



HEALTH HOLDING

HAFER ALBATIN HEALTH
CLUSTER
MATERNITY AND
CHILDREN HOSPITAL

Department:	Neonatal Intensive Care Unit (NICU)		
Document:	Departmental Policy and Procedure		
Title:	Performing Lumbar Puncture		
Applies To:	All NICU Staff		
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1. PURPOSE:

- 1.1 To obtain cerebrospinal fluid for analysis.
- 1.2 To set values as acceptable normal cerebrospinal fluid analysis results.

2. DEFINITONS:

- 2.1 **Lumbar Puncture (LP)** is a procedure in which an aspiration needle is placed into the subarachnoid space of the spinal cord, usually via the fourth lumbar intervertebral space, to collect cerebro spinal fluid (CSF) for diagnostic purpose.

3. POLICY:

3.1 Indications:

- 3.1.1 Infants with a positive blood culture.
- 3.1.2 Infants with early onset sepsis whose signs, clinical course or laboratory data strongly suggest bacterial sepsis.
- 3.1.3 Acquired late onset sepsis (after 3 days of age), when the incidence of meningitis is significant. Blood cultures can be negative in up to 39% of infants with meningitis. However, in bacteremic infants, the incidence of meningitis may be as high as 23%.
- 3.1.4 Infants who initially worsen with antimicrobial therapy or do not respond to antimicrobial therapy in the expected manner.
- 3.1.5 If signs of CNS involvement are present (seizures, coma, focal neurologic abnormality).
- 3.1.6 To monitor efficacy of antimicrobial therapy in the presence of CNS infection in selected cases.
- 3.1.7 To diagnose central nervous system congenital infections e.g. toxoplasmosis, syphilis, Rubella, cytomegalovirus, and herpes simplex as well as bacterial and fungal infections.
- 3.1.8 To aid in the diagnosis of metabolic disease e.g. hyperglycaemia.
- 3.1.9 Inject medications in selected cases.
- 3.1.10 To instil contrast material for myelography.

3.2 Contraindications:

- 3.2.1 Infants who are critically ill and likely to have cardiovascular or respiratory compromise from the procedure, the lumbar puncture can be deferred until the infant is more stable.
- 3.2.2 Uncorrected thrombocytopenia or bleeding diathesis.
- 3.2.3 Infection in the skin or underlying tissue at or near the puncture site.
- 3.2.4 Lumbosacral anomalies.
- 3.2.5 Increased intracranial pressure (ICP) may occur with bacterial meningitis or intracranial mass lesions. In the neonate with open cranial sutures, this rarely results in signs of trans tentorial or cerebellar herniation. However, herniation can occur after LP in the presence of elevated ICP, even when the sutures are open. If signs of significant increased ICP exist (rapidly declining or severely depressed level of consciousness, abnormal posturing, cranial nerve palsies, tense anterior fontanelle, abnormalities in heart rate, respirations, or blood

pressure without other cause), CT or MRI should be performed before LP. Papilledema is a late sign and is rarely present in the neonate, regardless of the degree of increased ICP.

3.3 The procedure is done under complete aseptic technique.

4. PROCEDURE:

- 4.1 Identify the patient by 2 identifiers; four names for Saudi/ complete name for Non-Saudi and medical record number.
- 4.2 Inform parents of planned procedure for their infant when possible and obtain consent.
- 4.3 Give medication for pain according to case e.g. oral sucrose with a pacifier, local Lidocaine 1% using a 25 gauge needle, or fentanyl for ventilated babies.
- 4.4 Monitor and document vital signs and oxygen saturation at the beginning & during and for one hour after the procedure. Pre-oxygenation and increased supplemental oxygen as required during the procedure can prevent hypoxemia. Ensure airway is patent all through the procedure.
- 4.5 Resuscitation equipment must be readily available and in working order.
- 4.6 Ensure infant has not been fed in previous hour (aspirate infant's stomach if fed within the past hour).
- 4.7 Assemble equipment. It is preferable to use a needle with stylet to avoid development of intraspinal epidermoid tumor.
- 4.8 Use strict aseptic technique. Wash hands for 2 minutes; wear sterile gloves, sterile gown and mask.
- 4.9 Positioning: Lumbar puncture can be done in the lateral decubitus position or in the sitting position with legs flexed (curl into fetal position). The assistant should hold the infant firmly at the shoulders and buttocks so that the lower part of the spine is curved and not rotated. Avoid direct flexion of the neck not to compromise the airway and increase cerebral venous pressure.
Some studies have shown that the interspinous space of the lumbar spines is maximally increased with children in the sitting position with flexed hips. Sitting flexed position, seems to be sufficiently safe and serve to enhance the success rate of a LP. It can be favoured whenever the infant's condition permits.
- 4.10 Disinfect the skin using povidone iodine and alcohol swab. Allow adequate time for the skin to dry.
- 4.11 Drape with sterile drape.
- 4.12 Palpate landmark accurately to prevent puncture above the L3 interspace (lower interspace should be used for preterm infants). The L3-4 interspace landmark is an imaginary line between the top of the 2 iliac crests.
- 4.13 Use a 22 to 25 gauge spinal needle with a stylet. It helps if you hold your thumb over the spinous process above the inter-space to aid in locating the puncture site if the infant moves. Insert the needle perpendicular to the skin, in the midline into the space between the fourth and fifth lumbar spinous processes with the bevel facing the flank (parallel to the longitudinal dural fibers, so the needle separates these fibers instead of lacerating them).
- 4.14 Pierce the skin with the needle and pause. Wait for the child to stop wriggling.
- 4.15 Re-orientate (ensure that back is vertical, needle is perpendicular to the back) and advance the needle gradually about 0.5cm at an angle in the direction of the umbilicus.
- 4.16 As soon as the submural space is entered, remove stylet and observe for CSF flow. If negative, re insert stylet and advance a little further. Repeat this until CSF is obtained. This prevents traumatic tap caused by over penetration.
- 4.17 Allow CSF to drip into three or four tubes, each with a volume of 0.5 to 1.0 ml (around 10 drops/tube)
- 4.18 Clean antiseptic solution from skin with sterile water or normal saline.
Send CSF urgently for the following (if a delay in analysis > 2 hours, white blood cell counts and glucose concentrations decrease significantly):
 - 4.18.1 Cell count with differential.
 - 4.18.2 Protein.
 - 4.18.3 Sugar; check plasma sugar at the same time, the ratio of CSF sugar to simultaneously obtained blood specimen should be above two thirds of the serum level.
 - 4.18.4 Culture and sensitivity (the gold standard for diagnosing meningitis) and gram stain.
 - 4.18.5 Others as indicated e.g. amino acid levels, viral studies e.g. Polymerase Chain Reaction amplification for herpes simplex virus.

- 4.18.6 Comment on turbidity and color; xanthochromia, bloody.
- 4.19 After the procedure:
 - 4.19.1 Check the temperature.
 - 4.19.2 Continue monitoring of vital signs and oxygen saturation for at least 4 hours.
 - 4.19.3 Assess pain score.
 - 4.19.4 Both physician and nurse document in progress notes the time, date, color of CSF, tolerance of the baby to the procedure and any encountered problem.
- 4.20 Complications:
 - 4.20.1 Hypoxemia from knee chest position or cardiopulmonary disturbances.
 - 4.20.2 Contamination of CSF sample with blood (traumatic tap).
 - 4.20.3 Aspiration.
 - 4.20.4 Spinal cord puncture and nerve damage if puncture site is above the level of cord termination.
 - 4.20.5 Infection: Meningitis from LP performed during bacteraemia (incidence about 0.2%), spinal cord or epidural abscess, vertebral osteomyelitis.
 - 4.20.6 Bleeding: Spinal epidural or subdural hematoma spinal or intracranial subarachnoid hematoma.
 - 4.20.7 Intraspinous epidermis tumour from epithelial tissue introduced into the spinal canal.
 - 4.20.8 Sixth-nerve palsy caused if removal of excessive CSF with resulting traction on the nerve.
 - 4.20.9 Sudden intracranial decompression with cerebral herniation.

5. MATERIALS AND EQUIPMENT:

- 5.1 Masks - for person performing procedure and assistant.
- 5.2 Sterile gloves and sterile gown.
- 5.3 Sterile drape.
- 5.4 Gauze swabs.
- 5.5 Antiseptic solution; Povidone iodine, 70% alcohol
- 5.6 Lumbar puncture needle - short bevel, Stylet, 22- 24 or 25 gauge 1.5 - 2.5 inches according to size of infant. If not available may use 23 or 24 gauge needle.
- 5.7 Sterile 3 CSF collection tubes.
- 5.8 Band aid or tegaderm

6. RESPONSIBILITIES:

- 6.1 Physician
- 6.2 Nurse

7. APPENDICES:



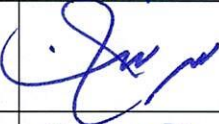
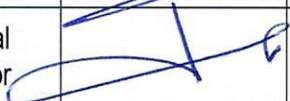

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9. APPROVALS:

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