this, a medical elevator is installed under the carpal ligament at the level of the trunk of the median nerve and in the projection of the median nerve, the fibers of the carpal ligament are cut with a bayonet-shape from the distal part in the proximal direction with an indentation of 0.5 cm from the median nerve to the ulnar and radial side, then hydropreparation of the median nerve is performed at the level of the carpal ligament in the amount of 10 ml of 0.5% novocaine and close the wound.

The peculiarity of the proposed method is that visually determine and mark on the skin the levels of entry into the carpal canal and exit from it of the median nerve, as well as the area of its maximum compression, the skin incision is made in a semi-oval shape 15-20 mm long in the area of the distal epimetaphysis of the forearm along the carpal ligament until it is completely visualized, after abduction The palmaris longus tendon laterally gives off the median nerve without exposure, for this, a medical elevator is installed under the carpal ligament at the level of the median nerve trunk and in the projection of the median nerve, the fibers of the carpal ligament are dissected with a bayonet-shape from the distal part in the proximal direction with an indentation of 0.5 cm from the median nerve to the ulnar and radial sides, then perform hydropreparation of the median nerve at the level of the carpal ligament in the amount of 10 ml of 0.5% novocaine.

Visual determination on the skin of the level of entry into the carpal canal and exit from it of the median nerve, as well as the area of its maximum compression, is sufficient for a specialist in hand surgery with knowledge of human anatomy.

Making a semi-oval skin incision 15-20 mm long in the area of the distal epimetaphysis of the forearm along the longitudinal carpal ligament allows you to visually expand the area of the surgical field.

Installation of a medical elevator under the carpal ligament allows for its atraumatic dissection without damaging the surrounding anatomical structures .

Performing a bayonet-shaped dissection of the fibers of the carpal ligament from the distal part in the proximal direction makes it possible to expand the carpal ligament and create decompression of the median nerve without exposing it, without padding and to eliminate adhesions in the future. In addition, due to the form of the dissection, restoration of the carpal ligament occurs partially spontaneously.

Performing hydropreparation of the median nerve at the level of the carpal ligament in an amount of 10 ml with 0.5% novocaine allows you to decompress the nerve and eliminate adhesions in the future.

fig. 1 - dissection of the fibers of the carpal ligament, where: 1 - median nerve, 2 - annular ligament, 3 - incision of the skin, subcutaneous fat, 4 - elevator, 5 - bayonet-shaped dissection of the fibers of the carpal ligament.

The method is carried out as follows.

The patient is placed in a supine position on the operating table. After 3 times treatment of the upper limb with a 10% betadine solution , a tourniquet is

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applied in the middle third of the forearm and intraosseous anesthesia is performed in the area of the epimetaphysis of the radius with 0.5% novocaine in an amount of 70.0 ml. The hands are in a supinated position. Visually determine and mark on the skin of the palmar surface of the hand the levels of entry into and exit from the carpal canal of the median nerve, as well as the area of its maximum compression. The skin incision is made in a semi-oval shape, 15-20 mm long, in the area of the distal epimetaphysis of the forearm along the longitudinal carpal ligament until it is completely visualized. The palmaris longus tendon is retracted laterally . The median nerve is exposed without exposure. To do this, a medical elevator is installed under the carpal ligament at the level of the trunk of the median nerve and in the projection of the median nerve the fibers of the carpal ligament are cut with a bayonet-shape from the distal part in the proximal direction with an indentation of 0.5 cm from the median nerve to the ulnar and radial sides. Afterwards, hydropreparation of the median nerve is performed at the level of the carpal ligament in the amount of 10 ml of 0.5% novocaine. The wound is closed in layers. Apply an aseptic bandage with alcohol. A plaster splint is applied for 2 weeks.

Example 1.

Patient A.U., M.S., born in 1986, IB No. 652/425, was admitted on March 10, 2022 with a diagnosis of a malunion fracture in a typical location of the left radius, complicated by carpal tunnel syndrome.

The operation was performed on March 11, 2022. The patient was in the supine position on the operating table, the left upper limb was treated 3 times with a 10% betadine solution , a tourniquet was applied in the middle third of the forearm and intraosseous anesthesia was performed in the area of the epimetaphysis of the radius with 0.5% novocaine in quantity 70.0 ml. In the position of supination of the hand, the levels of entry into and exit from the carpal canal of the median nerve, as well as the area of its maximum compression, are visually determined and marked on the skin of the palmar surface . The skin incision is made in a semi-oval shape, 15-20 mm long, in the area of the distal epimetaphysis of the forearm along the carpal ligament until it is completely visualized. The palmaris longus tendon is retracted laterally . A medical elevator was installed under the carpal ligament at the level of the median nerve trunk, and the median nerve was isolated without exposure. In the projection of the median nerve, the fibers of the carpal ligament are cut bayonet-shaped from the distal part in the proximal direction with an indentation of 0.5 cm from the median nerve to the ulnar and radial sides. Completed hydropreparation of the median nerve at the level of the carpal ligament in the amount of 10 ml with 0.5% novocaine. The wound is closed in layers. An aseptic dressing with alcohol was applied. A plaster splint was applied for 2 weeks.

The patient was discharged on March 14, 2022 in satisfactory condition to continue therapy on an outpatient basis under the supervision of a traumatologist.

Example 2.

Patient K.K., born in 1963, IB 7562/2645, was admitted on August 10, 2016 with a diagnosis of bruise and sprain in the wrist joint, complicated by carpal tunnel syndrome on the right.

The operation was performed on August 15, 2016. The patient was in the supine position on the operating table, the right upper limb was treated 3 times with a 10% betadine solution , a tourniquet was applied in the middle third of the forearm and intraosseous anesthesia was performed in the area of the epimetaphysis of the radius with 0.5% novocaine in quantity 70.0 ml. In the position of supination of the hand, the levels of entry into and exit from the carpal canal of the median nerve, as well as the area of its maximum compression, are visually determined and marked on the skin of the palmar surface . The skin incision is made in a semi-oval shape, 15-20 mm long, in the area of the distal epimetaphysis of the forearm along the carpal ligament until it is completely visualized. The palmaris longus tendon is retracted laterally . A medical elevator was installed under the carpal ligament at the level of the median nerve trunk, and the median nerve was isolated without exposure. In the projection of the median nerve, the fibers of the carpal ligament are cut bayonet-shaped from the distal part in the proximal direction with an indentation of 0.5 cm from the median nerve to the ulnar and radial sides. Completed hydropreparation of the median nerve at the level of the carpal ligament in the amount of 10 ml with 0.5% novocaine. The wound is closed in layers. An aseptic dressing with alcohol was applied. A plaster splint was applied for 2 weeks.

The patient was discharged on August 17, 2016 in satisfactory condition to continue therapy on an outpatient basis under the supervision of a traumatologist.

12 decompressions of the median nerve were performed at the level of the wrist joint using the stated method. In all cases, after 3 months from the moment of surgery, complete regression of the pain syndrome was observed, partial restoration of sensitivity - after 3 months, and complete recovery - after 6 months. The motor activity of the fingers and wrist joint in all patients was fully restored, there was no cicatricial adhesive process, and there were no signs of compression.

Thus, the use of the claimed method makes it possible to minimize the volume of the operation, eliminate the risk of damage to the nerve and great

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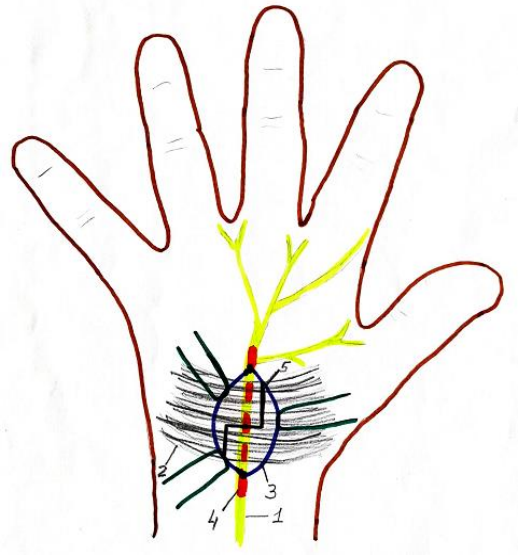
vessels, insufficient decompression, cicatricial adhesions, improve the clinical result, reduce the length of hospital stay and temporary disability in patients with neuropathy of the median nerve in the carpal tunnel . The method is simple, easy to implement, and highly effective. Recommended for wide use in practical medicine.

A method of surgical treatment of median nerve neuropathy in the carpal tunnel, including an incision of the skin, subcutaneous fat, decompression of the carpal ligament in the projection of the passage of the median nerve, retraction of the palmaris longus tendon laterally , isolation of the median nerve and closure of the wound, characterized in that it is visually determined and mark on the skin the levels of entry into the carpal canal and exit from it of the median nerve, as well as the area of its maximum compression, a skin incision is made in a semi-oval shape with a length of 15-20 mm in the area of the distal epimetaphysis of the forearm along the longitudinal carpal ligament until it is completely visualized, after abduction of the palmaris longus tendon , the median nerve is laterally isolated without exposure, a medical elevator is installed under the carpal ligament at the level of the trunk of the median nerve and in the projection of the median nerve, the fibers of the carpal ligament are cut bayonet-shaped from the distal part in the proximal direction with a 0.5 cm indentation from the median nerve to the ulnar and radial sides, then hydropreparation of the median nerve is performed at the level of the carpal ligament in the amount of 10 ml of 0.5% novocaine.

Thus, the new method we have developed can be used for the surgical treatment of neuropathy of the median nerve in the carpal tunnel .

After surgical treatment, the developed by us is noted restoration of the functions of the upper limb, pain relief, reduction of cicatricial adhesions, minimizing the volume of surgical intervention, eliminating the risks of surgical complications and insufficient decompression, reducing the time of hospital stay, the cost of treatment, and the period of temporary disability.

METHOD FOR SURGICAL TREATMENT OF NEUROPATHY MEDIA NERVE IN THE CARPAL TUNAL E



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The results were assessed according to the following criteria:

- excellent - achieving complete restoration of sensitivity of the median nerve, no pain in the carpal tunnel, range of motion in the full volume of the wrist joint. (43 – 50 points)

- good - achieving significant restoration of sensitivity of the median nerve, pain has decreased in the carpal tunnel, range of motion is slightly limited in the wrist joint. (42 – 36 points)

_ satisfactory – slight restoration of sensitivity of the median nerve, pain in the carpal tunnel has not decreased , range of motion is significantly limited in the wrist joint. (35 – 22 points).

- unsatisfactory - there is no restoration of sensitivity of the median nerve, severe pain in the carpal tunnel, range of motion is sharply limited in the wrist joint. (21 – 14 and below points)

We studied the results before and after surgical treatment of patients With syndromes carpal tunnel was performed before and after surgical treatment. The immediate results were studied in the period from 3 to 6 months after surgery. Long-term results of treatment were carried out at 6, 9 and 12 months after surgery (Table 1)

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Evaluation of the results of surgical treatment of patients with syndromes carpal tunnel

Treatment results of the main and control groups before and after treatment

Table No. 1

Period	Indicators (points)	Comparison groups		R
		Main group n=30	Control group n=30	
Before operations	Great	0	0	
	Fine	0	0	
	Satisfactorily	5(33.5%)	8(25%)	p > 0.1
	Unsatisfactory	25(66.5%)	22(75%)	p > 0.1
After treatment 1 month after operation	Great	2(6%)	0	p < 0.05
	Fine	16(51%)	11(40%)	p < 0.001
	Satisfactory	11(40%)	17(53.5%)	p < 0.05
	Unsatisfactory	1(3%)	2(6.5%)	p > 0.1
After treatment in 3 months after operation	Great	3(10%)	1(3%)	p < 0.05
	Good	18(62%)	15(50%)	p < 0.05
	Satisfactory	8(25%)	13(44%)	p < 0.05
	Unsatisfactory	13 %)	1(3%)	p > 0.1
After treatment in 6 months after operation	Great	3(9.5%)	0	p < 0.001
	Fine	21(71%)	20 (67%)	p > 0.1
	Satisfactory	6(19.5%)	9(30%)	p > 0.1
	Unsatisfactory	0	1(3%)	p > 0.1
After treatment in 12 months after operation	Great	3(10%)	0	p < 0.001
	Fine	23(77%)	23(77%)	p > 0.1
	Satisfactory	4(13%)	6(20%)	p > 0.1
	Unsatisfactory	0	13 %)	p > 0.1

The table shows that before treatment in both groups there were no excellent and good results, satisfactory in the main group there were 5 (33.5%), in the control group 8 (25%), unsatisfactory in the main group there were 25 (66.5%), in the control group 22 (75%)

After 1 month after treatment of the main group there were excellent and good results in 18 (57%), not noted in the control group, satisfactory in the main group 11 (40%), in the control group 17 (53.5%), unsatisfactory in the main group 1 (3%), in the control group 2(6.5%).

After 3 months after treatment, the main group had excellent and good results in 21 (72%), control group 16 (53%), satisfactory in the main group 8 (25%), control group 13 (44%), unsatisfactory in the main group 1 (3%), control group 1(3%).

After 6 months after treatment, the main group had excellent and good results in 24 (80.5%), control group 20 (67%), satisfactory in the main group 6 (19.5%), control group 9 (30%), unsatisfactory in the main group absent , control group 1(3%).

After 12 months after treatment the main group had excellent and good results 26 (87%), control group 32 (77%), satisfactory main group 4 (13%), control group 6 (20%), unsatisfactory no main group
and control group 1 (3%).

The method we developed using surgical treatment showed that a decrease in the likelihood of relapse of tunnel neuropathy SN in the carpal tunnel was noted, not only clinical improvement in the form of regression of pain and sensory disorders, but also positive results of neurophysiological and ultrasound indicators during instrumental examination of the median nerve. Before treatment of both There were no excellent and good results in the groups, there were 5 (33.5%) satisfactory results in the main group , 8 (25%) in the control group, 25 (66.5%) in the unsatisfactory main group, 22 (75%) in the control group. After 12 months after treatment the main group had excellent and good results in 26 (87%), control group 23 (77%), satisfactory in the main group 4 (13%), control group 6 (20%), unsatisfactory in the main group and no control group 1 (3%). Improvement in treatment results after surgical treatment of the main group (excellent and good results of 87%, compared to the control group of 77%), indicates the effectiveness of this surgical treatment method.

CONCLUSIONS:

1. The advantage of surgical treatment for carpal tunnel stenosis is a marked reduction in pain, reduced swelling and increased range of motion in the carpal joint, and reduced compression of the median nerve.

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2. Regression of clinical symptoms of the median nerve , as well as improvement of conductivity along it, and these data have been proven based on neurophysiological research.
3. Before treatment, both groups had no excellent or good results; satisfactory results in the main group were 33.5%, in the control group 25%, after treatment after 12 months. the main group had excellent and good results 87%, the control group 77%, improvement in treatment results shows the effectiveness of this treatment method.

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