



The nerve was sectioned using small surgical scissor. Then the two edges were returned back to their original position. The muscles were then returned back to their original positions and sutured using continuous suture using (chromic catgut) size 3.0. The skin sutured using interrupted suture using (Black silk) size 3.0. Prophylactic antibiotic solution injected (IM) for three days after operation to prevent infection.

**Results**

Immediately after surgical operation and during the walking, the staggering of all animals were shown but, the sign of right hind paws paralysis was absent. Few days later, the sign of right hind paws paralysis was observed clearly.

Post sacrificing the animals of W7 group, the right thigh was dissected to expose the areas of sciatic nerve section and popliteal fossa for examination if there was any anatomical changes. The results revealed a gap formation between the two nerve stumps [proximal and distal sectioned ends], range between 1-4 mm, adhesion and intermingling of nerve connective tissue [epineurium] with adductor magnus connective tissue [epimysium] was observed (fig 1) and there was no any sign of popliteal lymph nodes enlargement in any animal.

The same results was observed in W14 group, but the gap length was increased and it was 5-8 mm. Neuroma was observed in one animal and again there was no sign of lymph nodes enlargement in any animal. During the following two weeks, skin ulceration of the dorsal aspect of ankle joint was began to form. This ulceration was appeared clearly in most animals of W30 group (fig 2). Different results were observed in W30 group concerning the gap of sectioned sciatic nerve, ranging between the remaining of the gap and buildup the defect. The result revealed also a popliteal lymph node enlargement (fig 3).

During the period of 30-60 days, another area was invaded by ulcer with or without bone exposure, which was the anterior part of the dorsal aspect of animal paw. most of the hind paw of the animals of W60 group, were ulcerated. In W90 group, there was severe ulceration and bone exposure in all animals except one with lymph node enlargement. The ulceration extended to the ventral aspect of the hind paw (fig 4).

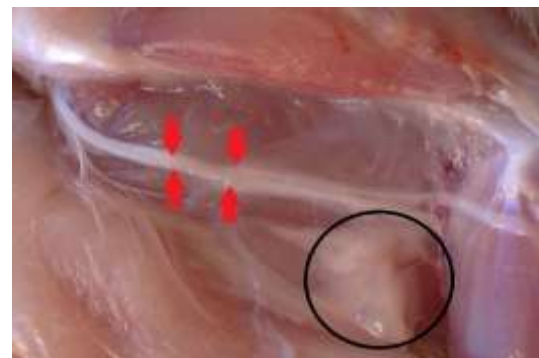
Examination of sciatic nerve, revealed different results, which included Small or large neuroma formation at proximal stump, with the remaining of the gap or approximation of the two stumps with weak or good connection (fig 5 , 6 & 7).



**Fig[1]:** W7 group, gap formation at the site of sciatic nerve section [circle] with adhesion and intermingling of nerve connective tissue [epineurium] with adductor magnus [A] connective tissue [epimysium]



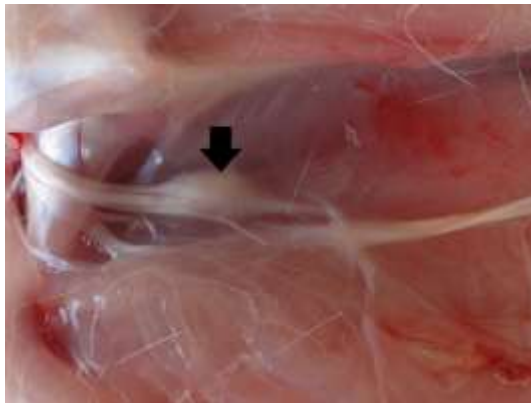
**Fig [2]:** W30, ulceration of skin of the dorsal aspect of ankle joint



**Fig[3]:** W30 group, disappearance of the gap between the original location of the two stumps of sectioned sciatic nerve [gray arrows] and Popliteal lymph node enlargements [circle]



**Fig[4]:** W90 group, severe ulceration in the animal hind paw with metatarsal bone exposure [gray arrows] and only one finger nail was remain [black arrow].



Fig[5]: W90 group, neuroma at the proximal stump [arrow]

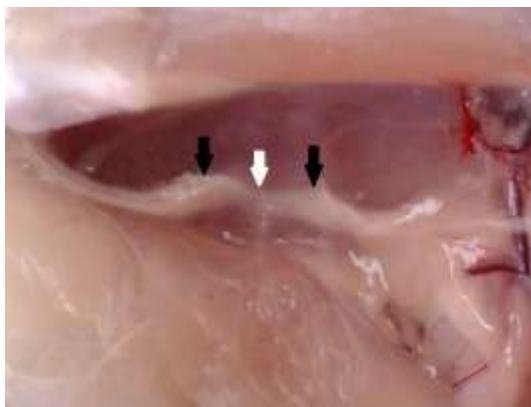


Fig [6]: W90 group, approximation of the two nerve stumps [black arrows] with weak connection [white arrow]

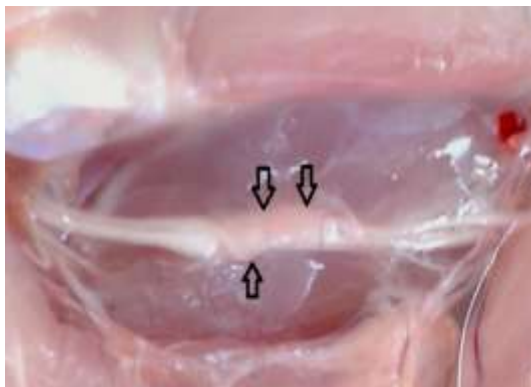


Fig [7]: W90 group, good connection with thickening in the epineurium [black arrows].

### Discussion

The observation in the present study revealed that, immediately post surgical operation, the sign of right hind paws paralysis was absent. Within few days, paralysis was propagated and became clear. This result was in agreement with electromyographical study made by Quan & Bird [7]. They found that, in the immediate minutes to first several days after nerve transaction, the distal axon fragment remains electrically excitable. During this period, distal stimulation to the site of injury may result in normal

or mildly abnormal values despite sever proximal nerve injury.

Chaudry and Cornblath [8] clarify in their study that, motor neuron remain excitable for up to 7 days after injury and sensory axons remain excitable for up to 11 days.

Sacrificing the animals of all major groups day seven post operation clarified, gap formation at the site of sciatic nerve section in most animals specially, that of weaning and maturation groups. This retraction, related to the connective tissues surrounding the nerve fibers rather than nerve fibers themselves. Bahcelioglu et al [9] found that, both collagen and elastic fibers were less resistant to age relates loss in the peripheral nervous system. So, the longitudinally arranged elastic fibers, responsible for retraction and collapse of the proximal and distal stumps in the weaning age rabbit.

In the present study, neuroma formation was observed in some animals at day fourteen and later. Traumatic neuroma (also known as amputation neuroma or pseudoneuroma) [10] is a type of neuroma which results from trauma to a nerve [11].

Traumatic neuroma, an attempt by an injured nerve to regenerate, may present as an unorganized, bulbous or nodular mass of nerve fibers and Schwann cells produced by hyperplasia of nerve fibers and their supporting tissues [12]. In addition to that, the mesenchymal cells proliferate in response to the inflammatory process and initiate collagen deposition at the proximal stump, this in conjunction with fibrin remnants from the initial hemorrhage, may lead to neuroma formation Raffe [13].

During the period of 14 - 60 days, the skin which innervated by sciatic nerve branches was invaded by ulcer with or without bone exposure, however, in mild cases, only the hair was lost from the skin. Dunnen & Meek [14] were categorized the decrease in the length of nails, atrophy of the skin and superficial wounds of the skin as trophic anomalies and the extensive wounds [e.g. exposed bone] or loss of a part of the foot or toes as auto-mutilation.

These changes in the hind paw were observed in most [e.g. about 75%]. however, the skin of some animals remain intact during their period of survival [e.g. about 25%]. This result was in disagreement with the result of Dunnen & Meek [14]. They found, that post sciatic nerve section in rats, up to 60% of the rats showed signs of auto-mutilation. It might be due to the differences in the body reaction of different experimental animals against the nerve section.

Popliteal lymph node enlargement, closely related to the presence or absence of skin changes. Even in mild cases, there was a slight changes in the size of the lymph node. The enlargement resulted from skin infection during friction or contamination of the ulcer.



## References

- [1] Diao, E.; Andrews, A. and Diao, J. (2004). Animal models of peripheral nerve injury. *Oper. Tech. Orth.* ;14: 153-62.
- [2] IJkema-Paassen, J.; Meek, M. F. and Gramsbergen, A. (2001). Transection of the sciatic nerve and reinnervation in adult rats: muscle and endplate morphology. *Equine. Vet. J.* ;33:41-5.
- [3] IJkema – Paassen, J.; Meek, M.F. and Gramsbergen, A.(2002). Reinnervation of muscles after transection of the sciatic nerve in adult rats. *Muscle Nerve*;25:891-7.
- [4] Bertelli, J.A.; Taleb, M. ; Saadi, A.; Mira, J.C. and Pecot-Dechavassine, M. (1995). The rat brachial plexus and its terminal branches: an experimental model for the study of peripheral nerve regeneration. *Microsurgery*, 16:77-85.
- [5] Blas C.D. (2010). , Wiseman J. Nutrition of Rabbit. 2nd ed. , P. 235.
- [6] Morimoto, M. (2009). General physiology of rabbit. In: Houdebine LM, Fan J. Rabbit Biotechnology: Rabbit Genomics, Transgenesis, Cloning and Model. springer Science and business media, B.V.. p. 27-33.
- [7] Quan, D. and Bird, S. J.(1999). Nerve conduction studies and electromyography in the evaluation of peripheral nerve injuries. *Orth. J.* 12:45-51.
- [8] Chaudry, V. and Cornblath D. R.(1992). Wallerian degeneration in human nerves: A serial electrophysiologic study. *Muscle Nerve* . 15:687.
- [9] Bahcelioglu, M.; Elmas, C.; Kurkcuoglu, A.; Calguner, E.; Erdogan, D.; Kadioglu, D.; et al. (2008). Age-related immunohistochemical and ultrastructural changes in rat oculomotor nerve. *Anat. Histol. Embryol.* 37(4):279-84.
- [10] Kahn MA.(2001). Basic Oral and Maxillofacial Pathology. Vol. 1.
- [11] Ronald, R.P.; Jean, B.L. and Joseph, J. L. (2007). Dermatology. Vol.2. Set. St. Louis: Mosby;.
- [12] Huang, L. F.; Weissmana, J.L. and Fana, C. (2000). Traumatic Neuroma after Neck Dissection: CT Characteristics in Four Cases. *AJNR* 21:1676-80.
- [13] Raffae, M. R. (1985). Principles of peripheral nerve repair: biology of nerve repair and regeneration. In: Newton CD, Nunamaker DM. Text book of small animal orthopedic; p. 504-45.
- [14] Dunnen, W.F.A. and Meek, M.F. (2001). Sensory nerve function and auto-mutilation after reconstruction of various gap lengths with nerve guides and autologous nerve grafts. *Biomaterials.* 22:1171-6.

## التغيرات السريرية والتشريحية بسبب قطع العصب الوركي في عمر الفطام للارانب

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## الملخص

الهدف من هذه الدراسة هو معرفة التغيرات السريرية والتشريحية التي تحدث بعد قطع العصب الوركي في عمر الفطام في الارانب. استعملت 25 أرنباً في هذه الدراسة تتراوح اعمارهم ما بين 1-2.5 شهر. تم تقسيمها إلى خمس مجموعات فرعية وفقاً لعدد ايام بقائها بعد العملية (W14) (W7) (W30) (W60) (W90). أجريت العمليات الجراحية تحت تأثير التخدير العام. تم قطع العصب بواسطة مقص جراحي صغير. سريريا وبعد بضعة أيام، لوحظ بوضوح وجود شلل في الطرف الخلفي الأيمن. وكشفت النتائج عن وجود فجوة بين نهايتي الأعصاب المقطوعة [الدانية والقاصية]، وتزداد الفجوة في اليوم الرابع عشر. وخلال الأسبوعين التاليين بدأ ظهور تقرح في الجلد من الجانب الظهري من مفصل الكاحل، كما لوحظ ان هناك تضخم في العقدة اللمفاوية المأبضية. وخلال فترة 30-60 يوماً عُزيت منطقة أخرى بالقرح مع أو بدون تعري للعظام، وهي الجزء الأمامي من الجانب الظهري من الطرف الخلفي. وفي يوم 90، كان هناك تقرح شديد وتعري العظام مع تضخم العقد اللمفاوية وأمتد التقرح إلى الجانب البطني للطرف الخلف. دلت النتائج على تردي الحالة بصورة تدريجية وعدم وجود تحسن في الاعصاب الطرفية.