MAJOR NERVE INJURIES - TREATMENT STRATEGIES

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Major Nerve Injuries
Unit
- **Epidemiology**
  - Motor vehicles
  - Young males
  - Death \ serious injury
  - Depression
  - Military
- **Finance**
  - Intensive care
  - Rehabilitation
  - Working population
Leeds: Major nerve injury

- Established 1988
- 4 Consultant Surgeons
- Multidisciplinary team
  - Radiology\Anaesthesia
  - Psychology
  - Physiotherapy
  - Occupational therapy
  - Specialist nursing staff
  - Pain Team
The Children’s Hand Clinic
SHOULDER DYSTOCIA

Intracranial pressure is caused by maternal contractions.

Anterior shoulder impacted on symphysis pubic.

Symphysis pubic.

Brachial plexus stretching.

DANGERS OF SHOULDER DYSTOCIA

- Umbilical cord entrapment
- Inability of child's chest to expand properly
- Severe brain damage or death due to hypoxia or acidosis if delay in delivery
- Brachial plexus damage

Brachial plexus lesion

Unhealthy arm (Erb's palsy)

Healthy arm
Brachial Plexus
Sensory Dermatomes
motor
Nerve cross-section
Mechanism of injury obp

Types of brachial plexus injuries

- A rupture is when the nerve is torn, but not from where it attaches to the spinal cord. This usually occurs beyond the vertebrae in the neck. A rupture requires surgery to reconnect the ends of the nerve.

- A neuroma forms when torn nerve fibres have attempted to regrow and heal themselves but scar tissue has grown in and around the injury. This scar tissue makes it impossible for the nerve to conduct electrical signals to the muscles. Surgery removes the scar tissue around the nerve and between the ends of a completely ruptured nerve.

- An avulsion is when the nerve is torn from where it attaches to the spinal cord. No recovery is expected with an avulsion injury. It cannot be repaired with surgery.

Figure 1. Types of nerve injury

Figure 2. Typical brachial plexus injury
Nerve Anatomy

Sensory

Dorsal root ganglion

Motor

Spinal cord

Anterior Horn Cell
Diagram of neuron showing:
- Axon Terminal
- Dendrites
- Axon Hillock
- Cellular Sheath (myelin-black)
- Node of Ranvier
- Axon Collateral
- End Plate
- Muscle
Nerve injury - pathology

Proximal
Near the brain

Distal
Away from the brain
Nerve injury

Proximal

Distal

Wallerian degeneration

IL-1, NGF, ILGF
Nerve injury - regrowth
Nerve injury - Neuroma
Challenges

- Technical
- Psychology
- Physical - (independent living)
- Innovative
- Research
Leeds: Major nerve injury

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  - Psychology
  - Physiotherapy
  - Occupational therapy
  - Specialist nursing staff
  - Pain Team
  - Surgeon
Why operate

- Assessment tool
- Treatment
  - Repair
  - Grafting
  - transfers
Evolution of surgery

- Exploration
- Neurolysis
- Direct repair
- Grafting
- Transfers
MEASURING OUTCOMES

- Surgeon
  - Motor
  - Sensory

- Patient
  - Injury
  - Self
  - Non biological

- Functional use/integration (sensory)

- Comparing like with like
  - different indications/extent of injury
Reanimation

- Shoulder
- Elbow
- Forearm-rotation
Nerve transfer

- **Motor**
  - Shoulder, elbow reanimation
    - Flexion
    - Extension
    - Rotation

- **Sensory**
  - Upper limb
  - Hand

- **Motor for functional muscle transfer**
What factors influence the outcome
- Extent of injury
- Length to motor end plate
- Surgery
- Timing
Timing of nerve repair

- Early repair
  - Distal recovery
  - Nerve cell death prevention
Evidence for early repair
- improves neuronal survival
- Sensory
- Motor
- Neuro protective factors
Reanimation-adding in a new muscle

- Late presentation
- Adjunct to early nerve surgery

- Import new nerves and muscles
- Improve function, cosmesis, psychology
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MAJOR NERVE INJURY CLINIC

THE CHILDREN’S HAND CLINIC

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