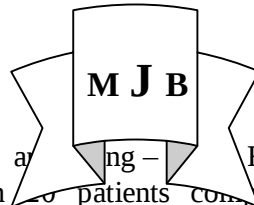


Evaluation of Epineural Repair of Acute Sciatic Nerve Injury

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Introduction

Epineural Repair Technique and Grading – Results :
This study carried on 20 patients complaining of acute sciatic nerve injury as a result of shell and bullet injuries from January 2002 – September 2007 , they underwent surgical intervention for sciatic nerve exploration 5 – 8 months post injury . The purpose of all nerve repair techniques is to restore continuity of the nerve trunk , including all of it's elements in order to achieve optimal and useful reinnervation of both sensory and motor end organs . There are many accepted techniques for coaptation of the ends of a severed nerve . No single repair method is appropriate for every instance of nerve injury . The choice of repair technique depends on several overriding anatomical factors [2] .

الخلاصة

هذه الدراسة تم اجراؤها على ٢٠ مريض يعانون من اصابات شديدة في العصب النسوي بسبب الانفجارات او الانفجارات للفترة من كانون الثاني ٢٠٠٢ الى تشرين الاول ٢٠٠٧ . خضع جميع المرضى الى تداخل جراحي لاستكشاف العصب النسوي (٥ - ٨) اشهر بعد الاصابة . ان الغرض من الطرق المختلفة لاعادة توصيل العصب هو لارجاع التوصيل العصبي الحسي والحركي لانجاز اعلى درجة وظيفية ممكنة للطرف السفلي وهناك طرق عديدة لانجاز هذا الغرض ولكن ليس هناك اية طريقة تتفرد بالافضل في العلاج . ان اختيار الطريقة يعتمد على عوامل تشريحية مختلفة ومتداخلة . في هذه الدراسة تم اعتماد طريقة خياطة الغشاء العصبي الخارجي فقط للعصب وتبين بأنها الطريقة الابسط والانعج من حيث النتائج الجيدة نسبياً التي تم الحصول عليها .

The following grading system used in the evaluation of acute nerve injury

British Medical Research Council Grading System

Grade	Description
M5	complete recovery
M4	All synergetic and independent movements are possible
M3	All important muscles act against resistance
M2	Return of perceptible contractions in both proximal and distal muscles
M1	Return of perceptible contractions in proximal muscles

Mo No contraction
From Sedon H) : Surgical Disorders of the peripheral nerves , 2nd ed .
Edinburgh , Churchill
Livingstone . 1975 [6]

British Medical Research Council system of assessment of sensory Recovery

Grade	Description
S4	complete recovery
S3+	some recovery of two point discrimination Within the autonomous area
S3	return of superficial cutaneous pain and tactile sensibility throughout the cutaneous area with disappearance of any previous overreaction
S2	return of some degree of superficial cutaneous pain and tactile sensibility within the autonomous area of the nerve
S1	recovery of deep cutaneous pain sensibility within the autonomous area of the nerve
S0	Absence of sensibility in the autonomous area

From Sedon H) : Surgical Disorders
of the peripheral nerves , 2nd ed .
Edinburgh , Churchill
Livingstone . 1975 [6]
Clinically :

Patients with acute peripheral
nerve injury usually have nerve
conduction defects that can manifest
as motor or sensory dysfunction[5].
Acute nerve injury can cause
temporary or persisting paralysis [1].
The sensory component and motor
component must be evaluated
separately to ensure accurate
diagnosis. In some cases, the injury
does not match the clinical
presentation. Operative findings of
nerve injury may or may not match
clinical findings .

Data exist of gross operative
evidence of nerve injury without
clinical evidence of neurological
dysfunction , such as with sheath
hematoma and compression by
fracture fragments . Conversely , data
exist of intraoperative grossly
normal appearing nerves with
clinical paresis [1]. These deficits
may develop after initially appearing
with a normal neurological
examination [2]. More specifically,

following a traumatic hip dislocation
, some patients may develop sciatic
nerve deficits even after an initial
normal neurological examination [1]
hence , when a nerve is damaged, it
may continue to appear normal in a
neurological examination . In truth
damage can be revealed only
through diagnostic studies .

In many instances , acute nerve
injury associated with complex
trauma
complicates a thorough neurological
examination .

In many patients , nerve injury may
remain undetected because joint and
/ or bony injury may dominate the
clinical picture [5]. Nerve injury may
be apparent immediately after
injury. For example, immediate
paralysis of common peroneal nerve
and foot drop with loss of eversion
of the foot usually are reported at
the time of a stretch / contusion
injury without fracture or dislocation
at the knee level [4]. Epineural
repair is enhanced with the use of
magnification either with magnifying
loupes or the operating microscope .

In accomplishing the primary
epineural suture technique , the

surgeon first divides the nerve ends proximal and distal to the injury site until all visible signs of damage have been debrided , fascicles then mushroom from the neural stumps, and the epineurium retracts slightly. The sutures are placed in the external epineurium using non - absorbable sutures. Usually 8 – 0 nylon is used for sciatic nerve injury repair. The nylon is placed through the epineurium proximally and distally, and tied. The epineurium is not closed so tightly that the fascicular ends become mismatched and malaligned by bunching up. It is preferable to leave a small gap in the epineurium held together by a small suture with the fascicular ends in more appropriate alignment. Therefore the suture which is not tied tightly, acts as the guiding suture rather than a retention suture. The second suture is placed opposite the first and then the epineurium is closed by halving the distance on the anterior and posterior of the nerve. If the nerve can not be approximated with 8 – 0 nylon suture , tension is considered excessive and further mobilization or nerve grafting should be performed.[2] Epineural repair is **Table 1** details of materials and methods .

strong and tension - resistant [7]

Materials and Methods

This study carried on 20 patients complaining of acute sciatic nerve injury as a result of shell and bullet injuries. from January 2002 – September 2007 , they underwent surgical intervention for sciatic nerve exploration 5 – 8 months post injury.

Preoperatively they were fully investigated taking in consideration the time of injury and the level of injury, and clinical findings and the motor and sensory deficit . We mainly depend upon the tenile sign and EMG and nerve conducting study finding in evaluation of the nerve status preoperatively and the same parameters were used for postoperative evaluation.

the epineural suture technique was used in all the cases under loup magnification or operative microscope. Both direct nerve repair and nerve grafting were used in our study depending upon the gap created by the injury itself or by the excision of neuroma during the preparation of the proximal or distal nerve stumps.

Age of the patient	8 – 60 years
Sex of the patient	Male 17 Female 3
Level of injury	15 middle and lower third 5 upper third and gluteal reagon
Severity of injury The nerve injured : C . P . N . P . T . N . Both	20 cases 12 cases 7 cases 5 cases

Direct repair	15 cases
Nerve graft	5 cases
(The gap)	4 – 10 cm



Figure 1 neuroma at the site of nerve injury prior to it's excision .

- Mobilization of the nerve used in most of the cases of direct repair with placing the joints in flexion position for a period of time using backslabs for this purpose .



Figure 2 direct epineural repair of sciatic nerve



Figure 3 The way of application of back slab with certain degree of knee flexion to minimize tension at the repair site .

8 – 0 nylon suture was used in all our cases for coaptation and the number of stitches varies from case to case according to the diameter of the nerve.

Both common peroneal nerve (C.P.N.) and posterior tibial nerve (P.T.N.) were delt with in our study aiming sensory improvement at the soles and correction of foot drop.

Sural nerve used as a graft in all our cases who needed nerve grafting .

Pneumatic tourniquet used in some cases with low level nerve injuries.

Blood prepared in all our cases

who were all underwent surgical repair under general anesthesia.

- Stitches were removed 14 days postoperatively and the backslab maintained for 6 weeks, taking in consideration the degree of the knee joint flexion which we gradually decreased 2 weeks postoperatively.

- We followed up our patients with tenile's test and EMG and NCS in 1 month interval.

Results

After 8 - 12 months of follow up :

- Sensory improvement ----- protective sensation
- Motor improvement ----- regain of dorsiflexion and planterflexion of the foot
- Progression in tenile sign 2 months postoperatively .
- EMG and NCS changes 4 months postoperatively .

Postoperatively	-
Motor improvement	- 12 cases
Sensory improvement	- 13 cases
Partial improvement	- 7 nerves

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- Table (2) post operative results .
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- Evaluation of Motor Function improvement
- Total No . 12 , Grade M5 - 2 , M4 – 2 , M3 – 5 , M2 – 3
- Evaluation of Sensory Function improvement
- Total No . 13 . Grade S3+ - 2 , S3 – 3 , S2 – 5 , S1 – 3

Discussion

The use of magnification in nerve repair makes the results of surgery much more encouraging taking in consideration the level and the type of injury and the time elapse after injury .

As in other studies the age of patients affected by shell injuries the younger age group is more

affected , and the male to female ratio is approximately 4 – 1 the same as other studies.

- Regarding the duration of the nerve injury and the time of repair as in other studies the intervention 3 – 4 months post injury has a better result than later repair.

- The more proximal the level of nerve injury the less is the outcome of repair as in other studies .
- Motor function improvement is less than sensory improvement and this is goes with the fact that the time of repair is greatly affect the motor function if performed 3 – 5 months post injury, while the time of repair is opened for sensory status improvement .
- The cases that showed partial improvement were the cases dealt with by nerve grafting and these results goes with results of nerve grafting in other studies.

Conclusion

No breakthroughs are at hand in the treatment of peripheral nerve injuries , but a number of things can be done to optimize the outcome .

1 - in contused nerves , repair should not be undertaken for three months from the time of injury . further more passage of time , however , reduces the possible benefits , and there is no place for exploration after 12 - 14 months have elapsed since the injury

2 - Recent developments have improved the outcome .

The operating microscope and micro instrumentation facilitate the performance of more precise nerve repair .

3 - Epineural repair is easy and effective method of nerve repair .

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