

## CSF access devices (implantable)

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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)

- 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
- Intrathecal antibiotics** (for chronic meningitis)
- Chronic CSF removal** (infants with intraventricular hemorrhage – patients too small for shunting)
- 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 / ventriculography / O-arm) to ensure that all catheter **perforations lie within ventricular compartment**
  - N.B. do not advance too far into 3<sup>rd</sup> 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.