

CSF access devices (implantable)

Last updated: April 10, 2019

Number of devices are available:

OMMAYA® reservoir - indwelling ventricular catheter connected to reservoir that is situated under scalp.

LEROY device.



OR equipment

Stealth navigation

O-arm

Endoscope

INDICATIONS

- need for chronic access to intrathecal space (usually ventricular system)

1. **Intrathecal chemotherapy:**

- for CNS neoplasms (incl. carcinomatous meningitis, CNS lymphoma or leukemia)
- prophylactic (absence of CNS involvement) because of high relapse rate in CNS: acute lymphoblastic leukemia, lymphoblastic lymphoma, Burkitt's lymphoma

2. **Intrathecal antibiotics** (for chronic meningitis)

3. **Chronic CSF removal** (infants with intraventricular hemorrhage – patients too small for shunting)

4. **Fluid aspiration** from chronic tumor cyst that is resistant to therapy (radiation or surgery)

PROCEDURE DETAILS

- optional equipment: endoscope, O-arm or C-arm (to verify position of ventricular catheter), neuronavigation system
- anesthesia: endotracheal general (local for patients too ill to tolerate general)
- position: supine, head midline, neck flexed 5°.
- incision:
 - inverted "U", slightly larger than reservoir (original Ommaya® reservoir is 3.4 cm diameter)
 - in right frontal region, unless indicated otherwise (e.g. for tumor cyst).
 - center incision over Kocher's point
 - circle of pericranium of diameter equal to that of reservoir is excised and saved or pericranium may be flapped separately in opposite direction (i.e. right-side-up "U"), and closed over reservoir to help secure it in position.
- burr hole over coronal suture 3 cm off midline; make hole small enough but also large enough not to deflect catheter.
- cruciate dura incision - large enough to visualize cortical surface
- minimal cortical bipolar coagulation → pial/cortical incision (avoid surface vessels)
- trajectory is towards a point intersecting plane 2 cm anterior to EAM aiming minimally towards midline (1-2°).
 - alternatively, aim perpendicular to skull surface
 - may inject 5-20 ml of filtered air into ventricles with ventricular needle - will guide catheter tip with intra-operative lateral skull x-rays (intraoperative pneumoencephalogram).
- total length of 7.25 cm of catheter is fixed (2-0 silk tie) to base of reservoir - allows catheter to lie on floor of anterior horn of lateral ventricle in most adults.
 - Strongly consider **intraoperative positioning aids** (pneumoencephalography / ventriculocopy / O-arm) to ensure that all catheter **perforations lie within ventricular compartment**
 - N.B. do not advance too far into 3rd ventricle (chemotherapy injection → severe nausea)
- excised pericranium is placed over dura, and **reservoir is sutured to pericranium** (i.e. reservoir sits in subgaleal pocket)
 - Note: dome of original Ommaya® reservoir has low resistance - may be easily collapsed if too much tension is placed on overlying scalp.
- reservoir is tested to insure function and remove air.
- fill bed with vancomycin powder and close pericranium, then scalp.
- patient may go to CT scanner intubated to verify catheter position.
- reservoir can be used immediately;
 - if early use of reservoir is desired (i.e. within 48 hrs post-op), skin closure should be performed with running nonabsorbable suture (e.g. nylon) and coated with collodion; surgical site can then be left without gauze dressing for easier access to reservoir.
- skin tattoo** can be created over reservoir center (to assist in localizing) using India ink and pricking skin with sterile needle. Dr. Ommaya requests to puncture each time different part of dome (by o'clock positions).

RESERVOIR PUNCTURE

- scalp is prepped with antimicrobial scrub, and using sterile technique, **25G or smaller butterfly non-coring needle** is introduced at oblique angle.
- original Ommaya® reservoir has firm plastic bottom surface which can be penetrated if too much force is applied.