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Ultrasound Pathological Changes under Function and Microscope Observation after Sciatic Nerve in Rats

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Keywords: Sciatic Nerve, Nerve Injury, Nerve Regeneration, Nerve Growth Factor, Neurotrophin 3 (NT-3)

Abstract: The most common case of contemporary neuro-orthopedics and neurosurgery is sciatic nerve injury, but after the sciatic nerve is severed, it cannot be cured by medical surgery. Objective: To restore the damaged sciatic nerve to normal function. Methods: The rat model of sciatic nerve injury was made by operation after anastomosis of the sciatic nerve. A blank control group, model group and NT-3 treatment group were set up. Compare the recovery of rat sciatic nerve function and the pathological changes under the microscope before and after treatment. Results: The sciatic nerve function index of the rats before injury was all above 9, and the nerve function was completely normal. The SFI value of the high-dose group was close to 0 after the fourth week, which was significantly different from other groups ($P < 0.05$), and its intensity Related to the concentration, the high-dose group had the most significant effect after statistical treatment; the recovery rate of calf triceps wet weight in the NT-3 high-dose group was higher than that of the other experimental groups, and the recovery rate at the sixth week was 77.35 %.The treatment effect is significant ($P < 0.01$), the amplitude of the sciatic nerve action potential of rats before injury is higher than the amplitude of the sciatic nerve action potential of rats after injury, and the NT-3 high-dose group basically recovered to Normal nerve action potential amplitude (11.21). Conclusion: NT-3 can speed up the recovery of sciatic nerve function after sciatic nerve dissection.

1. Introduction

Sciatic nerve injury occurs extremely frequently in clinical medicine. Most sciatic nerve damage is caused by trauma, but motor leaves can cause sciatic nerve damage. If nerve damage is not promptly and effectively treated and restored, the muscle tissue controlled by the damaged nerve will produce irreversible contraction, which will lead to neuromuscular dysfunction. Even if the peripheral nerve is damaged and receives treatment, the natural nerve regeneration rate after the

peripheral nerve is damaged is very slow, and the desired result is often not achieved in the later period. After receiving treatment, patients still have sequelae, which not only caused huge psychological and physical harm to patients, but also caused a huge burden on society.

Shams has conducted experiments to determine the neuroprotective effect of hyperbaric oxygen after sciatic nerve transection. Shams divided the experimental rats into five groups: sham operation group, sham operation + hyperbaric oxygen group, sciatic nerve transection group and sciatic nerve transection + hyperbaric oxygen (2.0 ATM / 100% oxygen) group (n = 14 / each group). The rats were annotated and observed one hour a day for five consecutive days. Four weeks later, the sciatic nerve and ganglion of the nerve root ganglion were eliminated to realize the biochemical evaluation of superoxide dismutase and catalase activity in the spinal cord, the biochemical evaluation of malondialdehyde level in the spinal cord, the immunohistochemistry of Caspase-3, cyclooxygenase 2, S100beta and the end of deoxynucleotidyl transferase gap in the spinal cord and DRG. Shams scheme has high accuracy but low stability [1]. Xu studied the protective effect of the defensive nerve after the transection of the sciatic nerve. Xu cut off the sciatic nerve and connected the two nerve stumps to the chitin conduit. The gap between the nerve stumps was 5mm. After repair, the mutant rabbit neutrophil peptide positive control nerve growth factor or negative control normal saline was injected into the muscle for 7 days [2].

In this paper, an experimental model of sciatic nerve injury was made. A blank control group, a model group, and three large-dose groups with low, middle, and high doses of neurotrophin 3 (NT-3) added to the damaged sciatic nerve were set up. A total of 2 months, from the detection of the sciatic nerve function index of each group of rats, the measurement of the calf triceps wet weight of each group of rats, the measurement of the nerve conduction velocity of each group of rats, the measurement of the amplitude of nerve action potential of each group of rats, The expression of staining and general observation were observed to compare the recovery of rat sciatic nerve function before and after treatment and the status of pathological changes under the microscope.

2. Review of Sciatic Nerve Injury

The most common case of contemporary neuro-orthopedics and neurosurgery is sciatic nerve injury, but after the sciatic nerve is severed, it cannot be cured by medical surgery. According to statistics, the total incidence of sciatic nerve injury reached 22.02%, the prevalence of males was 80.99%, 86% of patients were between 21 and 52 years old, and 84% were caused by accidents such as car accidents. In patients with sciatic nerve injury caused by trauma, medullary fractures accounted for 17.2%, simple posterior hip dislocation accounted for 13%, and hip fracture combined with hip dislocation reached 37%. It can be concluded that the incidence of sciatic nerve damage is high, the accompanying complications are numerous and the probability of causing disability is very high [3].

2.1. Causes and Classification of Sciatic Nerve Injury

In the contemporary era, China's land, sea, air, and logistics industries have all matured and can be said to be at the forefront of the world. Thanks to the continuous development of technology and economy, people's living standards have also continued to improve, thereby driving the continuous development and upgrading of the transportation industry, automobile manufacturing industry and real estate construction industry. The middle leaf increased the risk of traffic safety accidents, industrial manufacturing production packaging accidents and accidental injuries, which also directly led to the increasing incidence of peripheral nerve injury [4]. In addition, many natural disasters caused by force majeure factors have caused an increase in the number of sciatic nerve injuries. Various reasons, such as physical, muscle ischemia, chemical or suicidal immunity, can cause the

nerve or axon to undergo a disconnection reaction, damage the function of the nerve and change its morphological structure, and cause the conduction function of the nerve to be suppressed Eventually the numbness of the body and the feelings, movements and even sympathetic functions of the hands and feet. Sciatic nerve injury is a common clinical disease. According to the time of onset, sciatic nerve injury is divided into chronic injury and acute injury, and it can be divided into non-mechanical injury and mechanical injury according to different causes[5]. Because the recovery of physiological function of the sciatic nerve is not easy, the conditions and principles of nerve regeneration are very complicated. After the sciatic nerve is damaged, its nerve conduction velocity decreases, and the muscle cells shrink and die, causing the muscle function to dissipate. It is very difficult to treat and cure, and it has a profound impact on the patient's living standard and labor efficiency [6].

2.2. Clinical Manifestations of Sciatic Nerve Injury

The response of the sciatic nerve dissociation injury is not the same, because the peripheral nerve response is inconsistent, so the cause and depth of the sciatic nerve dissociation injury are not unique. Loss of vibration and reflection of the feet, loss of numbness due to deterioration of the sense of function, damage to the innervated skin, secretion of sweat glands, and muscle groups near and far. [7].

After the sciatic nerve is cut off, it will have a great impact on the lower body, which will cause patients to have difficulty walking. If the location of the sciatic nerve rupture is higher, all functions of the lower leg will disappear, and the sole of the foot will also be affected. Then the risk of secondary injury increases. The damage of the sciatic nerve mainly causes harm to the patient in two ways: the first is the physical symptoms. The symptoms of the early patients with sciatica are that when you often do any action, you will feel the pain of the needle sticking into the meat, and then As the condition continues to deepen, sciatica also worsens day by day, which is reflected in the patient's disability to move. The patient's turn around, hip abduction, and internal rotation cannot be carried out well. The sciatic nerve damage will cause collapse in the later stages, and the most serious will cause the patient to become disabled; the second is the psychological harm caused by the sciatic nerve damage to the patient. A series of symptoms caused by sciatica will cause sciatic nerve damage to patients Increased psychological pressure, which in turn leads to inferiority complex, increased risk of depression and even suicidal thoughts [8]. Patients suffering from sciatic nerve injury cannot normally enter social work, which causes a financial burden on families with such patients.

2.3. Treatment of Sciatic Nerve after Injury

After the peripheral nerve is cut off and injured, nerve regeneration and repair have become an urgent problem [9-10]. So far, thanks to the continuous deepening development of microsurgery technology, the level of sciatic nerve repair has made a great leap forward, providing an excellent environment and cornerstone for the regeneration of the sciatic nerve that has been interrupted. Surgical treatment of sciatic nerve injury has a history of many years, from the traditional stapling directly sutured to autologous nerve transplantation, and then developed into the current stage of biological treatment and autologous nerve substitute transplantation, replacing the original stump direct suture treatment A variety of newly-made artificial biological tissue nerves have also been used clinically as a medical treatment, but unfortunately their therapeutic effect cannot still be used as a substitute for autonomic nerves[11]. The fundamental reason is that after the sciatic nerve is damaged, many factors can affect the pathophysiological changes of the sciatic nerve, and the proximal and distal ends of the injured nerve will show different changes. These factors are not

completely clear, and these factors have a great influence on the acceleration of nerve function recovery in our clinical work. The focus of medical clinics and the hot issues of research in the medical field. A difficulty that has not yet been fully resolved includes and is not limited to how to promote the regeneration of nerve function after sciatic nerve injury and its function after injury to the sciatic nerve. effect. The clinical view of the repair of peripheral nerve injury is "the sooner the better, the sooner the repair of the broken sciatic nerve will be, the more effective it will be in recovering the motor function of the sciatic nerve of the patient" [12]. Consider repairing nerve surgery in time to make the nerve anastomosis to restore the connectivity and integrity of the nerve, and give neurotrophic factor injections regularly and quantitatively after the operation. In addition, you can also use tools to help you walk. These braces help to prevent foot sag. At the same time, you can also protect the sole of the foot and reduce the possibility of secondary damage to the damaged part.

3. Experiment Preparation and Treatment

3.1. Laboratory Animals and Materials

(1) Laboratory animals

The experimental animals in this experiment were a total of 60 healthy adult male rats about 10 months old (10 as spares), weighing between 200 and 250 grams. Before all experiments, the extracted rats were adapted Feeding, artificial control of light and darkness for 12 hours each, during which only food and drinking water were used. The feed and drinking water used were fresh and uncontaminated. All experimental animal operation methods in the course of this experiment are operated in accordance with the experimental animal operation management regulations.

(2) Experimental drugs

Normal saline and neurotrophin 3 (NT-3).

(3)The main laboratory equipment

Rat foot print walking box, suture, electrophysiology instrument, optical microscope, microwave oven, slicer, embedding machine, caliper, etc.

(4)Experimental reagents

NT-3, physiological saline, depilatory agent, 5% chloral hydrate, iodophor, formalin, staining solution, etc.

3.2. Experimental Method

(1) Preparation of rat sciatic nerve injury model

On the day before the experimental operation, the skin was prepared on the right hip and thigh of the rat, and 5% chloral hydrate intraperitoneal injection was used for anesthesia. The hair removal site was depilated, conventional iodophor disinfection was performed, and the prone position was adopted.

The sciatic nerve was cut: a longitudinal incision on the dorsal side of the left hind limb, the muscle tissue was separated under sterile conditions to expose and free the sciatic nerve, and the sciatic nerve was sharply traversed 15 mm below the piriformis foramen. Suture the skin and muscles in layers. The successful establishment of this model is that the anastomosis is neat, the nerve trunk is not twisted, the epineurium is turned out, the nerve bundle bulge does not appear, and the calf and ankle on the side undergoing surgery are completely paralyzed.

(2) Experimental animal grouping and administration route

Fifty rats were randomly divided into blank control group, model group, NT-3 low dose treatment group (low dose group), NT-3 medium dose treatment group (mid dose group) and NT-3

high dose treatment group (high dose Measurement group), 10 in each group. Blank control group: cut the skin directly, separate its muscles, only expose its sciatic nerve, and then suture after layers. Model group: first cut the skin, then separate the muscles, expose the sciatic nerve and completely cut it off, let it contract, and then suture layer by layer, daily subcutaneous injection of the same dose of saline as the treatment group. NT-3 treatment group: cut the skin of the operation area, separate its muscles, expose its sciatic nerve and completely cut off, let it retract, then suture layer by layer, subcutaneously inject 1ml of neurotrophin-3 (NT-3) every day, and Inject for consecutive weeks.

3.3. Observation Indicators and Methods

(1) General observation of experimental animals

After the experimental operation, the rats were continuously observed and recorded the walking postures, movements of the affected limbs, denervation of the sciatic nerve innervated areas such as the ankle and toes after sciatic nerve injury.

(2)Measurement of function index of sciatic nerve function in rats

In the second week, fourth week, and sixth week after the experimental operation, the footprints of rats in each group of experiments were collected using the rat foot print walking box prepared in advance before the experiment. Place the white paper cut to the size matching the walking box on the bottom of the box to collect the foot prints of the experimental rats. A variable measurement was carried out on the collected foot prints of each group of experimental rats. The measurement method was: the length of the foot print is the distance from the toe to the heel, the width of the foot address is the distance from the first to the fifth shame, the middle foot address is The distance of 2 ~ 4 welfare.

The measurement accuracy is accurate to the millimeter. When calculating the sciatic nerve function index, bring the above variables into the following formula:

SFI=38.3(EPL-NPL)/NPL+109.5(ETS-NTS)/NTS+13.3(EITS-NITS)/NITS-8.8

Among them, EST is the width of the rat's foot site on the experimental side (sciatic nerve injured side), NTS represents the width of the foot site of the normal rat, EPL represents the length of the foot print on the experimental side (sciatic nerve injured side), and NPL is the normal rat The length of the lateral foot print, EITS represents the distance between the middle toe of the experimental side (the sciatic nerve injured side), and NITS represents the distance of the middle foot of normal rats.

The signs of the SFI measurement results are: the sign indicating that the nerve function is completely normal is 0 to ± 11, the indicator that the nerve is completely disconnected is -100, and the sign representing the recovery of some nerve functions is -11 to -100.

(3)Observation of wet weight of triceps of lower leg (STW)

After the experiments of this study were carried out to the second, fourth and sixth weeks, after the neuroelectrophysiological testing of each group of experimental rats was completed, the bilateral calf head muscles of each group were completely removed Weigh with an accurate experimental balance.

Recovery rate of wet weight of triceps (STW) (%) = wet weight of calf triceps on injured side / triceps of normal leg * 100%.

(4)Measurement of nerve conduction velocity and maximum fluctuation value of nerve conduction

Under the premise of the experiment, each experimental group anesthetized the experimental rats again at the second week, the fourth week, and the sixth week, strictly controlled the incision under the sterile environment, and exposed the sciatic nerve anastomosis of the rat. Near end and far end.

The detection of nerve conduction uses an electrophysiological instrument to detect and record the average nerve conduction velocity, measure and record the maximum amplitude and MNCV.

(5)HE stain

The first step of HE staining is to process the tissue samples and make them into paraffin sections; the dried paraffin sections are dewaxed with xylene, infused with anhydrous alcohol, washed with distilled water, stained with hematoxylin stain, hydrochloric acid alcohol Differentiation, washed with distilled water, stained with eosin, dehydrated and transparent, and finally observed by microscopy.

4. Experimental Results

4.1. Experimental Observations

After the artificial sciatic nerve of the rat was disconnected, no matter the model group or the NT-3 low, medium and high dose group, the sensorimotor function of the limb and the energy loss in varying degrees were inevitable. All lower extremities showed ankle deformity and claudication, impaired motor function, and over time, swelling, etc, and so on, red fever and toes, spread, dry skin, loss of some hair, stomach ulcers, toes and muscle atrophy. Compared with the model group and the blank control group, the experimental rats in the NT-3 low-medium-high-dose group have made great progress.Although the symptoms of ankle deformity, dyskinesia, lameness, etc. also appear, the nutritional deficiency is more Less; the local muscle atrophy of the limbs, redness of the ankles, swelling, dryness and exfoliation were significantly lower than the model group and the blank control group; the toes also had deficiencies, but the number of deficiencies was lower than the blank control group and the model group. NT-3 low-medium-high-dose group when the material was collected six weeks after the experimental operation, the diameter of the proximal nerve of the newborn was larger than that of the control group and the blank control group.

4.2. Detection of Sciatic Nerve Function Index of Rats in Each Experimental Group

In the second week, the fourth week and the sixth week after the experimental operation, the rats in each experimental group were measured on their bilateral hind feet. The statistical results after the detection of the statistical data are shown in Table 1 and Figure 1. Table 1 shows the SFI index results in different time periods of each experimental group. Figure 1 shows the column line chart of SFI index results in different time periods of each experimental group. The whole process of experimental operation in each experimental group was operated by the same experimenter. After the skin of the experimental rats was cut, the experimenter quickly and accurately found the sciatic nerve of the rats for artificial sciatic nerve cutting and suturing. After the operation, the right hindlimb of rats in each experimental group was broken in a row, and the incision of rats in each experimental group was free from infection and other adverse phenomena, with good healing and no wound infection or death of experimental animals. When the experimental rats walked, their backs touched the ground, their ankles sagged and their feet buckled. Compared with the blank control group and model group, the activity of NT-3 group was better. Compared with the second week after operation, the movement state of the fourth week after operation was better, but there was still difference between the operation side and the non-operation side when comparing the footprints.

According to the SFI statistics of each experimental group in Table 1 and Figure 1, the SFI of the blank control group is lower than that of each experimental group ($P < 0.05$), and the model group is lower than that of the NT-3 treatment group. This difference is obvious Statistical significance ($P < 0.05$); the sciatic nerve function index of the rats before injury were all above 9, and the nerve

function was completely normal. The SFI value of the high-dose group was close to 0 after the fourth week, which was significant and statistically different from other groups Significance in science (P <0.05), indicating that the treatment effect in the high-dose group is significantly obvious.

Table 1. SFI index results of different time periods in each group

Group	Number	Before injury	Week 2	Week 4	Week 6
Blank control group	10	9.12±1.02	-85.32±2.05	-79.23±4.79	-59.44±3.24
Model group	10	9.04±0.23	-58.23±1.55	-43.99±2.44	-33.43±2.31
Low dose group	10	9.21±1.05	-50.35±4.30	-51.33±4.34	-31.65±3.43
Middle dose group	10	9.07±2.20	-50.34±3.24	-29.22±4.25	-30.98±4.66
High dose group	10	9.15±2.31	-25.66±3.76	-1.99±4.54	-1.88±5.69

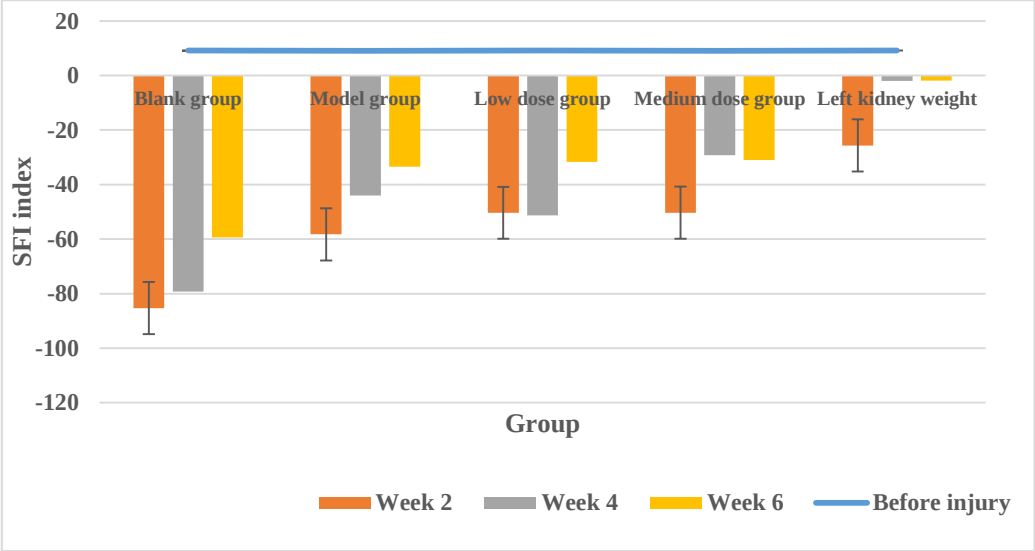


Figure 1. SFI index results of different time periods in each group

4.3. Wet Weight Detection of Triceps in Each Experimental Group

In the second week, the fourth week and the sixth week after the experimental operation, the recovery rate of the wet weight of the triceps in the legs of the rats in each experimental group was measured. The test results are shown in Table 2 and Figure 2. Table 2 shows the recovery rate of the wet weight of the triceps in the legs at different times in each experimental group. Figure 2 shows the column broken line distribution of the recovery rate of the wet weight of the triceps in the legs at different times in each experimental group.

Table 2. Recovery rate of wet weight of triceps in different time in each group

Group	Number	Before injury	Week 2	Week 4	Week 6
Blank control group	10	86.45±2.3	52.34±2.22	53.69±3.43	67.87±1.33
Model group	10	90.33±3.2	53.78±3.42	66.23±1.35	75.34±1.43
Low dose group	10	87.33±2.3	49.46±3.25	53.23±3.24	66.33±3.27
Middle dose group	10	87.99±2.4	55.89±1.16	63.24±2.73	68.45±6.76
High dose group	10	85.33±2.1	54.36±4.37	65.89±3.59	77.35±3.57

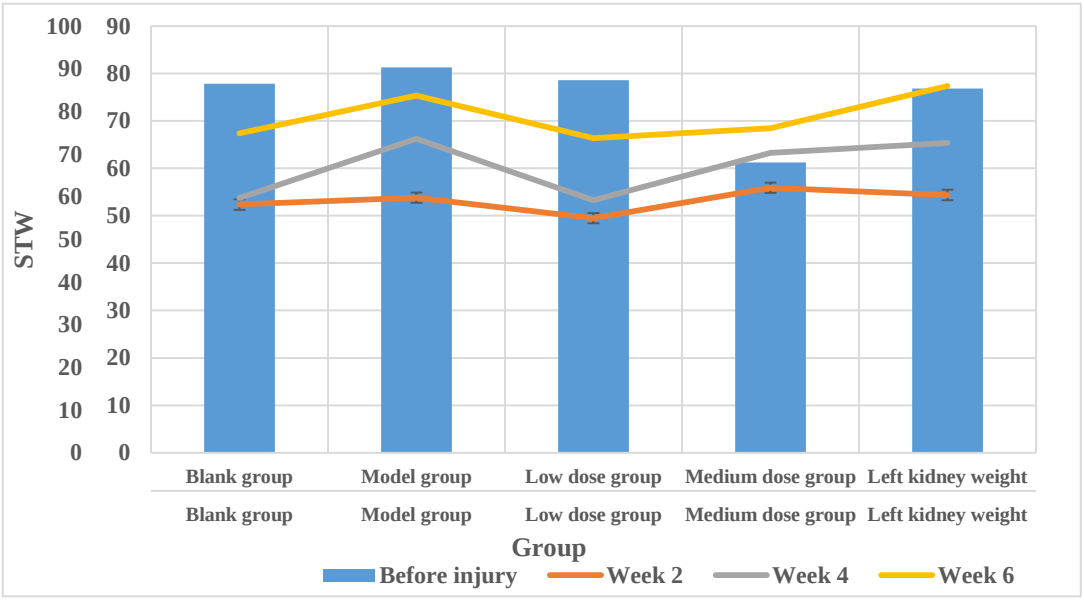


Figure 2. Recovery rate of wet weight of triceps in different time in each group

According to the STW test statistics of each experimental group in Table 2 and Figure 2, it can be seen that the recovery rate of the NT-3 medium-dose group and the high-dose group is higher than that of the blank control group at the second week; NT-3 The middle-dose group and high-dose group were lower than the other experimental groups than the model group (P <0.01); the wet weight of the rat triceps muscle before injury was higher than that after the injury, but There was no significant difference; the model group and the NT-3 high-dose group were higher than the other experimental groups at the sixth week, and the recovery rate of the high-dose group was 77.35%.

4.4. Determination of Nerve Conduction Velocity of Rats in Each Experimental Group

The experimental rats were tested and recorded for the average nerve conduction velocity in the second, fourth, and sixth weeks after the experimental operation. The results recorded after the test are shown in Table 3 and Figure 3 below. Table 3 is a table showing the results of the measurement of nerve conduction velocity of rats in each experimental group; Fig. 3 is a combined analysis chart of the area of the measurement of the nerve conduction velocity of rats in each experimental group and the cluster bar graph.

Table 3. Average conduction velocity of sciatic nerve in each time period

Group	Number	Before injury	Week 2	Week 4	Week 6
Blank control group	10	35.34±2.3	15.34±3.5	19.60±3.43	21.83±2.33
Model group	10	34.33±3.2	17.87±2.42	18.23±3.35	25.32±3.43
Low dose group	10	35.33±2.3	18.36±2.25	21.22±2.24	29.39±1.27
Middle dose group	10	34.99±2.4	21.39±2.16	25.24±3.73	30.45±3.76
High dose group	10	35.33±2.1	22.36±3.37	27.82±2.59	35.33±2.57

As can be seen from Table 3 and Figure 3, in the detection of the average sciatic nerve conduction velocity of rats in each group, the treatment group compared with the blank control group P <0.05, the blank control group was relatively low at 2, 4, and 6 weeks, while NT-3 The conduction velocity values of the high-dose group at each time point are relatively high, and compared with other groups, the difference is significantly statistically significant. However, in the NT-3 low-dose group, it can be seen that the difference between the time and the blank model group

is not obvious, and it cannot be explained that there is a statistical difference between the two. Compared with the NT-3 medium-dose group and the high-dose group, the difference was not statistically significant. The nerve conduction velocity in rats before injury is higher than that after injury, but the high-concentration NT-3 treatment group can return to the nerve conduction velocity before injury (35.33m / s) after 6 weeks.

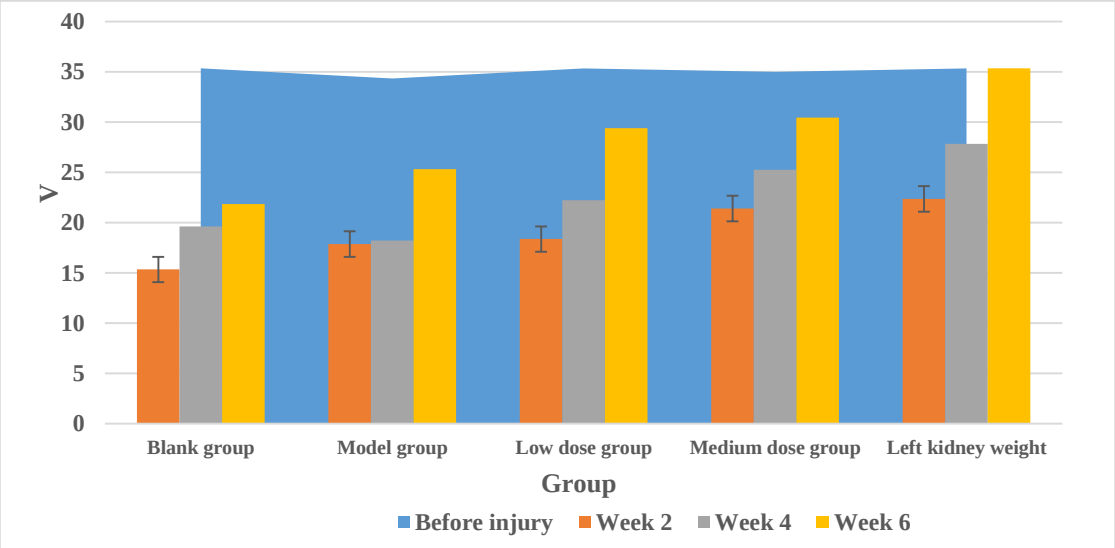


Figure 3. Average conduction velocity of sciatic nerve in each time period

4.5. Detection of Amplitude of Action Potential Wave of Sciatic Nerve in Each Experimental Group

The highest amplitude of the sciatic nerve was tested on the experimental rats in the second, fourth and sixth weeks after the operation. The amplitude of the action potential of the sciatic nerve in each experimental group is shown in Table 4 and Figure 4. Table 4 shows the results of detecting the amplitude of action potential waves of the sciatic nerve of each experimental group. Figure 4 shows the combined analysis of radar and pie charts of the detection results of the action potential amplitude of the sciatic nerve of each experimental group.

Table 4. Amplitude value of action potential of sciatic nerve at different time in each group

Group	Number	Before injury	Week 2	Week 4	Week 6
Blank control group	10	10.45±0.3	3.16±0.22	5.03±0.43	7.84±0.33
Model group	10	10.33±1.2	4.21±0.42	6.11±0.35	8.97±1.43
Low dose group	10	10.33±0.3	5.27±0.25	5.12±1.24	9.14±0.27
Middle dose group	10	12.99±1.4	5.69±0.16	7.01±1.73	12.29±2.76
High dose group	10	11.33±1.1	6.00±1.37	6.48±1.59	11.21±1.57

It can be seen from the results that at each time period, the difference between the model group and the NT-3 medium-dose group is not obvious, and compared with the other groups, $P < 0.05$, there is a statistical difference. There is no statistical difference between the remaining three groups. The amplitude of the sciatic nerve action potential of the rat before injury was higher than that of the rat after injury, but the NT-3 high-dose group slowly recovered to a nerve action similar to the previous one after the experimental treatment The amplitude of the potential wave.

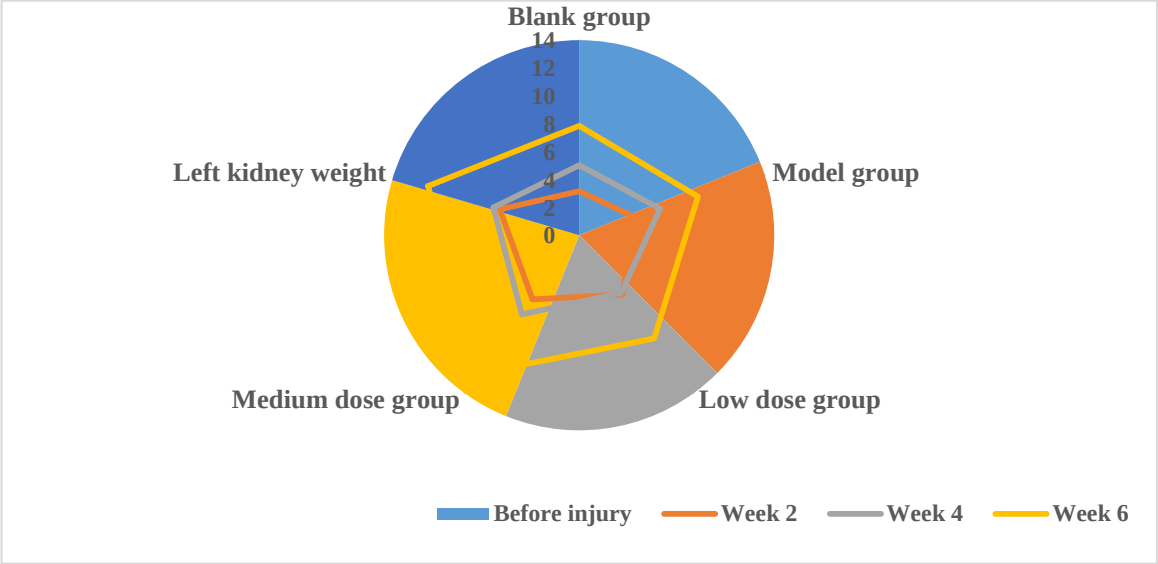


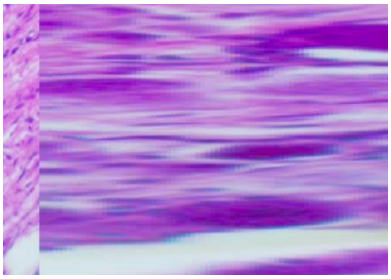
Figure 4. Amplitude value of action potential of sciatic nerve at different time in each group

4.6. HE Staining Observation and Analysis

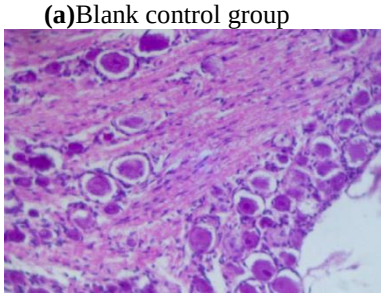
The observation result of the low-power microscope is that the periphery of the nerve cell is a membrane that forms connective tissue. The experimental result is shown in Figure 5. Within the ganglion, there are bundles of nerve fibers of different thickness, grouping many large and round spinal ganglion cells. From a high magnification point of view, the cell bodies of pseudo-monopolar neurons are round and have different sizes. Because the pseudo-monopolar neuron has only one cell process, it is difficult to see the connection between this cell process and the cell body; the cell nucleus is large and round, with little staining, and the cell nucleus is obvious. The dispersion of fine-grained reticulates was observed in the cytoplasm. Each neuron has a layer of satellite cells, flat cells or cubic dwarf cells, with less cytoplasm and a round or elliptical nucleus.The nerve fibers between them are mainly spinal cord fibers, and the cell bodies of spinal ganglion neurons are distributed in clusters. The cell bodies are large in size and fused. A special raised structure with a deep speckled nucleus can be observed.

The nucleus is large and round, and the nucleus is more obvious. The deep speckled Nissl bodies can still be observed. Glial cells are distributed around smaller cell bodies. Observation with high magnification lens in the fourth week after the experimental operation can find neuronal cell edema, the number of neurons with vacuolar degeneration decreases, dissolves, and the typical color of Rickettsia neuron apoptosis is lightened, and the cells stain Contracted state, nuclear concentrated pulp shrinks, chromatin density increases and is concentrated, axons are not obvious, but the cell membrane is intact, the cytoplasm is orange, the volume shrinks and deforms, and air halo around the cell body .

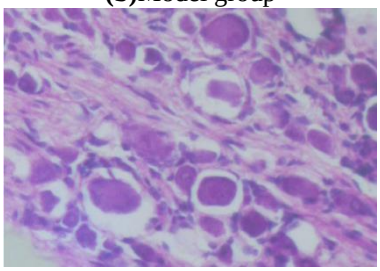
As shown in Figure 5, the NT-3 high-dose group showed neuronal ganglion edema and apoptotic neurons with lighter degeneration, there were also vacuums around the weak body, deeper stainedneuronal cells edema, atypical apoptosis .There are fewer cells and the core is slightly shrunken, the chromatin density is increased, the color of the staining solution is dirty, the orange color of the pulp is darker, and there is no obvious abnormal change in the blank control group and the model group.



(a) Blank control group



(b) Model group



(c) High dose group

Figure 5. Neural cells of lumbar spinal ganglion at 4 weeks after sciatic nerve disconnection (HE staining,X400)

5. Discussion of Experimental Results

In this research experiment, 1 ml of neurotrophin-3 was treated in the early stage of sciatic nerve discontinuation and continued until the sixth week after the experimental operation. A blank control group, a model group, and a NT-3 low, medium and high dose group were set to make it more convincing to discuss the findings of this experimental study:

(1) Compared with NT-3 model group and blank control group, the local application of NT-3 through nerve injury, the test of sciatic nerve function index of experimental rats in each group, the wet weight of calf triceps in each experimental group, and the large size of each experimental group Measurement of rat nerve conduction velocity, detection of amplitude of sciatic nerve action potential of rats in various experimental groups, expression of HE staining and general observation after surgery showed that NT-3 can accelerate the recovery of sciatic nerve function after treatment of sciatic nerve dissection;

(2) The sciatic nerve function index of rats before injury was significantly higher than the sciatic nerve function index of rats after injury, but the use of high doses of NT-3 can promote the experimental rat nerve function index to return to normal values;

(3) The wet weight of the rat triceps before injury was higher than that after injury, but there was no significant difference;

(4) The nerve conduction velocity in rats before injury is higher than that after injury, but the NT-3 high-dose group can return to the nerve conduction velocity before injury in the sixth week after surgery. The NT-3 low-medium-high-dose group uses NT-3 to accelerate nerve conduction

speed. The nerve regeneration and functional recovery after peripheral injury and repair depend on the internal and external conditions of nerve cells. The accelerated nerve conduction speed means that nerve cells can survive again;

(5) The amplitude of the sciatic nerve action potential of the rat before injury was higher than that of the rat after injury, but the NT-3 high-dose group slowly recovered to the nerve action that was not much different from the previous one after the experimental treatment Potential wave amplitude;

(6) In the NT-3 low-medium-high-dose group, the protective effect of NT-3 on the neurons of the lumbar spinal ganglion of rats is more significant than that in the blank control group and the model group. The nerve cell apoptosis and the number of nerve cells are not significantly reduced. Nutrient 3 for 6 weeks and its protective effect on spinal ganglion neurons is significant.

6. Conclusion

The innovation of this article lies in the combination of physical and chemical methods to obtain the test results and make a view that is in line with the hot spots of contemporary medicine. The problem of recovery after clinical peripheral nerve injury is difficult to solve, and the cause of it is the death of ganglion neurons and a series of pathological degenerations and changes. The death of neurons and the reduced number are one of the reasons that affect the regeneration of peripheral nerves. The number and function of important nerve cells and the role of repairing spinal ganglia. Therefore, how to protect neurons in the early stage of ischemic injury is a very important research point.

The regenerative gene that satisfies the peripheral nerve regenerative nerve is: the regenerative gene can obtain a higher level of expression, just NT-3 creates a very good environment, so this study uses NT-3 treatment to provide neurotrophic nerve axon transplantation Factors lack nutrition, which plays an important role in the early bone marrow formation and the health and recovery of the nervous system. After application of NT-3, it can promote the proliferation and differentiation of nerve membrane cells. Because the nerve membrane nerve plays a huge role in the process of nerve regeneration, its differentiation ability can regenerate the growth of axons, increase the effective and large amount of secretion of neurotrophic factors, nerve regeneration environment, promote nerve regeneration, NT-3 can maximize recovery Nerve cell drugs.

Due to the limitation of time and money, this subject has such deficiencies in the depth and breadth of research. Due to time constraints, trial evaluation data research cannot currently be used directly for clinical treatment. Therefore, a unified model test and clinical research must be established to improve the deficiencies of existing animal model pathology research. The ultimate goal is to guide the investigation results towards with a better clinical treatment. Neurotrophin 3 (NT-3) will have other functions that require further scientific research in the future. It is believed that the research in this article can make a great contribution to the clinical solution of sciatic nerve injury in China, and it can also lay the cornerstone for the treatment of sciatic nerve injury with traditional Chinese medicine, and eventually accelerate the recovery of nerve function regeneration and its function after sciatic nerve injury, and improve the effect of rehabilitation.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this

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Conflict of Interest

The author states that this article has no conflict of interest.

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