Electrical stimulation of the upper limb

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Three upper limb Pathways

• Shoulder subluxation
• Upper Limb Active Function
• Upper limb Passive

All differ in aims but follow a similar 6 month protocol and include a 1 month treatment withdrawal to assess if treatment continuation is indicated.
Shoulder Subluxation

- Initial assessment
- Set up
- 2 week follow up
- 6 week follow up
- 10 week follow up
- 18 week follow up (withdraw ES)
- 22 week reassessment

**Indication**

- Pain

**Outcome measures**

- Pain VAS
- ARMA
- Subluxation distance
- GAS
Passive pathway

- Initial assessment
- Set up
- 2 week follow up
- Stretching/mobilisation & splinting
- 6 week follow up
- 10 week follow up
- 18 week follow up
  (withdraw ES)
- 22 week reassessment

**Indications**
- No active movement
- Pain
- Spasticity
- Difficulty in managing hygiene, dressing etc

**Outcome measures**
- Pain VAS
- ARMA
- GAS

ES a passive activity aiming to strengthen muscle, reduce spasticity, increase ROM and desensitise pain
Active pathway

- Initial assessment
- Set up
- 2 week follow up
- Stretching/mobilisation & splinting
- 6 week follow up
- 10 week follow up
- 18 week follow up (withdraw ES)
- 22 week reassessment

Indications
- Some active movement
- Pain
- Spasticity
- Difficulty in managing hygiene, dressing etc

Outcome measures
- Pain VAS
- ARMA
- Box & Block, ARAT, Jebson etc.
- GAS

Important to encourage active participation with ES to practice functional movements or tasks
ES Tips

• Use bigger electrodes on bigger muscles
• Strongest effect under the black electrode
• Blue Pals can be more comfortable
• Covidien blue electrodes are two stiff to follow contours of the skin

• Asking for too much is bad for adherence
• Always provide printed photos and place a copy in the notes
• If you can’t find the electrode position do movement on you self and palpate the muscle movement
Shoulder subluxation - overlapping channel

- 2 channel stimulation – mode 8 (40Hz) or 9 (20Hz)
- Supraspinatus & posterior Deltoid alternating with anterior & middle Deltoid or Supraspinatus & middle Deltoid alternating with anterior & posterior Deltoid
- Active on posterior deltoid to encourage external rotation
Microstim modes 8 (40Hz) or 9 (20Hz)

- Humorous lifted into the glenohumeral socket by the first channel and maintained in position by the second
- Start with 2 x 15 min and build up over 4-6 weeks to 2x 1h
- Some patients choose to use longer periods
- 40Hz may be more comfortable, 20Hz may give less fatigue
- Initial training at 40Hz will give smoother contraction later with 40Hz
Indications
Finger thumb and wrist spasticity
Reduced ROM
Reduced strength or volitional movement

Placement
Active placed over common extensors / posterior interosseous nerve

Indifferent over motor-point of extensor pollicis longus, abductor pollicis longus and extensor indices
Hand opening

Rule of Three Fingers

Indifferent 3 fingers from the wrist

Active 3 fingers above indifferent and offset half an electrode width to the ulna side
Hand opening

Fine tuning

Swap the polarity to determine the relative proportion of thumb/index finger extension and wrist/finger extension.

Move active to determine the relative amount of ulna and radial deviation and finger and wrist extension.
Ulnar nerve stimulation

**Indications**
- Reduce flexor spasticity
- Strengthen Intrinsics & thumb adduction
- Reshape “flat” hand

**Placement**
- Remember, little, ring and part of middle are ulna nerve and index is median nerve so place indifferent over index (median nerve) side to achieve a balanced effect across the fingers

Alternate with long finger extensors (mode 6) for an effective reduction in stiffness / spasticity of the hand.
Median Nerve – Intrinsic muscles

**Indication**
To strengthen intrinsics and thumb abduction
Reduce flexor spasticity
Reshape flat hand
Encourage a tripod Grip

**Placement**
Place indifferent Ulna side (little finger) of lumbricals to achieve a balanced movement of the fingers and active over the centre of the wrist

Alternate with Forearm Extensors (hand opening mode 6)
Alternative position if more thumb abduction required or if median nerve stim is uncomfortable

**Indication**
To strengthen intrinsics and thumb abduction
Reduce flexor spasticity
Reshape flat hand
Encourage a tripod grip

**Placement**
Place indifferent Ulna side (little finger) of lumbricals to achieve a balanced movement of the fingers and active over the thenar eminence

Alternate with Forearm Extensors (hand opening mode 6)
Rhombooids and lower Trapezius

Indications
• Winged scapular
• Shoulder girdle instability

Placement
• Medial and lower boarder of the scapula
• Choose active and indifferent by trial and error
Shoulder flexion/abduction and reaching

Shoulder flexion/abduction

Elbow extension

weak triceps, high biceps tone can be uncomfortable - watch overflow to radial nerve
Reciprocal stimulation - alternating channels (mode 6)

Elbow extension

Elbow flexion, forearm supination
Combining elbow flexion with shoulder flexion or extension

Elbow & shoulder flexion

Elbow flexion, shoulder extension
General reaching

- One channel over anterior deltoid and triceps
- One channel over forearm extensors
- Mode 7 simultaneous

Consider gravity assisted positions to start with