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## Introduction

Peripheral neuropathy is the most frequent disabling neuromuscular complication of burns.[1] Burn-associated peripheral neuropathy has been found to vary widely from 2% to 52%.[2]

Peripheral neuropathy can be divided into mononeuropathy or polyneuropathy according to the number of involved nerves. The former is generally caused by localized factors and the latter by generalized factors. [1] Besides burn-associated peripheral neuropathy, there are also a number of other indications for peripheral neurological investigations in burn patients. Optimal timing in performing electrodiagnostic tests is critical in achieving better patient outcomes. Ideally NCS should be performed when symptoms are first described.

Two tests are commonly performed:

### 1) Electromyography (EMG)

EMG records and analyses the electrical activity in the muscles. During an EMG, small, thin needles are placed in the muscle being tested to record the electrical activity.

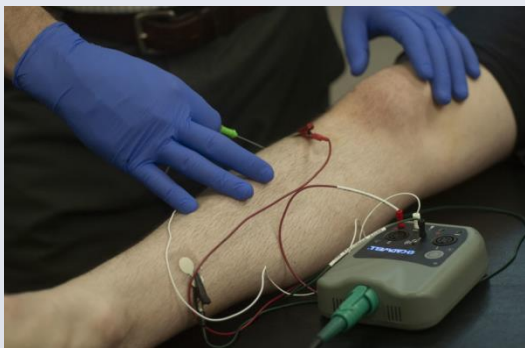


Fig 1: EMG in a leg

### 2) Nerve conduction studies (NCS)

NCS are done to determine if a nerve is functioning normally. Electrodes are taped to the skin in various places along the nerve pathway and the nerve is stimulated with an electric current.



Fig 2: Nerve conduction studies at the wrist

In the Mersey Burn Centre and other centres alike it can be challenging to get NCS for burns patients because of the unique challenges this patient cohort presents. The unaccustomedness of neurophysiologist with burns patients often results in these patients being declined. These patients often remain undiagnosed for prolonged periods of time

AIMS:

1) To outline the challenges hindering early performance of NCS in burn patients and propose possible solutions.

2) To develop a collaborative standard operating procedure (SOP) which can facilitate the timely undertaking of NCS in burn patients.

## Aetiology of burn neuropathy

Several possible mechanisms have been suggested:

- 1) Direct thermal injury
- 2) Vascular occlusion of the vasa nervorum
- 3) Post injury oedema
- 4) Compressive nerve entrapments

Compressive nerve entrapment in burns	
Burn related causes	Iatrogenic causes
Post injury oedema	Poor positioning
Scarring and contracture	Bulky or tight dressings
Heterotrophic ossification	Prolonged tourniquet times

## Indications for performing electrodiagnostic testing in burns

1. Assessing new signs and symptoms of peripheral neuropathy
2. Characterization and localization, of nerve pathology
3. Results of the electrodiagnostic tests will help classify peripheral neuropathies in burns can classified as:
  - Demyelinating neuropathy
  - Axonotmesis
  - Entrapment neuropathy
4. Assessment of recovery

## Barriers to performing electrodiagnostic tests in burns

- 1) Bulky dressings
- 2) Patients with extensive burns to affected limb
- 3) Concerns over sterility of equipment
- 4) Concerns about infection transmission
- 5) Concerns over patient pain and discomfort during procedure



Fig 3: Burns covering affected limb can deter physiatrists from performing electrodiagnostic studies



Fig 4: Bulky dressing need to be removed to perform the investigations

## Designing protocols for performing electrodiagnostic testing in burns

Using a multi-disciplinary approach involving burn surgeons, burn nurses, members of the infection prevention team, pain management team and neurophysiologists, obstacles hindering performance of NCS in acute burns were outlined and solutions suggested and agreed to enable performance of NCS in burn patients with wounds and dressings.

Some discussion points for improving access to electrodiagnostic tests include:

- Adapting instruments and equipment to use over burns and open wounds
  - Sterile or clean cover over wounds e.g. cling film
- Explore the option of performing some electrodiagnostic tests on the burns ward for isolated patients.
- Optimise patient analgesia prior to performing these investigations

## Conclusion

Through collaborative efforts a new protocol and a SOP are being developed which address the logistics around performing the tests in patient who have unhealed burns requiring dressings. This SOP details the approach to wounds and dressings, how to minimise infection transmission, how to deal with patients with multi-drug resistant infections and analgesia requirements prior to performing these tests.

This SOP will facilitate timely diagnosis and treatment of those burn patients affected by peripheral neuropathy.

## REFERENCES

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