**SUPPLEMENTAL CONTENT 1**

*Description of technique - modified lateral hemispherotomy*

Following administration of general anesthesia patients are positioned supine with a shoulder roll and their head rotated 90 degrees with slight extension in a headholder with pins (a gel donut is used for children under 2 years). The hair is parted or minimally trimmed at the site of the incision and the skin is infiltrated with bupivacaine with epinephrine. A T-shaped incision is fashioned extending from just superior to the root of the zygoma to the superior temporal line, and from the anterior hairline to the mid-parietal region. A subgaleal dissection is performed while leaving the temporalis muscle attached. The interfascial technique1 is used to preserve the nerve to the frontalis: the superficial layer of temporalis fascia is incised from the zygoma root to the keyhole region and reflected anteriorly with the rest of the scalp. Small burrholes are made at the temporal fossa and superior posterior parietal region (for eventual drain placement) to provide epidural access for an osteoplastic craniotomy. The temporalis muscle and fascia posterior to the temporal burrhole are cut in line with the eventual craniotomy, leaving the anterior-inferior origin of the temporalis muscle intact. A high-speed drill is used to create the craniotomy which is low in the middle fossa, and extends to the superficial temporal line superiorly. The temporalis muscle anteriorly is dissected off the bone in the region of the anterior-inferior portion of the craniotomy (leaving the insertion at the superior temporal line intact) to allow for propagation of the craniotomy cuts underneath the temporalis muscle. The osteoplastic craniotomy flap is then cracked and reflected anteriorly and inferiorly. The sphenoid wing can be trimmed down if necessary, but a completely flat sphenoid wing is not necessary. Dural tack-up sutures are used as needed to control epidural bleeding but are not routine. The dura is opened in a U-shaped fashion based anteriorly and the edges of the dural exposure are reflected with suture.

The hemispherectomy is achieved by the following steps: 1) removal of a block of opercular tissue which incorporates the insula and some of the basal ganglia and thalamus (providing both removal of the insula and exposure of the ventricular system); 2) temporal lobectomy; 3) complete corpus callosotomy; 4) a frontal disconnection separating the frontal lobe from residual deep brain and midbrain; and 5) a posterior disconnection separating the parietal and occipital lobes from the deep brain and midbrain.

Prior to initiating the necessary resections and disconnections, the middle cerebral artery is sacrificed. This allows for reduced operative time and minimizes blood loss. The pia-arachnoid over the frontal and temporal opercula and Sylvian fissure are opened to expose the proximal M2 branches just distal to the horizontal segment of the MCA. These are cauterized and cut. The next step is removal of the opercular block of tissue lateral to the lateral ventricle. The cortisectomy is initiated over wherever the ventricle is easiest to locate, usually in the frontal or temporal regions. Using the ventricle as a landmark, the cortisectomy is then extended circumferentially such that the frontal horn, temporal horn, and atrium of the ventricle are exposed. A small cottonoid is used to temporarily occlude the foramen of Monro to prevent the egress of blood products and debris into the rest of the ventricular system. The opercular opening over the Sylvian fissure (through which the MCA branches were sacrificed) completes the ring-like opening in the cortex extending to the ventricle. By gently retracting this opercular tissue and insula anteriorly, a parasagitally oriented cut is made 5 – 10 mm lateral to the choroidal fissure (through the basal ganglia and thalamus). Care is taken to minimize retraction on this tissue prior to removal to prevent traction on the deep brain and brainstem. Because the lenticulostriate blood supply is intact, the remaining stump of deep brain requires some attention for hemostasis but this bleeding is controllable with bipolar electrocautery, irrigation, and gentle pressure with a cottonoid without the need for hemostatic material.

A standard temporal lobectomy is then performed. Since the MCA is sacrificed, the temporal neocortical tissue is removed rather than disconnected. This is done to avoid a large territory infarct with potential for significant inflammatory or mass effect in the postoperative period. The operating microscope is utilized for resection of the mesial temporal structures. The microscope is then directed superiorly and the callosotomy is initiated at the junction of the septum pellucidum with the roof of the ventricle at the midportion of the callosum. Gentle suction is used to section the callosum and expose the interhemispheric fissure which is used as a landmark to complete the callosotomy anteriorly and posteriorly. The earlier removal of the opercular block of tissue allows for the callosotomy to be performed with minimal brain retraction. The frontal disconnection is then performed by sectioning the remaining white matter tracts extending from the frontal lobe to the deep brain structures. This cut is made as posteriorly as possible to avoid leaving connected mesial frontal tissue, while avoiding the hypothalamus. It is useful to create a trough several millimeters wide to allow for better visualization utilizing the exposed posterior extent of the rostrum and arachnoid over the anterior cerebral artery as a landmark (Figure 1). This disconnection is extended medially to grey matter or interhemispheric fissure and inferiorly to the Sylvian fissure and floor of the anterior cranial fossa. The posterior disconnection is then performed by sectioning the remaining white matter connecting the parietal and occipital lobes to the deep brain. This is done by making a coronally-oriented cut, sectioning from the base of the splenium to the posterior aspect of the hippocampectomy. The cut extends medially to the grey matter or pia-arachnoid overlying the incisural space. The resection cavity is irrigated with copious amounts of saline. The exposed choroid is cauterized. A ventricular catheter is placed in the resection cavity (subdural space which communicates directly with the exposed ventricle), and tunneled out the parietal burrhole. The cavity is irrigated with copious amounts of saline until the fluid is clear. The dura is closed with running 4-0 braided nylon suture. The bone flap is replaced with rigid fixation. The scalp is closed in anatomic layers using absorbable suture. An MRI is obtained on the first postoperative day to confirm the disconnections. The ventricular drains are left open at 10 cm above the ear for the first 48 hours. Following that, the drains are raised as tolerated to 20 cm, usually over 1-3 days, then clamped and removed if there are no signs or symptoms within 24-48 hours of clamping. If there are concerns of hydrocephalus, repeat imaging is obtained, but this is not routine. If weaning of CSF drainage is not tolerated, the period of CSF drainage is extended for at least 3 days after which the patient is again challenged by elevating and clamping the drain. If there is no evidence of a decreased need for CSF diversion at this point the options of continued attempts at weaning the drain versus shunt placement are discussed with the patient and family. Variables considered at that time include the diminishing returns with continued attempts, the appearance and cell counts of the CSF, and the patients particular signs and symptoms.

**1.** Yasargil MG, Reichman MV, Kubik S. Preservation of the frontotemporal branch of the facial nerve using the interfascial temporalis flap for pterional craniotomy. Technical article. *J Neurosurg.* Sep 1987;67(3):463-466.