Lumbar Drain Management

Thoracic Aortic Aneurysm Surgery

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What is a Lumbar drain?

A small, flexible, soft plastic tube placed in the lower back (lumbar area) to remove cerebrospinal fluid (CSF)

Used to drain some of the cerebrospinal fluid that fills the ventricles of the brain and surrounds the brain and spinal cord.
Purpose of the Lumbar drain

Draining cerebrospinal fluid (CSF) can reduce pressure in the spinal cord or brain.

↑ Increased Pressure  =  ↓ Reduce blood flow

↑ Confusion

↑ Headache/Pain

↑ Weakness/Paresis

↑ Paralysis
Paraplegia remains one of the most devastating complications of thoracoabdominal aortic surgery and is associated with a significant increase in both morbidity and mortality (Fedorow, et al., 2010).
Indications for cerebrospinal fluid (CSF) drain

Evidence from randomized and nonrandomized trials and from cohort studies support the use of CSF drainage as an adjunct to prevent paraplegia when this adjunct is used in centers with large experience in the management of TAAA.

Lower limb neurologic deficits occurred in 12% of patients who underwent CSF drainage and 33% of control subjects.

Why does this happen?

Intraoperative ischemia of the spinal cord is thought to be, in part, related to interruption of blood flow to the arteries that supply blood to the spinal cord during surgery.

Why does this happen?

• Aortic cross clamping reduces the distal mean arterial pressure (MAP) and the spinal cord perfusion pressure (SCPP)

• Clamping reduces the perfusion to the spinal cord and can cause ischemia and edema

• Then end result may be partial or incomplete paresis or complete paraplegia
What increases the risk?

1. Emergency (dissection/rupture)
2. Increased Clamp Time
3. Extensive Aneurysms
4. Post-op Hypotension
5. Increased Age
6. Previous Aneurysm Repair
7. Diabetes (comorbid diseases)
Perioperative Insertion

- Side lying position
- Sterile site prep of the lumbar spine
- Needle insertion at L3-L4 or L4-L5 into intrathecal space
- Cerebrospinal fluid flow confirmed
- Catheter advanced 5-7cm – (often times anesthesia will place stich)
- Occlusive Dressing applied
- Transducer connected and leveled at the right atrium
- CSF drained to <10mmHg
ICU Management Orders

- Transduce Cerebrospinal Fluid Pressure (CSFP) (sometimes called ICP)
  - Position patient HOB 30°
  - Level transducer to phlebostatic axis or right atrium
  - Continuously transduce CSFP
  - Turn stopcock off toward the cylinder
  - Read waveform on end expiration
  - Document the CSF pressure every 1 hour for 3 days
  - If CSF >10mmHg drain to <10mmHg or no more than 15ml
ICU Management Orders

- Neuro Vital Signs
  - Neuromuscular Checks q1h
  - Neurovascular Checks q1h
  - Notify MD/NP/PA for any changes immediately

- Maintain Lumbar Drain
  - 72 hours for open repair
  - 24-48 hours for endovascular repair
ICU Management Orders

- Monitor for Pink/Bloody CSF.
  - If CSF Pink/Bloody clamp drain and notify CV surgeon and CV Anesthesia

- Maintain Hemoglobin >9mg/dl
  - Notify NP/PA/MD for possible transfusion order.

- Maintain Cardiac Index >2.5

- Maintain SBP >140 mmHg
Delayed Paraplegia

Evidence does suggest that CSF drainage is an effective rescue maneuver for patients who develop delayed-onset paraplegia.

Predictors of DP include:
1. Increased age
2. Greater extent of TAAA (I,II,III),
3. CSF drain complications,
4. Post operative renal replacement therapy
5. Fluctuations in *systolic* arterial blood pressure, but *not mean* arterial pressure.

Recognizing Neurological Deficits

A new neurologic deficit developing after the patient awakened from the operation with a normal examination.

Deficits can be graded as:

- 0 = no muscular contraction
- 1 = a barely detectable flicker or trace of contraction
- 2 = active movement with gravity eliminated
- 3 = active movement against gravity
- 4 = active movement against gravity and resistance
- 5 = normal.

A significant improvement in paraplegia or paraparesis defined as an improvement of at least two motor grades.
Delayed Neurologic Deficit Management

**C**SF Drain Status
- Malfunction
  - Replace Drain
- Normal

**O**xygen Delivery
- Low?
  - 1. $O_2$ sat
  - 2. Hgb: $>10$ mg/dl
  - 3. CI: $>2.5$ L/min/BSA

**P**atient Status
- Assess
  - 1. Mean BP: $>90$ mmHg
  - 2. SCPP: $>80$ mmHg (MAP-CSFP)
  - 3. Cognitive Status: Bloody CFS?

1. Patient Flat
2. Drain pressure $<5$mmHg
3. Drain for 7 days

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Lumbar Drain Removal & Monitoring

• MD/NP/PA to remove drain in sterile fashion
• Site inspected and covered with 2x2 and clear occlusive dressing
• Patient to lay flat with spine aligned for 2-4 hours
• Monitor for headache due to continued CSF leak
• Notify CV anesthesia if symptoms do not resolve
References
