



**Policy and Procedure for Lumbar Puncture Management
in Neurosurgical Patients**

MoH/DGKH/NEURO-S/P&P/003/Vers.1
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Sultanate of Oman
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Directorate General of Khoula Hospital
Neurosurgery Department

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Approval Process

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Acronyms:

| | |
|-------|--|
| LP | Lumbar puncture |
| CSF | Cerebrospinal fluid |
| IIH | Idiopathic intracranial hypertension |
| C & S | Culture and sensitivity |
| BP | Blood Pressure |
| ECG | Electrocardiogram |
| SpO2 | Peripheral capillary oxygen saturation |



Policy and Procedures for lumbar puncture management in Neurosurgical patients

1. Introduction

Khoula Hospital being the major neurosurgical set-up in Oman is responsible for management of neurosurgical patients from almost all over the country. The invasive procedures, if required in concurrence with the treatment of neurosurgical pathologies should be carried out with utmost care and maintaining sterility. One of such invasive procedure is a lumbar puncture which is commonly carried out in neurosurgery practice.

2. Scope

3.1 This policy applies to all clinicians and nursing staff responsible for treatment of neurosurgery patients in DGKH.

3. Purpose

3.1 To ensure a consistent and safe practice when performing a lumbar puncture in in-patient settings.

4. Definitions

Lumbar puncture (LP): insertion of a hollow needle into the subarachnoid space below the level of the spinal cord (corresponds to second Lumbar vertebra) for diagnostic purposes.

5. Policy

This is the policy of DGKH to ensure that:

5.1 Once the indication for LP is ascertained by the treating clinician the sterile technique must be maintained during the procedure and appropriate personal protective equipment must be utilized.

5.2 Decision regarding necessity of consent is made by the physician performing procedure.



5.3 Prior to procedure, the patient /parents/guardians should be given information/teaching about the procedure as appropriate to situation and how they may assist during procedure.

6. Procedures

6.1 pre- operation procedures:

6.1.1 Sterile gown and gloves

6.1.2 Masks with face shield

6.1.3 Paediatric Lumbar Puncture Tray (contains 22 gauge needle) or Adult Lumbar Puncture Tray (contains 20 gauge needle), additional Lumbar Puncture needles (as requested). Neonates : 25 gauge 1 inch (25mm) or butterfly - Pediatrics: 22 gauge 2½ inch (63mm) or 20 gauge 3½ inch (88.9mm)

6.1.4 Betadine antiseptic solution

6.1.5 Sterile Normal Saline solution

6.1.6 Sterile marker and labels

6.1.7 Sterile specimen tubes

6.1.8 If measurement of opening intracranial pressure required, obtain manometer

6.1.9 Ensure proper patient identification. Prepare specimen requisitions as ordered, ensuring correct patient identification.

6.1.10 Topical and Local Anesthetic agents - 2% Lidocaine

6.1.11 ECG, BP and SpO2 monitoring per unit specific standards and patient status.

6.1.12 Procedural sedation/analgesic

6.2 Wash hands and don personal protective equipment.

6.3 Provide non-pharmacological procedural pain management as appropriate and pharmacological agents as ordered.



6.5 Open sterile gown and gloves for the physician – to be done by the attending nurse / a doctor assistant.

6.6 Open LP tray maintaining sterility of contents. Pour Betadine and sterile Normal Saline into proper containers. Add needle to tray as requested. Provide sterile marker/labels for physician to label solutions.

6.7 Position patient:

6.7.1 Neonates – if infant in bassinet, transfer to open care bed for procedure. Position infant /child at edge of bed or stretcher with side rail down. **Note:** Health care personnel must remain at bedside once side rail down to ensure safety of infant/child.

6.7.2 Position patient in lateral recumbent position with knees and neck flexed toward chest (fetal position). Attending nurse or doctor assistant should assist patient in maintaining this position.

6.7.3 Cooperative patients may be positioned sitting on edge of bed/stretcher with trunk flexed forward, shoulders supported by the attending nurse or other health care professional.

6.8 Parents/guardians should not perform positioning functions, but may provide comfort and support during procedure as deemed appropriate by the doctor performing the procedure.

6.9 During operation Procedures the following should consider:

6.9.1 Expose back, lumbar and midline spine region and ensure patient is lying on an absorbent pad.

6.9.2 Select site for LP

6.9.3 Identify the highest point of the iliac crests.

6.9.4 A direct line joining these landmarks should guide the identification of the fourth lumbar vertebral body.

6.9.5 Identify, through palpation, the subarachnoid space at the level of L3/4 or L4/5 as these are well below the termination of the spinal cord.



- 6.9.6 Mark the identified insertion point through gentle pressure with the cap of a needle.
- 6.9.7 Set up sterile trolley with all necessary equipment (Spinal needle, manometer, universal containers x 4, Lignocaine, syringes, needles, skin sterilization fluid, sterile pack, cannula dressings and small dressing).
- 6.9.8 Thoroughly clean and sterilize the skin around the proposed LP site with Betadine solution and allow to dry fully.
- 6.9.9 Drape area accordingly.
- 6.9.10 Using 1 or 2% Lidocaine (Lignocaine) and a 25gauge (orange) needle, infiltrate the skin with 3ml local anesthetic, raising a small bleb. Deeper injection can then be achieved using a 21gauge (green) needle, taking care to aspirate prior to injection with each movement of the needle to avoid intravenous injection. Be aware that the maximum dose is 3mg/kg and that if someone uses the maximum dose and fails the procedure, more senior clinicians and those from other specialties [anaesthesia] will be unable to make further attempts.
- 6.9.11 The spinal needle should then be inserted slowly and advanced angling slightly towards the head as if aiming for the umbilicus. It is then gently advanced towards the dural space. It should be introduced incrementally and the stylet periodically removed to check for the presence of CSF flow. If no flow demonstrated reinsert the stylet until the subarachnoid space is entered.
- 6.9.12 Once CSF appears the stylet should be removed, the manometer attached and opening pressures recorded.
- 6.9.13 once opening pressures established the CSF should be collected. 10-15 drops as a minimum should be collected in each sequentially numbered universal containers and then the Glucose bottle. The safe maximum volume that can be collected is 40 milliliters though larger volumes may increase the risk of post procedure headache.
- 6.9.14 If performing therapeutic drainage of CSF for IIH ensure closing pressure is checked and documented along with opening pressure (this is helpful for follow up.)
- 6.9.15 Once the samples have been collected the manometer should be removed and the stylet reinserted. The spinal needle can be gently removed until it is within the body of the stylet and then both stylet and needle can be removed together.



6.9.16 The aspiration of CSF through the spinal needle is not recommended during any stage of procedure.

6.9.17 Insertion site should be covered with a dressing.

6.9.18 Specimens are usually sent for the following: Specimen #1 - C &S (Microbiology) #2 protein and glucose (Biochemistry) #3 cells and Gram stain (Hematology) #4 Virology and PCR as requested. Additional tubes of CSF may be required for acid fast bacilli (TB lab), fungal studies, metabolic studies, etc.

Note: CSF specimens cannot be sent to the hospital laboratory via the pneumatic tube system as it would destroy cells.

6.9.19 Document the date, time, procedure done, color of CSF, opening pressure (if applicable), specimens sent, patient tolerance of procedure, and appearance of site/dressing

6.10 Post Operation Procedures, the following should be consider:

6.10.1 Monitor vital signs and neurological status.

6.10.2 Assess LP site for bleeding or CSF leak every 15 minutes for one hour.

6.10.3 Maintain patient in supine position for 1 hour or as ordered. (There is no evidence that extended supine positioning or bed rest prevents post-LP headache).

6.10.4 Assess for presence of headache and nausea.

6.10.5 Administer analgesic and antiemetic if required.

6.10.6 Attending nurse to report to doctor if there are significant changes in vital signs or neurological status, including pupillary changes, swelling, bleeding or CSF leak at LP site, tingling or loss of sensation/function of lower limbs, changes in bowel or bladder control, headache or nuchal pain or rigidity.

6.11 To avoid unnecessary repeated LPs, where the clinician is unfamiliar with a test being performed, it would be wise to check with the laboratory how much CSF they require and if there are any special requirements for the sample before performing the procedure and sending the sample.



6.12 If the procedure was particularly challenging or has been repeated for further investigations it may be worth communicating with the laboratories the order of priority of the investigations in case there is inadequate sample for all of the requested investigations.

6.13 If the lumbar puncture proves technically challenging, multiple attempts should not be made by junior members of the team and the procedure should be attempted by the most senior, available clinician from the requesting team. If the procedure still cannot be performed support can be sought from the on-call anaesthetists.

6.14 It remains the responsibility of the operator performing the procedure to ensure that samples are appropriately labelled and conveyed to the laboratory

6. Responsibilities

6.1 Head of the department of Neurosurgery and unit heads shall

6.1.1 Ensure that the policy is available and accessible to all staff.

6.1.2 Encourage all staff to be aware of this policy and strictly follow it.

6.1.3 Their willingness is crucial to achieve the aim behind the policy.

6.2 Head of the Nursing and ward In-charges shall

6.2.1 Ensure that the policy is available and accessible to all staff.

6.2.2 Encourage all staff to be aware of this policy and strictly follow it.

6.2.3 Their willingness is crucial to achieve the aim behind the policy.



5. Document History and Version Control

| Document History and Version Control | | | |
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| Version | Description of Amendment | Author | Review Date |
| 01 | Initial Release | Dr. Pravin Kharangate | |
| 02 | | | |
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| Written by | | Reviewed by | Approved by |
| Dr. Pravin Kharangate | | | Dr.Ali AlMashani |

6. Related Documents:

7. References:



| Title of book/ journal/ articles/ Website | Author | Year of publication | Page |
|---|--|----------------------------|-------------|
| Guideline for Lumbar punctures – | – Royal Children’s hospital, Melbourne | | |
| . Guideline for Lumbar punctures – Department of Paediatric Neurology, Leeds Teaching | hospitals NHS Trust | | |
| Guidelines for Lumbar punctures | BC Children’s Hospital, Vancouver | | |
| Guideline for Lumbar punctures | Portsmouth hospitals NHS Trust | | |
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