

ORTHOPAEDICS



FOR PRIMARY
HEALTH CARE



LION

LEARNING INNOVATION VIA
ORTHOPAEDIC NETWORKS

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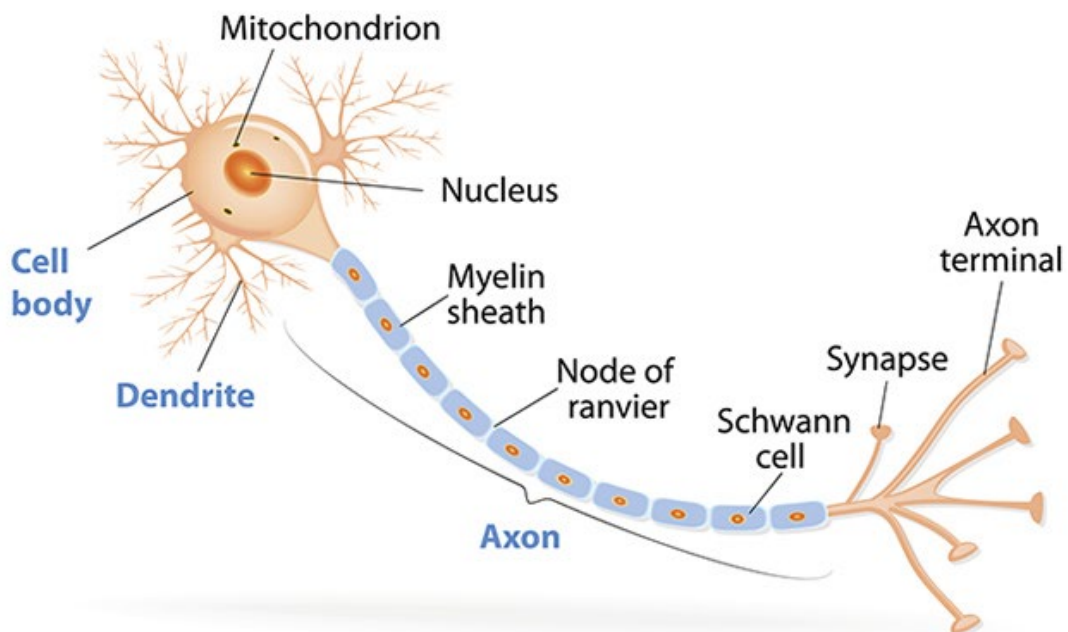
UNIVERSITY OF CAPE TOWN'S **ORTHOPAEDIC DEPARTMENT**

Nerve Injuries

by Prof Michael Solomons

Learning objectives

1. Understand the anatomy of a nerve
2. Understand the types of nerve injuries
3. Management and when to refer



Anatomy of a nerve

While most other connective tissues are made of multiple cells, the functional unit of a nerve, the axon, is a SINGLE cell that in the case of a motor nerve might extend from the spinal cord to the foot.

The cell body sits in the anterior horn of the spinal cord and the end of this single cell sits on the motor end plate of the target muscle. This is why nerve injuries are devastating and associated with poor outcomes.

Depolarisation travels down the nerve by a relatively slow process. The myelin sheath allows the depolarisation to jump from node of Ranvier to the next node of Ranvier thereby accelerating the transmission – a process called saltatory conduction.

When other tissues are damaged, they can be replaced by fibroblasts which can do a similar job to the host tissue. Nerves need to be replaced by nerves otherwise the function is lost.

Types of nerve injury

Neuropraxia

Here the nerve is just 'bruised' with a temporary inability to transmit the impulse from the cell body to the end organ. No intrinsic cell damage. Recovery should be 100%. Can take anything from few seconds ('funny bone', numb leg after sitting on hard chair etc) to a few weeks

Axonotmesis

Here the axon is damaged but not the myelin sheath. The cell will make building blocks to send down to the damaged end to repair and regrow. Can only grow down an intact nerve tube. Recovery incomplete but fairly good. Slow process – nerve ‘grow’s at 1mm a day

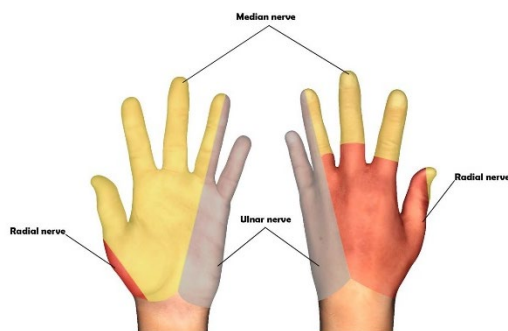
Neurotmesis

Here the whole nerve is divided by extreme distraction force or a transection by sharp object. Recovery impossible unless surgically put back together again. After surgery recovery poor due to the inability to perfectly align. “A macroscopic solution to a microscopic problem”

Management

General Principles

- Need to try work out or differentiate a neuropraxia(minor) from a neurotmesis (major)
- Neuropraxia follows low energy non-penetrating trauma
- Remember ALL nerves have a motor AND sensory component (Commit the peripheral nerve dermatomes to memory)
- Neuropraxia – the sensation in that nerve’s distribution might be intact
- High energy or penetrating injury with nerve deficit assume neurotmesis and refer to Hand or Peripheral Nerve Surgeon



Radial nerve

Supplies

- Elbow EXTENSION
 - Triceps
- Wrist EXTENSION
 - ECRL/ECRB/ECU
- Finger EXTENSION
 - EDC/EIP/EDM
- Thumb EXTENSION
 - EPL/EPB/APL

Presents with

- Wrist drop
- Finger drop
- Thumb drop

Types

- Saturday night palsy
- Associated with Humerus fracture open or closed
- Penetrating

Management

If suspect a neuropraxia such as Saturday night splint then use wrist extension splint to avoid contracture, refer to physiotherapy to maintain passive range of motion, expectant recovery

If penetrating injury refer early to nerve surgeon

Ulnar Nerve

Supplies

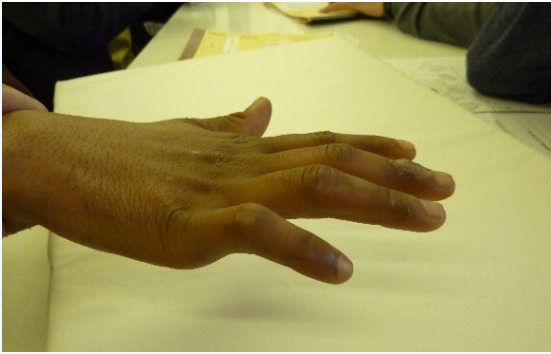
Extrinsics (muscles in forearm)

- FCU
- FDP to little and ring fingers

Intrinsics (small muscles in hand)

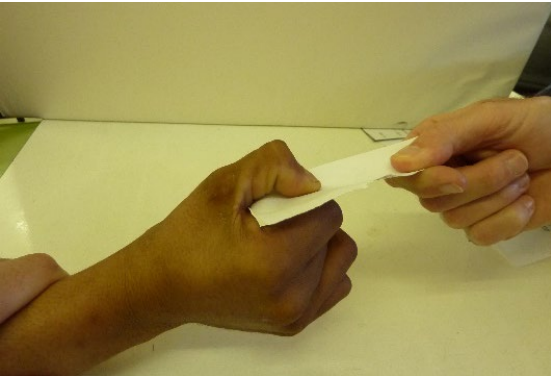
- All interossei
- Hypothenar muscles
- Adductor Pollicis
- Lumbricals to little and ring

Presents with



Ulnar nerve claw

Hyperextended MPJ of little and ring and flexed position of PIPJ little and ring



Weak pinch

Tends to hyperflex thumb IP joint (Froment's Sign)

Median Nerve Palsy

Supplies

Extrinsic (muscles in forearm)

- FCR
- FDP to index and middle fingers

Intrinsic (small muscles in hand)

- Thenar muscles – Opposition, Abduction, Flexion
- Lumbricals of index and middle fingers

Presents with

- Inability to flex thumb and index when tries to make fist
- High median nerve palsy only
- Benediction sign/pointing sign/gun sign/ trigger sign



Other:

Brachial plexus

Obstetric

- Usually due to obstructed labour (shoulder Dystocia). Most recover but 10% need surgery. Refer at maximum 2 months for assessment if have not recovered fully

Traction

- Low energy - Associated with dislocated shoulder. Important to document before reducing shoulder. Mostly recover
- High energy- Associated with fall from height or motorbike accident onto shoulder. Needs early referral.

Peroneal nerve

- Direct blow to peroneal nerve as it winds around fibula neck or following major knee injury
- Presents with foot drop
- Needs orthosis and referral

Sciatic nerve

- Can present with substantial loss of function and sensation in lower leg after fracture of pelvis or dislocation of hip
- Refer early

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About the book

Informed by experts: Most patients with orthopaedic pathology in low to middle-income countries are treated by non-specialists. This book was based on a modified Delphi consensus study* with experts from Africa, Europe, and North America to provide guidance to these health care workers. Knowledge topics, skills, and cases concerning orthopaedic trauma and infection were prioritised. Acute primary care for fractures and dislocations ranked high. Furthermore, the diagnosis and the treatment of conditions not requiring specialist referral were prioritised.

** Held et al. Topics, Skills, and Cases for an Undergraduate Musculoskeletal Curriculum in Southern Africa: A Consensus from Local and International Experts. JBJS. 2020 Feb 5;102(3):e10.*

The Lion

The Learning Innovation via Orthopaedic Network (LION) aims to improve learning and teaching in orthopaedics in Southern Africa and around the world. These authors have contributed the individual chapters and are mostly orthopaedic surgeons and trainees in Southern Africa who have experience with local orthopaedic pathology and treatment modalities but also in medical education of undergraduate students and primary care physicians. To centre this book around our students, iterative rounds of revising and updating the individual chapters are ongoing, to eliminate expert blind spots and create transformation of knowledge.

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