Erb's Palsy/ Brachial Plexus Injury

Brachial Plexus Injury (BPI) can occur as a result of extreme lateral traction on the head of the infant away from the shoulder during the last phase of delivery. The damage is due to forceful widening of the angle between the neck and shoulder, the strongest force being at C5 and it decreases down to T1.

Risk Factors:

- Shoulder dystocia- 4-16% develop OBPI
    - Fetal macrosomia (large for gestational age >4000g) cephalic presentation
    - Maternal diabetes or obesity
    - Rapid/prolonged labour (>60 mins 2nd stage)
- Vaginal breech presentation
- A previous child with erb's palsy
- Forceps delivery or vacuum extraction

Prevalence: In UK, 1 in 2300 live births (50-70 cases per year in Scotland)

Types of Nerve Injury: (Seddon and Sutherland)

- **Avulsion**: This is the most serious type of Erb's palsy. It occurs when the nerve completely rips away from the spine.
- **Neurotmesis**: can occur at different levels. A 3rd-degree neurotmesis injury is the disruption of the axon and endoneurium. When this occurs the perineurium and epineurium remain intact. Disruption of the axon and perineurium is considered a 4th-degree injury. A complete disruption of the entire nerve trunk is classified as a 5th-degree injury.
- **Axonotmesis:** damage to the axon and its myelin sheath. However, the endoneurium, perineurium, and epineurium remain intact. Although the internal structure is preserved, the damage of the axons does lead to Wallerian degeneration. This type of nerve injury also results in a complete recovery although it does take much longer than a neuropraxic injury (1mm/day).
- **Neuropraxia**: This is the mildest form of peripheral nerve injury with minimal structural damage. This allows for a complete and relatively short recovery period. In a neuropraxic injury, a focal segment of the nerve is demyelinated at the site of injury with no injury or disruption to the axon or its surroundings. This is usually due to prolonged ischemia from excess pressure or stretching of the nerve with **no** Wallerian degeneration.

Severity - will depend on the number of nerves involved and the degree of damage:

- Erb's Palsy affects C5, C6
- upper-middle trunk involves C5, C6, C7
- Klumpke's Palsy involves C8, T1
- Total BPI affects all levels of the Brachial plexus, C5-T1

Associated problems & injuries:

- Horner's syndrome (i.e. miosis, ptosis, anhidrosis) - suggesting injury to stellate ganglion; strong association between children with Horner's syndrome and intrinsic hand weakness;
- clavicular and humeral fractures - fractures are managed conservatively by placing the affected arm within the vest/ babygrow until pain settles and callus is formed (approx 3 weeks)- see more information below.
- torticollis
- cephalohaematoma
- facial nerve palsy
- diaphragmatic paralysis (phrenic nerve)

Newborn Process and Guidance:

Assessment:

The newborn baby will be assessed by medical staff initially as part of the newborn examination and escalated to senior clinician/consultant if there are concerns regarding brachial plexus injury.

Areas to assess (in newborn with suspected erb's palsy):

Passive range of movement :

- elbow flexion and extension
- forearm supination
- wrist abduction and extension

** NB. **Do not assess full passive shoulder range before 5 days old**

Active movements :

- shoulder abduction/flexion/elevation/external rotation
- elbow flexion
- forearm supination
- wrist extension/ abduction

Useful methods of assessing active shoulder control, flexion of elbow and supination is to:

- elicit a Moro response
- place the baby in prone with both arms alongside body - wait for baby to move arms from beside body into flexed position.

Posture of upper limb- looking for the typical "waiters tip" posture where affected upper limb is held in internal rotation and adduction of the shoulder, elbow extended and forearm pronated, often with a flexed, adducted wrist

Clavicular/ humeral fracture- note whether or not a fracture is present.

An **x-ray of clavicle and humerus** is routinely taken prior to discharge from SCRH to rule out pseudoparalysis resulting from clavicle and humerus fractures and to ensure fracture management is advised prior to discharge home. (Advice is different if a fracture is present- see below)

Note if Horner's sign is present- i.e. Ptosis of eyelid, Miosis (small pupil), and disturbance of sweating on affected side of face) (This can happen when the lower trunk of the brachial plexus is avulsed from the spinal cord).

Where possible, the visiting advanced paediatric orthopaedic physiotherapists (cover wards every morning) can be asked to review the baby who has suspected Erb's palsy prior to discharge (only if if they are available on the wards) however this is not essential.

Treatment/ Advice

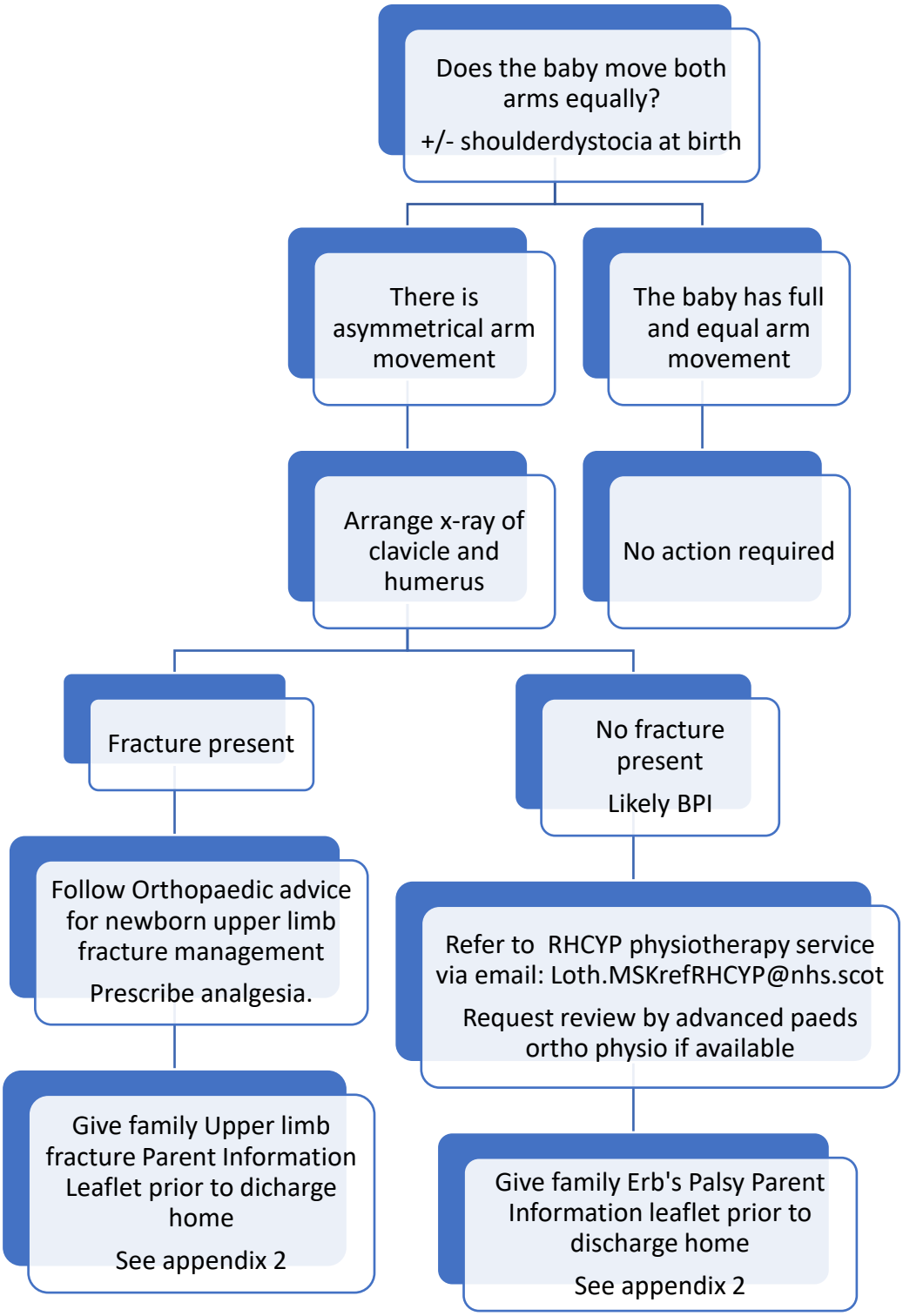
- A demonstration of positioning and handling to ensure joint protection, and exercises for the first 5 days may be given by the advanced paediatric orthopaedic physiotherapist where possible however physiotherapy review is not guaranteed and the Erb's palsy Parent Information Leaflet should be given to the family prior to discharge by medical or nursing staff.
- These advice sheets are available to be printed off from the guidelines file (under Parent information section) of the Reference Library. They are accessible to Medical and Nursing staff. (appendix 2)
- If a fracture is present, the orthopaedic advice is to immobilise the arm with the forearm on abdomen inside the baby's vest/ babygrow. Pain relief should be prescribed. Recommend paracetamol PRN as per the local neonatal guideline. The neonatal junior doctor should prescribe this on a kardex after birth and on an IDL for discharge. A Parent Information Leaflet for Upper limb fractures is also available and should be given to the family prior to discharge by medical or nursing staff.
- If the baby is in RHCYP one of the physiotherapy team can be contacted.

Onward Referral for Physiotherapy Follow Up

- The baby with suspected Erb's palsy should be referred to the Paediatric physiotherapy service via email to: Loth.physioMSKrefRHCYP@nhs.scot for ongoing assessment and physiotherapy intervention as per the referral pathway (appendix 1)

Appendix 1:

Care Pathway on Postnatal Wards- Brachial Plexus Injury/ Upper Limb fractures



Appendix 2:

- **Erb's Palsy- Information for Parents with a newborn -** This PDF erbs-palsy-newborn-advice-v30.pdf should be given to the family prior to D/C home.

- **Upper Limb Fracture- Information for parents with a newborn**: This PDF Newborn Upper Limb Fracture Advice should be given to the family prior to D/C home and relevant advice given