



HEALTH HOLDING

HAFER ALBATIN HEALTH  
CLUSTER  
MATERNITY AND  
CHILDREN HOSPITAL

<b>Department:</b>	Rehabilitation Centre		
<b>Document:</b>	Multidisciplinary Policy and Procedure		
<b>Title:</b>	Physiotherapy Protocol for Brachial Plexus Injury		
<b>Applies To:</b>	All Physiotherapist, Physicians and Nurses		
<b>Preparation Date:</b>	January 11, 2024	<b>Index No:</b>	REH-MPP-004
<b>Approval Date:</b>	January 25, 2024	<b>Version :</b>	(2)
<b>Effective Date:</b>	February 25, 2024	<b>Replacement No.:</b>	REH-MPP-004(1)
<b>Review Date:</b>	February 24, 2027	<b>No. of Pages:</b>	03

## 1. PURPOSE:

- 1.1 To gain the normal range of motion, to improve nerves conduction and to strengthen the muscles of the upper extremity involved.

## 2. DEFINITIONS:

- 2.1 Brachial Plexus Injury: It occurs most frequently following difficult breech or forceps delivery (Obstetrical Brachial Plexus Palsy) (OBPP).
  - 2.1.1 Erb's Palsy: (the most common)
    - 2.1.1.1 Due to injury to the lower cervical spinal roots C5, C6 and C7 with weakness of the shoulder, elbow and, if C7 is involved, wrist muscles but with sparing of the small muscles of the hand.
    - 2.1.1.2 The affected arm hangs limp in medial rotation by the baby's side. The hand is flexed at the wrist with the fingers extended in the classical 'waiters tip' position.
    - 2.1.1.3 There is paraesthesia of the anterior aspect of the forearm, bilateral in 8-20% (almost exclusively breech).
  - 2.1.2 Klumpke's Palsy (Claw Hand)
    - 2.1.2.1 Due to injury to the lower cervical spinal roots C7, C8 and 1st thoracic spinal root (T1).
    - 2.1.2.2 Weakness of the small muscles of the hand results in a claw hand.
    - 2.1.2.3 The action of unopposed long flexors of the inter-phalangeal joints and extensors of the metacarpophalangeal joints results in extension of the metacarpophalangeal joints with flexion of the inter-phalangeal joints. There is also paraesthesia of the ulnar border of the arm.
- 2.2 A three-tiered classification system to describe the severity of nerve damage:
  - 2.2.1 Neuropraxia: This is the mildest type of peripheral nerve damage when damage to the insulation around the nerve's axon is damaged
    - 2.2.1.1 There is no damage to the axon itself, which is the part of the nerve fibre responsible for conducting electrical impulses to muscles.
    - 2.2.1.2 This localised damage to the outer nerve fibres (the myelin sheath) causes an interruption in the conduction of the impulse down the axon resulting in short-term paralysis or muscle weakness.
    - 2.2.1.3 Spontaneous recovery (remyelination) usually takes place within weeks to months.
  - 2.2.2 Axonotmesis: This is more severe damage to the nerve fibres, where both the myelin sheath and the axon of the nerve are damaged but the Schwann cells and the connective tissue framework surrounding the axon (the endoneurium, perineurium and epineurium) remain intact.
    - 2.2.2.1 Axonotmesis leads to Wallerian degeneration shortly after the injury. This is when the part of the axon between the injury and the neuron's cell body starts to degenerate (including the myelin sheath), leaving only the outermost layer of the nerve fibre hollowed out.

- 2.2.2.2 When the degeneration is complete, regeneration of the axon can start from the lesion, typically within four days of the injury. New shoots grow at a pace of one millimetre per day.
- 2.2.2.3 The prognosis for axonotmesis is fair, but it may take months for the nerve to regrow and connect to the muscle. The process may be complicated by scar tissue forming at the site of the injury (known as neuroma). The scar tissue could interrupt the conduction of electrical impulses between the muscles and the nerve cell.
- 2.2.3 Neurotmesis: This is the most severe form of a nerve injury.
  - 2.2.3.1 Here the axon, myelin sheath and connective-tissue framework are damaged. Electrical impulses cannot be sent to the muscles and the limb is paralysed. Wallerian degeneration will start following the injury (similar to axonotmesis) and this is when the part of the axon between the injury and the neuron's cell body starts to degenerate. Unlike axonotmesis, the prognosis for regrowth is very poor.
  - 2.2.3.2 Surgery may be able to repair the nerve so that some movement and feeling in the arm can be restored.

### 3. POLICY:

- 3.1 Patient should have a Referral Form from the treating physician.
- 3.2 Refers to x-ray before initial assessment.
- 3.3 Physician /Physiotherapist initially assesses, evaluates and fills out the specific Form.
- 3.4 Refers to physician to do electromyography and nerve conduction study when needed.
- 3.5 Refers to an Orthotics Department for correction splint if needed.
- 3.6 Do re-evaluation after 2 weeks (natural course for recovery period).

### 4. PROCEDURE:

- 4.1 Physiotherapist shall be explaining, gives information and home instruction/program to the family regarding the patient condition especially proper positioning of the involved limb.
- 4.2 Physiotherapist should observe all the time the following precautions:
  - 4.2.1 Be gentle on giving exercises and avoid overstretching of flaccid muscles, tendons, and ligaments.
  - 4.2.2 Keep the involved limb in a neutral position. This position protects against further injury to the plexus and prevent over stretching of flaccid muscles, tendons and ligaments.
- 4.3 Management /Plan:
  - 4.3.1 Gentle Passive Range of Motion Exercises (PROME) on all planes of the involved upper extremity.
  - 4.3.2 Electrical Muscle Stimulator (EMS).
  - 4.3.3 Plan for correction splint to prevent contracture (from the first visit).
  - 4.3.4 Occupational Therapy (OT) Programs; usually for Lower (Klumpke's Palsy) or Complete Brachial Plexus Injury.
- 4.4 Frequency and duration of treatment:
  - 4.4.1 The appointment will be determined by the therapist 3 days a week in the first month, then every two days depending on the response to the management plan.
  - 4.4.2 Frequency of later visits will depend on the initial level of involvement, age of the child and parents' ability to perform a home-based program successfully.
  - 4.4.3 Prognosis depends upon the severity of the stretching injury. If this was mild, full recovery may occur, though it may take many months.
- 4.5 Discharge Planning:
  - 4.5.1 Any patient who reaches the treatment goals set by the therapist is re-evaluated and discharged.
  - 4.5.2 If patient does not respond to treatment with electrical stimulation and exercises, within 2 month the patient is referred to a rehabilitation doctor to decide whether the patient should be discharged and complete treatment at home, or he is referred to a neurologist to decide another way of treatment.

## 5. MATERIALS AND EQUIPMENT:

- 5.1 Electric muscle stimulator (EMS).
- 5.2 Some motivated toys for the movements like flexion, extension, external and internal rotation.

## 6. RESPONSIBILITIES:

- 6.1 Physician: Assess, diagnose and prescribe medicine.
- 6.2 Physiotherapist: Initial assessment, evaluates and fills out the General Evaluation Form and documents data in the Referral Form.
- 6.3 Nurse: Triage, and if the patient is more than 12, she should help male physiotherapist to do physiotherapy.

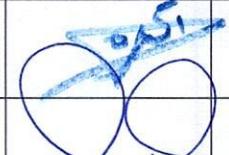
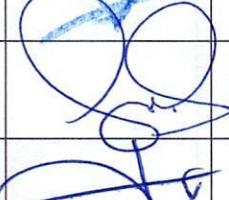
## 7. APPENDICES:

- 7.1 Referral form. (Electronic )
- 7.2 Assessment forms. (Electronic )
- 7.3 Follow up notes. (Electronic )
- 7.4 Discharge form. (Electronic )
- 7.5 Education form. (Electronic )

## 8. REFERENCES:

- 8.1 Physiotherapy department protocols in MCH- Al-Jouf.

## 9. APPROVALS:

	Name	Title	Signature	Date
Prepared by:	Ms .Amira Yahya Hamed	Head of Rehabilitation Centre		January 11, 2024
Reviewed by:	Mr. Abdulelah Ayed Al Mutairi	QM&PS Director		January 18, 2024
Reviewed by:	Dr. Tamer Mohamed Naguib	Medical Director		January 18, 2024
Approved by:	Mr. Fahad Hazam Alshammari	Hospital Director		January 25, 2024