INDICATIONS

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

1. Intrathecal chemotherapy:
   a) for CNS neoplasms (incl. carcinomatous meningitis, CNS lymphoma or leukemia)
   b) 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)

- preop: 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: help coronal suture 3 cm off midline; make hole small enough but also large enough not to deflect catheter.

  - craniate dura incision - large enough to visualize cortical surface

  - minimal cortical bipolar coagulation – pica/cortical incision (avoid surface vessels)

  - trajectory is towards a point intersecting plane 2 cm anterior to EAM aiming minimally towards midline (T2-3)

  - 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 / ventriculoscopy / 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 early wound healing.

  - 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 pricked 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.