Brachial Plexus Injuries

Clinical Science III

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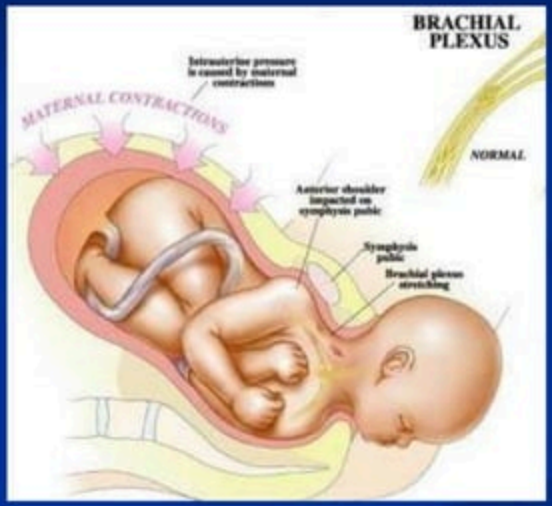
BRACHIAL PLEXUS INJURIES

- Specifically: Obstetrical Brachial Plexus Injury
- Usually result from forcible extraction of fetus by traction on shoulder in a breech presentation, or from traction and tipping of the head in a shoulder presentation



BRACHIAL PLEXUS INJURIES

- Incidence ranges .5-2/1000 births
- Contributing Factors:
  - Birth weight >3500g
  - Shoulder dystocia
  - Prolonged labor
  - Maternal diabetes
  - Infant sedation
  - Breech delivery

BPI

- Occurrence:
  - 0.1% spontaneous deliveries
  - 1.2% breech presentation
  - 1.3% forceps deliveries

BRACHIAL PLEXUS INJURIES

- May produce lifelong effects:
  - Total body
  - Multifactorial
  - Progressive musculoskeletal impairment
  - Limb length deficits

BRACHIAL PLEXUS INJURIES

May have associated trauma:

- clavicle or humerus fractures
- facial nerve injuries
- shoulder subluxation
- torticollis
- hemi paralysis of the diaphragm with phrenic nerve injury (C4)

BPI: pathology

- May be upper or lower plexus or both
- Roots, trunks, divisions , cords and peripheral nerves can all suffer:
  - Neurotmesis: complete rupture
  - Axonotmesis: disruption of axons while neural sheath remains intact
  - Neurapraxia: temporary nerve conduction block with intact axons

BPI: pathology

- Partial or complete rupture may evolve into a neuroma, mass of fibrous tissue
- Hemorrhage into subarachnoid space
- May have combination of types of lesions
- Transient or permanent

BPI Neuronal Recovery

- Axon regeneration 1 mm per day
  - 4-6 months for upper arm
  - 7-9 months for lower arm
- Recovery is varied according to damage
  - 2 years upper arm
  - 4 years lower arm

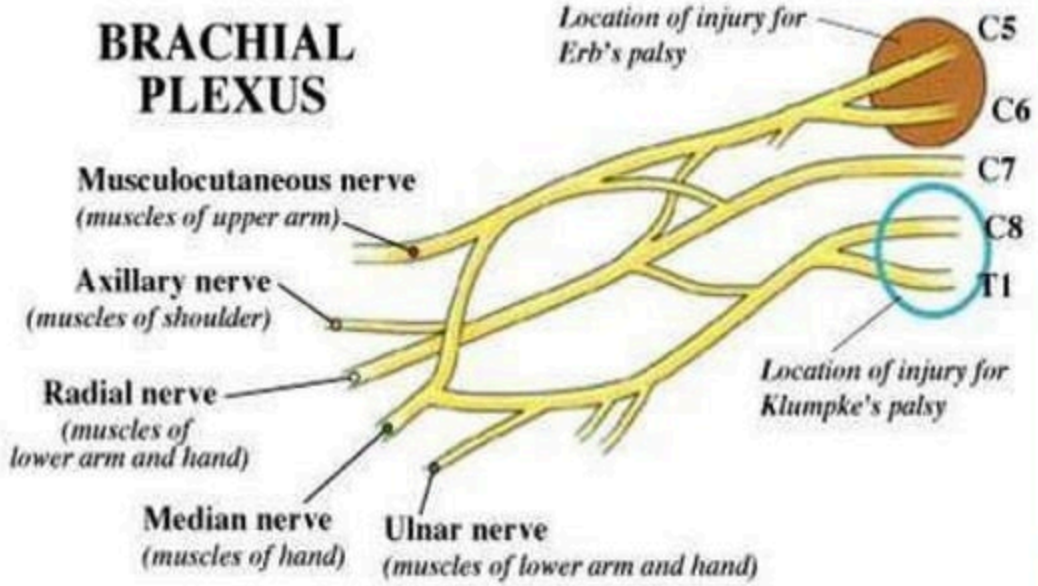
Classification

- Mild: stretching of the nerve fibers
- Moderate: stretching and tearing
- Severe: complete rupture with avulsion of roots from spinal cord
- Diaphragmatic and serratus anterior paralysis suggests avulsion

Classification:

- Erb's Palsy, or upper
  - Involvement of the upper brachial plexus and 5th and 6th C-nerve roots (20% more common than lower)
- Klumpke's Palsy or lower
  - Involvement of the lower brachial plexus and 7th and 8th nerve roots
  - Caused by traction on abducted arm

SHOULDER DYSTOCIA



Erb's Palsy

Caused by the forceful separation of head/shoulder

- biceps, deltoid, brachialis, brachioradialis, supinator, supra and infraspinatus, subscapularis, teres minor, serratus anterior and rhomboids, long extensors of wrist, fingers and thumb may be involved

Erb's Palsy cont

- Affected arm usually hangs at side with shoulder ADD/ IR and elbow extension, forearm pronation and wrist flexion and finger flexion ("waiter's tip" position)
- Moro, biceps and radial reflexes are absent - intact grasp
- May have sensory loss

PROGNOSIS for Erb's Palsy

- Generally good for spontaneous recovery, although may be incomplete
- Depends on degree of involvement
- Majority of spontaneous recovery by 9 months

TREATMENT

- Usually involves rest for 7 - 10 days (possibly splinting)
  - Positioning/splinting
  - Gentle ROM
  - Stimulation of muscle function
  - Encourage active movement
  - Weight bearing
  - Sensory input

TREATMENT cont.

- Bimanual activities
- Balance reactions
- Taping
- Botox
- Electrical stimulation

LOWER (Klumpke's Palsy)

- Involvement of the lower brachial plexus and 7th and 8th (T1) C- nerve roots
  - caused by traction on abducted arm
  - Incidence .6-2% of all OBPI

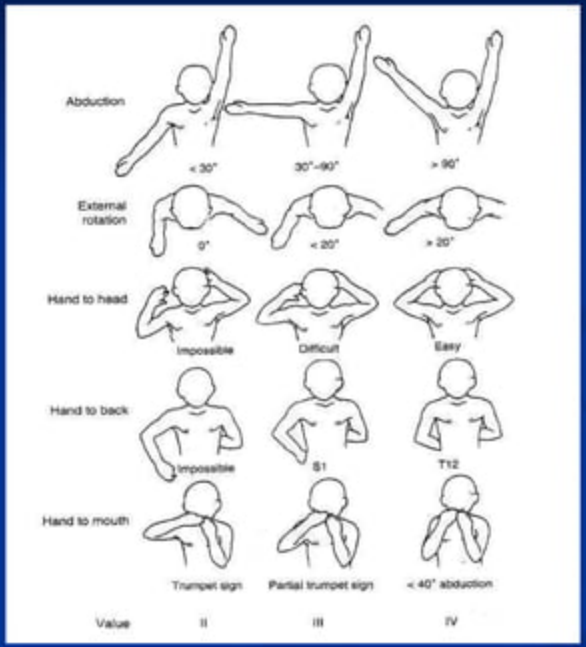
Klumpke's Palsy

- Resting position of forearm supination, paralysis of wrist flexors, extensors, intrinsic muscles of hand (claw- hand deformity)
- Sensory loss of ulnar border of hand/forearm
- T1 involvement
  - may see associated paralysis of sympathetic nerves with a Horner's Syndrome

BOTH (Erb - Klumpke) Total Brachial Plexus Injury

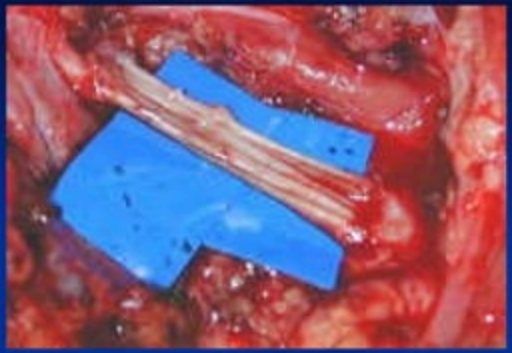
- Infrequent occurrence
- Avulsion of plexus/roots
- Recovery limited after avulsion/rupture
- Loss of sensation
- Surgical indication

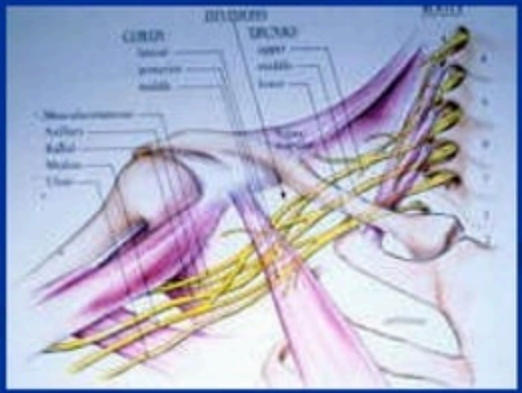
Mallet Scale



Surgical Intervention

- Neurosurgery 5-10% OBPI
  - Nerve grafting
  - Neuroma dissection and removal
  - Neurolysis (decompression and removal of scar tissue)
  - Direct end to end anastomosis of nerve ends

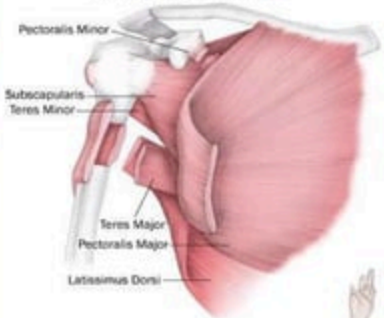


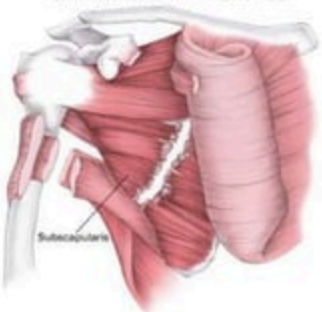


Surgical Intervention

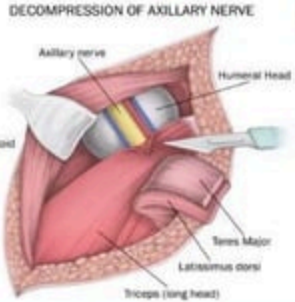
- Later surgeries:
  - Soft tissue release
  - Reduction of gleno-humeral joint dislocation
  - Transfer of muscles osteotomies

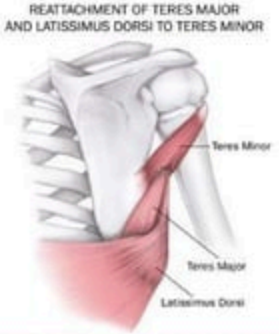
Mod Quad


SURGICAL RELEASE OF:
Pectoralis Minor, Pectoralis Major,
Teres Major, and Latissimus Dorsi.
Pectoralis Minor
Subscapularis
Teres Minor
Teres Major
Pectoralis Major
Latissimus Dorsi


PARTIAL RELEASE OF SUBSCAPULARIS
Subscapularis


41°
158°


DECOMPRESSION OF AXILLARY NERVE
Axillary nerve
Humeral Head
Deltoid
Teres Major
Latissimus dorsi
Triceps (long head)


REATTACHMENT OF TERES MAJOR
AND LATISSIMUS DORSI TO TERES MINOR
Teres Minor
Teres Major
Latissimus Dorsi

BPI Impairments of Body Structure and Function

- Abnormal muscle substitutions
- Neglect due to increased function and ease of movement of opposite arm
- Soft tissue contracture
- Scoliosis, pelvic obliquity
- Abnormal bone growth
- Flattening of humeral head, short clavicle
- Positional torticollis

BPI Activity Limitations

- Inability to grasp, reach
- Limited bilateral activities ex-catch, carry
- Decreased ability for ADLs
- Compromised developmental activities/delay
- Decreased balance reactions/protective responses
- Neglect, self –abuse
- Later-shoulder pain, arthritis

Scapular winging, Trumpet sign

BPI Treatment Intervention

BPI Treatment Intervention

Interventions

Interventions