



Motor and sensory assessment of Sciatic Nerve Function Following Surgical Excision of induced fibrosis in a rabbit model

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ARTICLE INFO.

Article history:

-Received: 2/5/2025

-Received In Revised Form:15/7/2025

-Accepted: 20/7/2025

-Available online: 30/12/2025

Keywords:

Sciatic nerve, Surgical excision, Diclofenac sodium, Rabbit.

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ABSTRACT

The current study was conducted to evaluate the surgical removal of iatrogenic sciatic nerve fibrosis that occurs after intramuscular injection with diclofenac sodium. A total of 20 healthy local- breed male rabbits were randomly divided into two equal groups (n=10). All rabbits underwent general anesthesia, followed by surgical exploration of the sciatic nerve in the left hind limb and injection of (1.5mg/kg) diclofenac sodium (2.5%) intraneurally to elicit an experimental iatrogenic sciatic nerve injury. All of the experimental animals was left for 14-day post operation and was divided into two groups, control groups were left without treatment, dissection group group underwent surgery to open the site of the induction surgery and removing the fibrosis from and around the sciatic nerve. For the clinical assessments, motor and sensory functions were evaluated weekly from the first week post operation until the end of the 84-day study period. Motor and sensory evaluations revealed statistically significant differences between the control group and dissection group on all of the clinical evaluation periods, the postoperative period confirmed an earlier clinical improvement in the treatment group in the knuckling sign and gait of the experimental animals with a better recovery muscle contraction force, the sensory evaluation revealed an earlier recovery and return of sensation in the dissection group when compared with the control group.

Introduction

The nervous system consists of Central Nervous System (C.N.S.) and Peripheral Nervous system (P.N.S). The peripheral nervous system (PNS) connects the body's outermost regions to the central nervous system. It has an afferent sensory fibers and of efferent motor fibers that extend to striated skeletal muscle innervating through the neuromuscular junction (31). Scientists used the rabbits in many neurological researches (9). Anti-inflammatory drugs such as methylprednisolone used for treatment of certain sciatic nerve injuries (8). Following intramuscular gluteal injections of diclofenac sodium, researchers observed degeneration of the epineurium, fibrosis, and thickening of the perineurium in the sciatic nerve, as well as demyelination, lymphocyte infiltration, vacuolization, and edema (2). After severe nerve injury, peripheral axons can regenerate, however the likelihood of a full functional recovery is usually quite low without an appropriate medical or surgical treatment (36). Researchers used anti-inflammatory drugs to improve the nerve capability of regeneration and decrease inflammation (39). The use of chitosan nano particles shed more light on the regeneration of nerves using more variety of biomaterials (33), as well as transplantation of stem cells (20). The use of Low Power He-Ne laser therapy to enhance the sciatic nerve regeneration (11). Scientists described the Role of Human Umbilical Cord Mesenchymal Stem Cells and Acellular Human Umbilical Cord Tissue on Healing of the peripheral nerve after complete transection (15), and the use of mesenchymal stem cells embedded in conduit to accelerate the regeneration and alignment of axons (7). In small animal's clinics, sciatic nerve injuries are common after traumas or treatments (23). And currently there is no reliable and practical surgical treatment for such cases in veterinary clinics this is why we are conducting this study.

The aim of this study: To evaluate the effectiveness of surgical dissection and removal of fibrosis tissue on regeneration of sciatic nerve iatrogenic neuropathy which will be evaluated through Clinical evaluation (weekly Post Operation for 12 week).

Materials and Methods

Experimental Animal Design

Twenty healthy adult male rabbits were used in this study, with a weight ranged between (1-2 kg). They were separately housed in cages (2 Rabbits

per cage), given commercial available food and provided with water ad libitum, The Rabbits were kept in cages for 14 days for acclimation before the experimentation began. The experimental animals were randomly divided into two equal groups (n=10), Induction of sciatic nerve injury is done through intraneural injection of (1.5mg/kg) diclofenac sodium (2.5%) using a micro syringe. Two weeks' post-operation the first group is left without treatment as a control group, in the dissection group surgical removal of scar and fibrosis of the sciatic nerve lesion using a micro scissor. All experimental animals were followed by motor and sensory clinical signs observation weekly until 12th week.

Anesthetic Protocol

Before anesthesia, the Rabbits were off food for a period of two hours. A mixture of ketamine hydrochloride 35mg/kg (ALFASAN, KETAMINE10%, HOLLAND) , xylazine hydrochloride 5mg/kg (ALFASAN, XYLAZINE 2%, HOLLAND) was used for intramuscular injection so as to attain induction and maintenance of anesthesia (11).

Surgical Preparation

Hair on the skin of the Rabbit was clipped from caudo-lateral aspect of the left hind limb up to the level of the wing of ilium dorsally, to the level of the sacrum caudally and the stifle joint distally. The limb will cover from the end of the limb to the stifle joint, placing a latex gloves over the distal extremity and secure it to the limb with a tape. Sterile skin towel and towel clips were used to cover the glove and secure it to the limb. The animal is set in right lateral recumbency. The skin of the operation site was disinfected with chlorhexidine gluconate, isopropyl alcohol 70% and disinfected with 10% tincture iodine, the left hind limb was draped with the aperture of the fenestrated drape located at the intended operation site. After sterile draping of the area, a longitudinal Postero-Lateral incision was made approximately 25mm caudolateral to the greater trochanter at the level of the distal one third of the femur, using a scalpel blade number #15 (Fig.1.). The subcutaneous tissue and fascia lata was bluntly dissected to separate the biceps femoris and semitendinosus muscles. All experimental animals underwent induction of sciatic nerve injury to inject (1.5mg/kg) of diclofenac sodium (2.5%) intraneurally (27) (Fig.1.).

the Sciatic Nerve before induction of injury. (D). The Sciatic Nerve after the induction of Sciatic Nerve injury

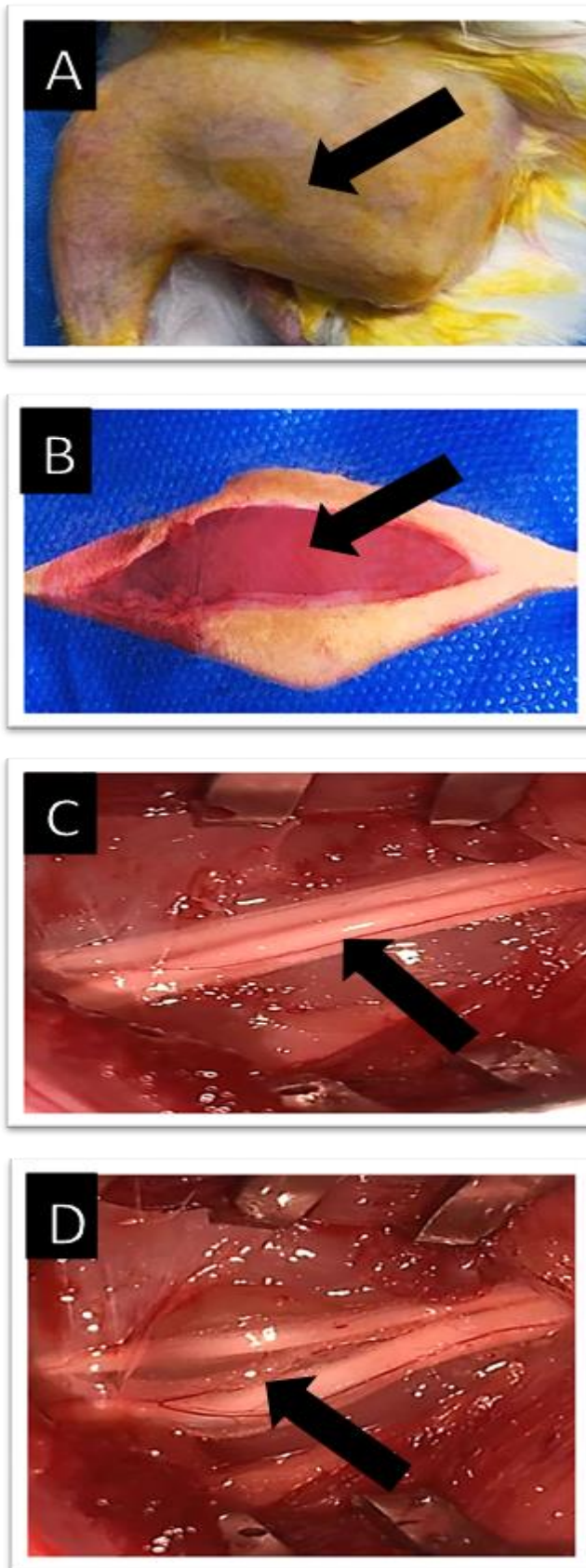


Figure 1. Induction of Sciatic Nerve Injury. (A). Site of operation. (B). Incision of the operation between biceps femoris muscle and semitendinosus muscle. (C).

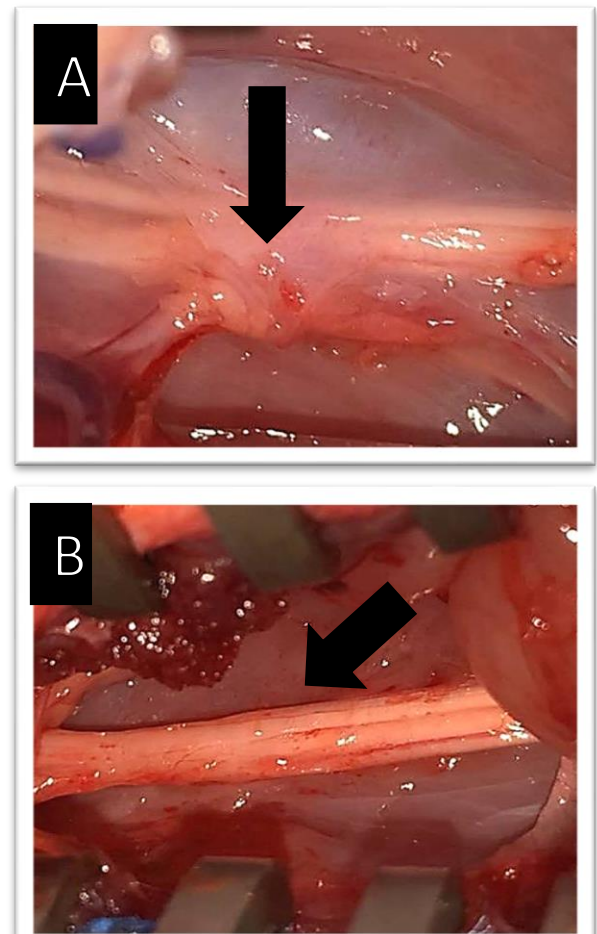


Fig. 2. Removal of scar and adhesions off the sciatic nerve. (A). Scar, adhesion around and on the sciatic nerve. (B). the scar and adhesions are removed using an ophthalmic scissor

The fascia and muscles were sutured using a 4.0 Polydioxanone (PDS) in a simple continuous suture technique, the subcutaneous and skin tissue were closed with 4.0 Polydioxanone. Subcuticular suture technique. Two weeks Post Operation (PO), the animals in the first group are left without treatment as a control group. In the Second group, Removal of the scar tissue and adhesions using an ophthalmic scissor using microsurgical dissection (Fig.2.). The animals were given (40,000, IU penicillin, and 50 mg streptomycin/kg B.W intramuscularly) daily for 7 days' post operation and Meloxicam (0.3mg/kg SC) once (4). the limb is dressed using a bandage and a self-adhesive bandage for the first 5 days Post operation. Motor and sensory injured Sciatic nerve clinical signs were evaluated weekly starting from the first week to the end of the study.

Motor Functions Evaluation

All animals were examined weekly from the first week post operation to the end of the study on the 12th week post operation using peripheral nerves damage grading criteria and clinical signs scoring system according to (12). The onset and ability to walk of the animals were recorded. The types of Gaits were graded as normal, crouched or crawled on heel. Knuckling was graded as normal, mild, moderate to severe. Muscle contraction force was graded based on weak, moderate, and strong. Muscle mass was graded as normal, mild, moderate, and severe muscular atrophies (12) (Table 1)

Sensory Functions Evaluation

The sensory functions of the sciatic nerve were recorded and evaluated on a weekly basis commencing from the 1st week until the 12th week PO. Grading criteria of toe spreading reflex, lateral aspect leg sensation, toe pinch and toe prick as a present (+) or absent (-) were the parameters accessed for the evaluation purpose. The lateral leg sensation and toe prick and pinch methods were suitable for the evaluation of foot withdrawal and vocalization tests. If they provide a positive response it was considered as an indication of recovery (34) (Tab.2).

Table 1: Modified the scoring system for motor clinical signs evaluation (12)

Clinical observation	Description	Day	Score
Onset	Animal ability to right its foot and move its limb	1-2 days	5
		3-4 days	4
		5-6 days	3
		7-8 days	2
		9-10 days	1
		11-13 days	1
Walk	Animal demonstrates an ability to walk on its front foot	2-4 days	4
		5-7 days	3
		8-10 days	2
		11-13 days	1
	Normal - Animal		3

Type of gait	is walking with the palmer surface of foot		
	Crawl - Animal is walking on heel		2
	Crouch - The animal is reluctance to walk, severe knuckling and flaccidity of limb		1
Knuckling	Flexion of the fetlock joint and bending of digits		
<i>Normal</i>	Palmer surface of the foot face the ground		4
<i>Mild</i>	Palmer surface of the foot face the ground with little flexion of digits		3
<i>Moderate</i>	The animal can walk with more difficulty than above grade		2
<i>Severe</i>	The animal dragged the limb and walked on the dorsum of foot		1
Muscle contraction	The ability of limb muscle contraction, this test by flaccidity and contraction of muscle legs while hanging		
<i>Weak</i>	Flaccid paralysis of the limb and the animal unable to push the operator limb		1
<i>Moderate</i>	More than weak grade		2
<i>Strong</i>	Developed vigorous movement of the limb to push the operator hand		3

Table 2: Modified scoring evaluation of the sensory clinical signs (34)

Clinical Observations	Description	Score
<i>Toe spread</i>	Lateral spearing reflex of the digits with maximum	

	space between them when the animal is hanging	
<i>Present</i>		1
<i>Absent</i>		0
<i>Lateral aspect leg sense</i>	Lateral aspect sense induced by pricking the leg with needle	
<i>Present</i>		1
<i>Absent</i>		0
<i>Toe pinch</i>	Reflex induced by pinching the most distal portion of each digit on both front limbs with forceps	
<i>Present</i>		1
<i>Absent</i>		0
<i>Toe prick</i>	Reflex induced in palmer surface of foot by needle	
<i>Present</i>		1
<i>Absent</i>		0

Statistical Analysis

Data was analyzed using SAS (Statistical Analysis System-Version 9.1). Two-way ANOVA and means were compared using Duncan Multiple Range Test (DMRT) assess significant difference among means, $P \leq 0.05$ was considered statically significant.

Results

Comparative Analysis of Motor Clinical Signs Observations Assessments in All Of The Groups Onset and Walk

The experimental animals after two weeks PO, Dissection ($3.90 \pm 0.18a$) group exhibited significantly ($P \leq 0.05$) improvement in the onset and walking capabilities when compared to the control ($3.50 \pm 0.16a$) group. Similarly, walk ability in the Dissection ($3.50 \pm 0.16a$) group has significant differences ($P \leq 0.05$) compared to the control ($3.50 \pm 0.16a$) group.

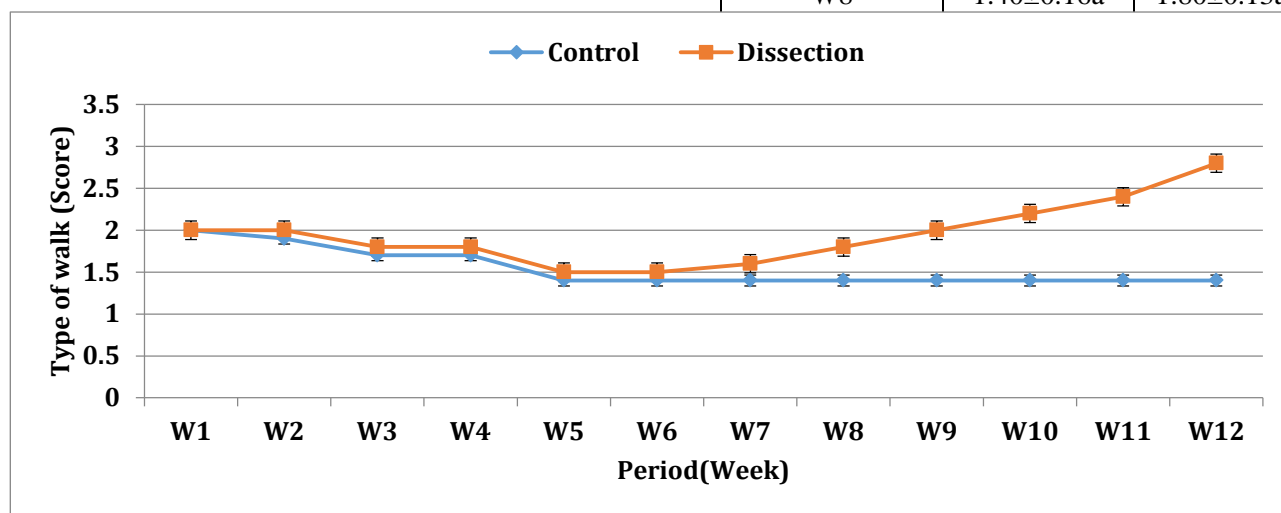
Table 3: Mean time rate of clinical observation of the onset and walking clinical signs following surgery

Group	Control	Dissection
Test		
Onset	$3.50 \pm 0.16b$	$3.90 \pm 0.18a$
Walking	$2.70 \pm 0.21b$	$3.50 \pm 0.16a$

Gait

The experimental animals of Dissection ($2.00 \pm 0.00a$) group showed no clear significant difference from the Control ($1.90 \pm 0.10a$) groups. On the 4th week Postoperative day, the Dissection ($1.80 \pm 0.13a$) group and Control ($1.70 \pm 0.15a$) group started showing more signs of crouching. On the 8th week postoperative day, the Dissection ($1.80 \pm 0.13a$) group had a significantly improved difference in the crouching score from the Control ($1.40 \pm 0.16a$) group. By the 12th week postoperative day, the Dissection ($2.80 \pm 0.20a$) group had Normal gait which is significantly ($P \leq 0.05$) better when compared to the Control ($1.40 \pm 0.24b$) group by the end of the experiment.

Chart 1: Motor clinical observation of the gait signs from the 1st week to the 12th week PO



Group \ Week	Control	Dissection
W2	1.90±0.10a	2.00±0.00a
W4	1.70±0.15a	1.80±0.13a
W8	1.40±0.16a	1.80±0.13a

Knuckling

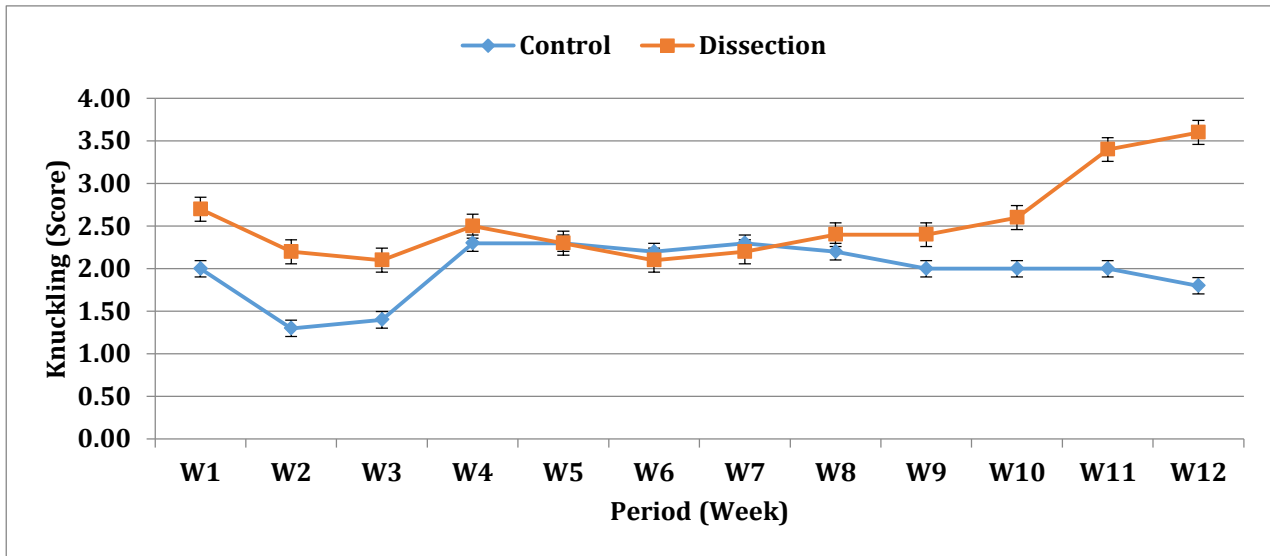
All of the experimental animals exhibited noticeable motor dysfunction in their hind limbs. As shown in (Table 5), the severity of knuckling on the 2nd week PO was significantly ($P \leq 0.05$) different between Control ($1.30 \pm 0.15b$) group and dissection ($2.20 \pm 0.25a$) group, on the 4th week PO, the knuckling severity ranged among all animals of the Control ($2.30 \pm 0.15ab$) group and dissection ($2.50 \pm 0.16a$) group. On the 8th week PO, the Control ($2.20 \pm 0.20a$) group and dissection ($2.40 \pm 0.16a$) group exhibited no significantly differences in the knuckling which ranged between mild to moderate knuckling. Once the study reached the 12th week PO, the knuckling was significantly ($P \leq 0.05$) different among animals of Control ($1.80 \pm 0.37b$) group and Dissection ($3.60 \pm 0.24a$) group with the dissection

group leans more toward mild and normal knuckling by the end of the experiment.

Table 5: Motor clinical observation of the Knuckling signs on the 2nd, 4th, 8th and 12th weeks PO.

Group \ Week	Control	Dissection
W2	1.30±0.15b	2.20±0.25a
W4	2.30±0.15ab	2.50±0.16a
W8	2.20±0.20a	2.40±0.16a
W12	1.80±0.37b	3.60±0.24a

Chart 2: Motor clinical observation of the gait signs from the 1st week to the 12th week PO



Muscle force contraction

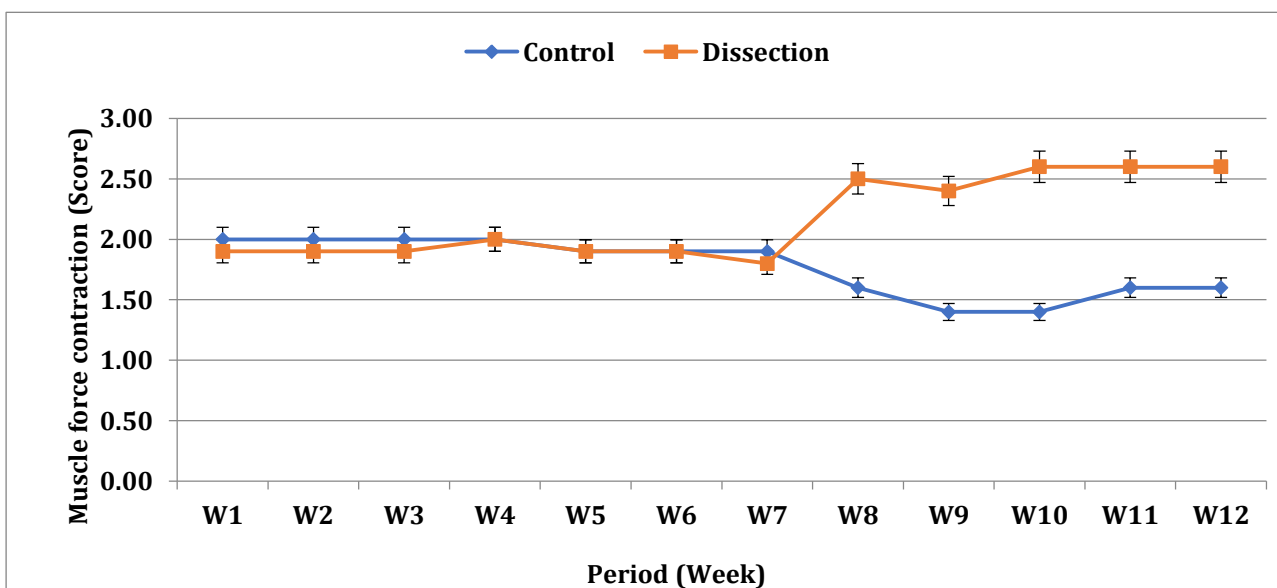
On the 2nd week PO day, the mean of muscle force contraction in Control ($2.00 \pm 0.00a$) group and Dissection ($1.90 \pm 0.10a$) group showed no significantly ($P \leq 0.05$) difference, same results were recorded on the 4th week PO on Control ($2.00 \pm 0.00a$) group and dissection ($2.00 \pm 0.00a$) with moderate muscle force contraction. On the 8th week PO, dissection ($2.50 \pm 0.16a$) group exhibited a stronger muscle contraction when compared to the Control ($1.60 \pm 0.16b$) group. At the end of the experiment on the 12th week PO, Dissection ($2.60 \pm 0.24a$) group exhibited stronger muscle force contraction when compared to the

Control ($1.60 \pm 0.24b$) group which showed moderate muscle force contraction (Table 6).

Table 6: Motor clinical observation of the Muscle force contraction on the 2nd,4th,8th and 12th weeks PO

Group \ Week	Control	Dissection
W2	$2.00 \pm 0.00a$	$1.90 \pm 0.10a$
W4	$2.00 \pm 0.00a$	$2.00 \pm 0.00a$
W8	$1.60 \pm 0.16b$	$2.50 \pm 0.16a$
W12	$1.60 \pm 0.24b$	$2.60 \pm 0.24a$

Chart 3: Motor clinical observation of the Muscle force contraction from the 1st week to the 12th week PO



Comparative Analysis of Sensory Clinical Signs Observations Assessments of all Groups

Toe Spreading Reflexes

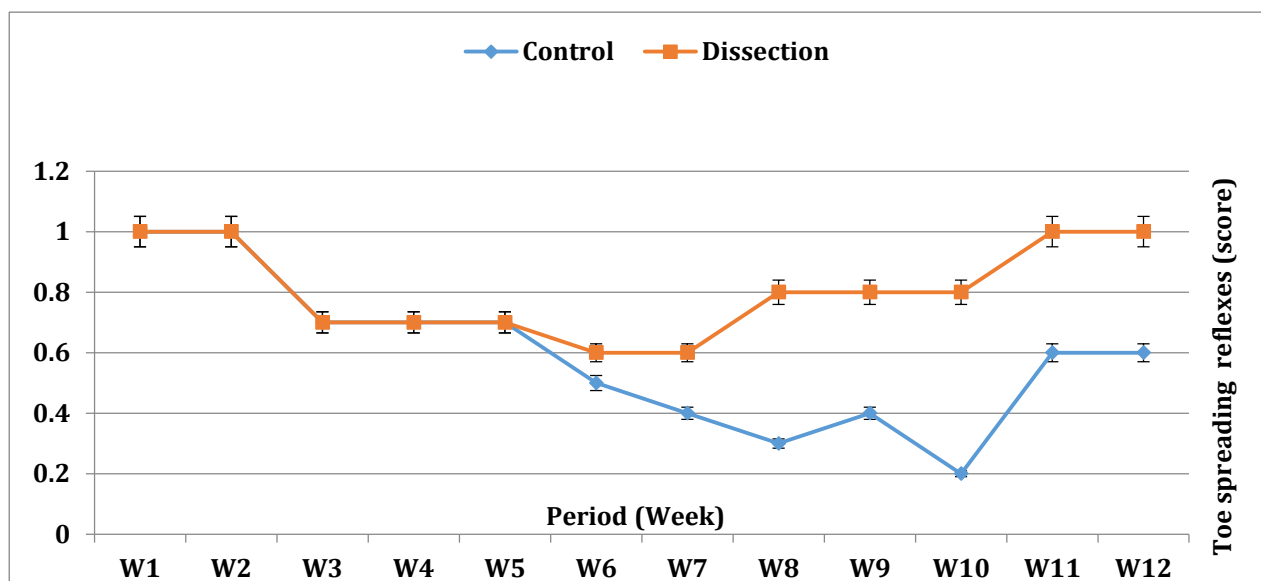
On day 2nd week PO, toe spreading reflexes were present in both Control (1.00±0.00a) group and Dissection (1.00±0.00a) group, same goes for the 4th week PO with mean of (0.70±0.15a) for both of the experimental groups. In the 8th week PO day the majority of the animals of the control group showed absence of sensation with mean of (0.30±0.15b) which is significantly different when compared to the dissection group with mean of (0.80±0.13a). by the end of the experiment in the 12th week PO both of the Control (0.60±0.24a) group and the dissection (1.00±0.00a) group

showed no significantly difference in the toe spread reflex with absence of reflex in the majority of the experimental animals

Table 7: Sensory clinical observation of the Toe spreading reflexes on the 2nd, 4th, 8th and 12th weeks PO

Group \ Week	Control	Dissection
W2	1.00±0.00a	1.00±0.00a
W4	0.70±0.15a	0.70±0.15a
W8	0.30±0.15b	0.80±0.13a
W12	0.60±0.24a	1.00±0.00a

Chart 4: Sensory clinical observation of the Toe spreading reflexes from the 1st week to the 12th week PO



Lateral Aspect Leg Sensation

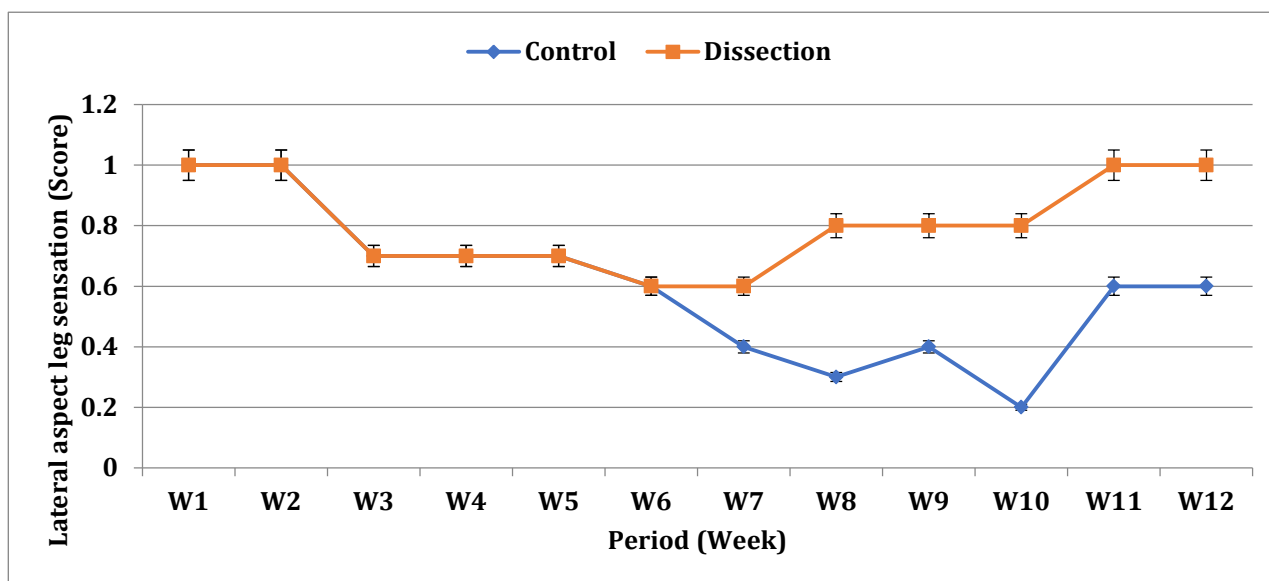
On day 2th week PO, there was a presence of sensation in the Control (1.00±0.00a) and Dissection (1.00±0.00a) groups. Same results go for the 4th week PO, with mean of Control and Dissection groups being (0.70±0.15a). On day 8th week PO there was a significantly (P<0.05) difference on the Control (0.30±0.15b) group where most of the animals had absence of sensation in the lateral aspect of the hind leg when compared to the Dissection (0.80±0.13a) group with the majority being positive for sensation of the lateral aspect of the leg. At the end of the experiment on day 12th week PO, both of the Control (0.60±0.24a) group and Dissection

(1.00±0.00a) group had positive presence of lateral aspect leg sensation with insignificant differences in their mean.

Table 8: Sensory clinical observation of the Lateral aspect leg sensation on the 2nd, 4th, 8th and 12th weeks PO.

Group \ Week	Control	Dissection
W2	1.00±0.00a	1.00±0.00a
W4	0.70±0.15a	0.70±0.15a
W8	0.30±0.15b	0.80±0.13a
W12	0.60±0.24a	1.00±0.00a

Chart 5: Sensory clinical observation of the Lateral aspect leg sensation from the 1st week to the 12th week PO.



Toe pinch

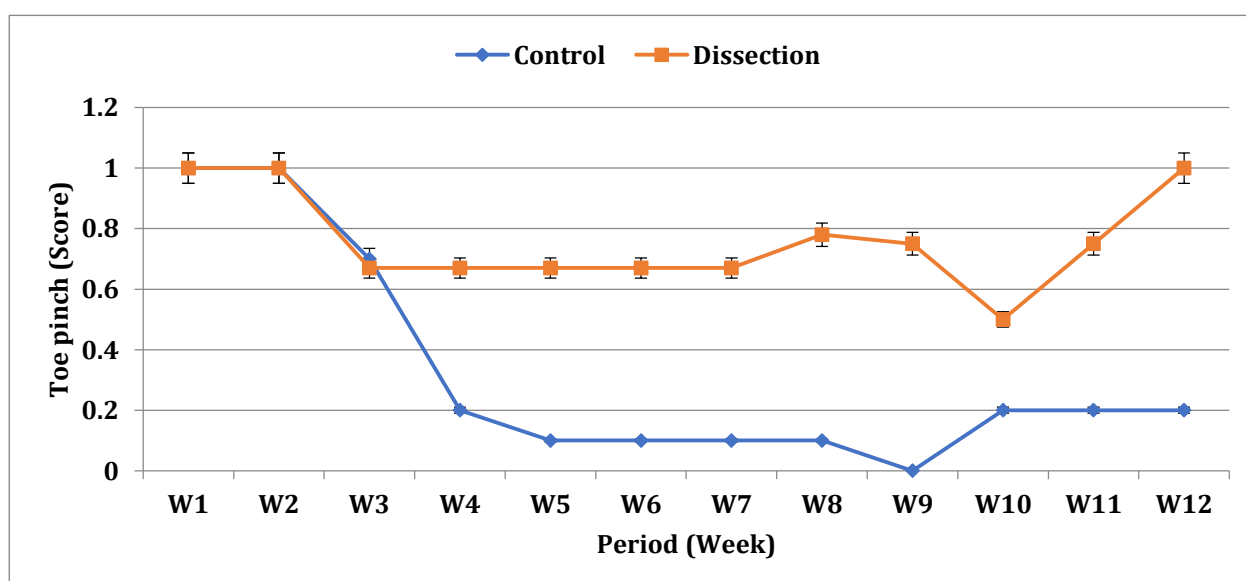
On the 2nd week PO, both Control (1.00±0.00a) group and Dissection (1.00±0.00a) group showed presence of toe pinch sensation. The 4th week PO, showed significantly ($P \leq 0.05$) difference mean of toe pinch of the Control (0.20±0.13b) group with regressed results when compared to the Dissection (0.67±0.16a) group that had a better result. On the 8th week PO, there was a more significantly difference between the Control (0.10±0.10b) group and the Dissection (0.78±0.14a) group with the majority of the control group had absence of sensation. At the end of the experiment on the 12th week PO, there was a presence of toe pinch sensation in the Dissection (1.00±0.40a) group when compared to the Control (0.20±0.20a)

group, with all the animals from the Dissection group showed positive sensation to the toe pinch test.

Table 9: Sensory clinical observation of the Toe pinch test on the 2nd,4th,8th and 12th weeks PO in all of the experimental groups.

Group \ Week	Control	Dissection
W2	1.00±0.00a	1.00±0.00a
W4	0.20±0.13b	0.67±0.16a
W8	0.10±0.10b	0.78±0.14a
W12	0.20±0.20b	1.00±0.40a

Chart 6: Sensory clinical observation of the Toe pinch test from the 1st week to the 12th week PO



Toe prick

On the 12th week PO, all of the animals in the experimental groups showed absence of toe prick test sensation. On the 4th week PO, there was no significantly ($P \leq 0.05$) difference on the mean of toe prick in the Control ($0.20 \pm 0.13b$) group when compared to the Dissection ($0.70 \pm 0.15a$) group with the dissection group having more percentage of animals that had presence of sensation. On the 8th week PO, characterized with a better mean of toe prick sensation in the Dissection ($0.80 \pm 0.13a$) group compared to the Control ($0.10 \pm 0.10b$) group. At the end of the experiment in the 12th week PO, the experimental groups exhibited Significant ($P \leq 0.05$) difference in the mean of toe prick on the Dissection ($0.80 \pm 0.20a$) group when

compared to the Control ($0.20 \pm 0.20b$) group which has absence in the majority of the experimental animals

Table 10: Sensory clinical observation of the Toe prick test on the 2nd, 4th, 8th and 12th weeks PO in all of the experimental groups.

Group \ Week	Control	Dissection
W2	$0.00 \pm 0.00a$	$0.00 \pm 0.00a$
W4	$0.20 \pm 0.13b$	$0.70 \pm 0.15a$
W8	$0.10 \pm 0.10b$	$0.80 \pm 0.13a$
W12	$0.20 \pm 0.20a$	$0.80 \pm 0.20a$

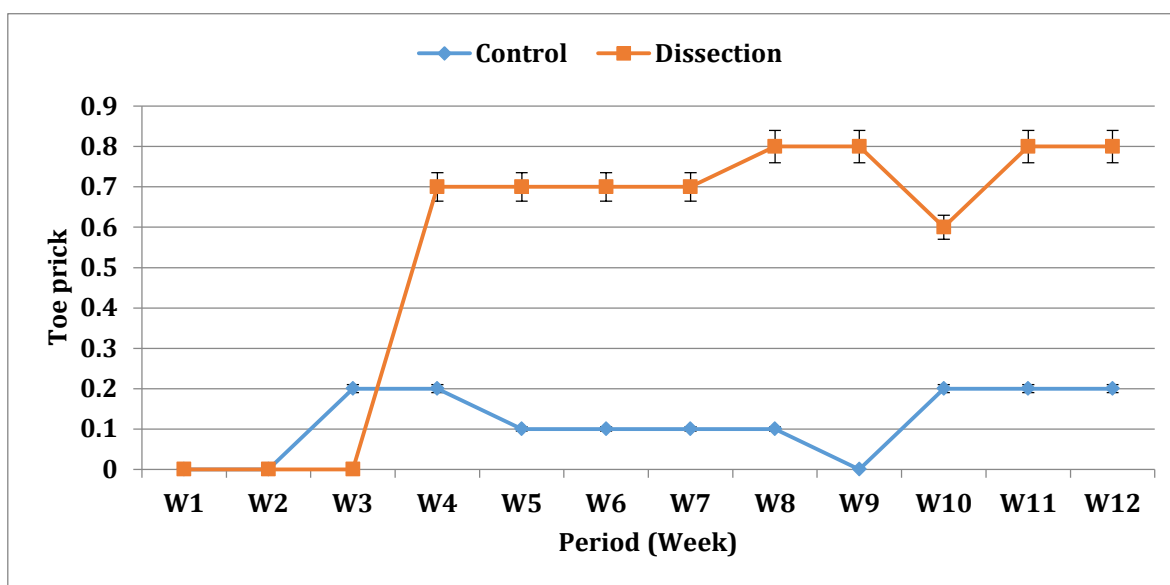


Chart 7: Sensory clinical observation of the Toe prick test from the 1st week to the 12th week PO

Discussion

The data from the current study demonstrated the onset of the ability to walk developed as early as the 4th postoperative day in the majority of the Dissection group. However, compared to the control group which exhibited the first sign of onset of the ability to walk in the 4th day and completed in the 7th day in most of the animals. This could be explained by the intensity of pain that followed sciatic nerve damage and the degeneration and regeneration processes, which included unmyelinated sprouts growing outward from the nerve stump or proximal cross-cut fibers.

Altered gait in the Control group was noticed by other researchers when a rabbit was subjected to iatrogenic nerve injury and it was shown that it causes reduced functional score (16). Interestingly, Gait analysis in this study shows improved motor function in the Dissection group where the axon could grow and reach target organ and innervate the muscle fiber to improve the motor function. The postoperative analgesic with meloxicam may be a reason for the early development of the limb motor function in both of the study groups, this explanation was supported by a study (10) which showed that COX-2

inhibition with meloxicam reduced inflammation and pain, which could indirectly support recovery by mitigating the secondary damage caused by inflammation following nerve injury. Animals in the Dissection group exhibited better Knuckling results in the 12th week PO when compared to the control group and this is mostly explained by the nerve repair and the innervation of the operated limb's muscle faster than the control group due to the Scar tissue removal surgery which can be explained by the positive sensory evaluation in the 8th and 12th week post operation in the dissection group (44). Demyelination causes neuropathic pain, sensory loss, and motor dysfunction by slowing down or blocking the transmission of action potentials (28). Scientists used bovine urinary bladder submucosa to prevent adhesion and promote healing in different organs and this might work to promote further regeneration of sciatic nerve after iatrogenic injury (5). This study revealed different means of Muscle contraction force between and treated and untreated groups which can be explained by the presence and speed of nerve refunction that can reach specific muscles. Researchers Found out that when a nerve is damaged, the nerve impulses slow down or cannot reach the muscles that provide motor function of the hind limb such as the extensor digitorum longus tibialis anterior, and gastrocnemius (22). The toe prick test is a commonly employed method in rabbits to assess nociceptive reflexes, primarily in studies involving anesthesia, pain, and neurological injury (30). Without neural stimulation, the muscles cannot generate force, leading to flaccid paralysis (37). This study revealed that the treated groups had a positive Feedback on the Muscle contraction force sign in which most of the experimental animals regained its strength by the end of the experiment on the 84th day which is a typical positive outcome indicate regeneration of sciatic nerve and re-innervation (7). When the sciatic nerve is injured, sensory impulses aren't transmitted properly, which results in numbness or loss of feeling in the places the nerve supplies. may show either hypoaesthesia (less feeling) or anesthesia (total absence of sensation) in the afflicted limb, Proprioceptive signals from the hindlimb are transmitted by the sciatic nerve and are crucial for balance and movement coordination (17). Researchers investigated the activation of fibroblast to differentiate into myelinated schwann cells (24). The results showed that removing of scars and fibrosis and free the sciatic nerve from the compressing lesion can improve the outcome and accelerate the

regain of axonal alignment and innervation. Failure of regeneration may result in lasting sensory deficits which if the nerve damage is severe or is not addressed right away (37) which align with my study results on the control groups that revealed a long lasting sensory deficit by the end of the study period Sciatic nerve injury after injection affect the toe spread reflex since the peroneal nerve will be affected as well which might hinder the reflex of the underline muscles of the hind leg, in a study where the toe-spreading reflex was used to measure nerve regeneration following peroneal nerve transection and repair in a study with New Zealand White rabbits. As the muscular weight of the peroneal target muscles on that side grew, the reflex was consistently triggered on the side where the nerve lesion was closest to the dependent muscles. This result emphasizes the toe spread reflex's sensitivity and dependability as an indicator of rabbits' recovery and regeneration of axons (35). Peripheral nerve injuries can result in neuropraxia, axonotmesis, or neurotmesis, depending on the severity of trauma (38). A research was done that linked the loss of sensation with the injury that happen to the sciatic nerve or one of their bifurcations in which peroneal nerve being the most important nerve for the lateral leg sensation in cases of sciatic nerve injury, sensory deficits are most pronounced in areas innervated by the peroneal nerve, especially the lateral leg (18). The positive sensory results in the dissection group in the end of the experiment is due to the removal of fibrosis and compression which align with (40) study which indicated that compression by scar or fibrosis hinder the function of the sciatic nerve and disrupt the transport of protein and organelles which is important for nerve function. Other researchers used different techniques to prevent scar formation and improve regeneration such as wrapping the nerve with omental pedicle (13). The plantar surface of the foot provides sensory information for the polysynaptic toe-spreading reflex, which then sends motor output to the muscles that govern toe extension and The toe-spreading reflex depends on the sciatic nerve, which transmits the motor output to the toe extensor muscles as well as the sensory input from the plantar surface (19). the positive outcome in the end of the study period can be contributed to the local stem cells and growth factors from within and around the sciatic nerve (6). Therefore, despite stimulation, there will be no visible response, even in awake or lightly sedated animals (30). This makes the toe prick test a diagnostic tool for identifying peripheral nerve injury, in

addition to assessing pain or sedation levels (21) and these studies clarify that if the iatrogenic sciatic nerve injury is left without treatment it will have a long lasting nerve motor and sensory deficits and decompression and removing of sciatic nerve lesion is crucial (37).

Conclusion

This study evaluate the efficacy of surgical dissection and removal of the scar, fibrosis and lesion from the sciatic nerve, the results revealed a that removing the sciatic nerve lesion after iatrogenic sciatic nerve injury can accelerate the regeneration and re-innervation which in turn will encourage faster motor and sensory recovery after iatrogenic sciatic nerve lesion done to animals through intramuscular injection with diclofenac

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sodium, this treatment method is successful to promote better results and has appositive outcome after such injuries happen to the sciatic nerve and can be applied clinically by physicians.

Acknowledgements

The author would like to express his thanks and grateful to the College of Veterinary Medicine and College of Sciences in Baghdad for providing facilities to complete this study.

Funding

The funding for this study came from the authors.

Conflict of Interest

The authors declare no conflict of interest.

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التقييم الحركي والحسي لوظيفة العصب الوركي عقب الاستئصال الجراحي للتليف المُستحث في نموذج الأرانب

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الملخص

أُجريت الدراسة الحالية بهدف تقييم الإزالة الجراحية للتليف العصبي الوركي المنشأ طبيًا والذي يحدث عقب الحقن العضلي بمادة ديكلوفيناك الصوديوم. شملت الدراسة عشرين أرنبًا ذكرًا سليمًا من السلالة المحلية جرى تقسيمها عشوائيًا إلى مجموعتين متساويتين بواقع عشرة أرانب في كل مجموعة. خضعت جميع الحيوانات للتخدير العام تلاه استكشاف جراحي للعصب الوركي في الطرف الخلفي الأيسر ثم تم حقن ديكلوفيناك الصوديوم بجرعة مقدارها 1.5 ملغم/بتركيز 2.5% داخل العصب مباشرةً وذلك لإحداث إصابة تجريبية منشأها طبيًا في العصب الوركي. بعد إحداث الإصابة تُركت جميع الحيوانات لمدة أربعة عشر يومًا بعد العملية ثم قُسمت إلى مجموعتين: مجموعة السيطرة التي لم تتلقَ أي تدخل علاجي إضافي ومجموعة التشريح التي خضعت لتدخل جراحي تم خلاله فتح موقع العملية التحريضية السابقة وإزالة النسيج الليفي المتكوّن من العصب الوركي وما يحيط به. تم إجراء التقييمات السريرية للوظائف الحركية والحسية بصورة أسبوعية ابتداءً من الأسبوع الأول بعد العملية وحتى نهاية فترة الدراسة التي استمرت أربعة وثمانين يومًا. أظهرت نتائج التقييم الحركي والحسي وجود فروق ذات دلالة إحصائية بين مجموعة السيطرة ومجموعة التشريح خلال جميع فترات التقييم السريري كما بينت النتائج حدوث تحسن سريري مبكر في مجموعة الاستئصال تمثل في تحسن علامة انثناء مفصل الرسغ ونمط المشي لدى الحيوانات التجريبية إضافة إلى استعادة أفضل لقوة انقباض العضلات. أما من الناحية الحسية فقد أظهر التقييم عودة مبكرة للإحساس في مجموعة الاستئصال مقارنةً بمجموعة السيطرة مما يشير إلى فعالية التدخل الجراحي في تحسين التعافي الوظيفي للعصب الوركي المصاب.

الكلمات المفتاحية: العصب الوركي، الاستئصال الجراحي، دايكلوفيناك صوديوم، الأرنب.