

BACKGROUND

The contralateral transfalcine approach can address select lesions near the interhemispheric fissure. No study defines the maximal lateral or superior limits contralateral hemisphere exposure once the falx has been removed. Thus, this anatomical study aims to define the maximal superior and lateral limits of exposure using contralateral transfalcine approach.

MATERIAL AND METHODS

- 10 embalmed latex injected specimens dissected and measured
- Parasagittal craniotomies and interhemispheric approaches in the anterior, middle, and posterior-thirds of the interhemispheric fissure in all specimens
- Specimen was placed in a hypothetical lateral position. For all approaches, the side ipsilateral to the hypothetical lesion was superior
- Rectangular falcine incision was made and, superiorly, it was carried as far as possible under direct visualization
- Superior point of visualization of the contralateral cortex was marked
- Contralateral hemisphere was resected as lateral as possible from the superior point of visualization down to the axial level of the corpus callosum
- Distance between the most superior point of visualization of the contralateral hemisphere and the most superior point of its cortex, and the distance between the midline and the lateral limit of visualization at the level of the corpus callosum were measured in millimeters (mm)
- Illustrative cases are reviewed

RESULTS

- Anterior-third of the interhemispheric fissure
 - Superior limit of visualization
 - 4.8 mm (2-7 mm)
 - Lateral limit of visualization
 - 22.9 mm (18-38 mm)
- Middle-third of the interhemispheric fissure
 - Superior limit of visualization
 - 9.7 mm (7-14 mm)
 - Lateral limit of visualization
 - 22.4 mm (16-31 mm).
- Posterior-third of the interhemispheric fissure
 - Superior limit of visualization
 - 12.6 mm (8-15 mm)
 - Lateral limit of visualization
 - 21.3 mm (17-28 mm)

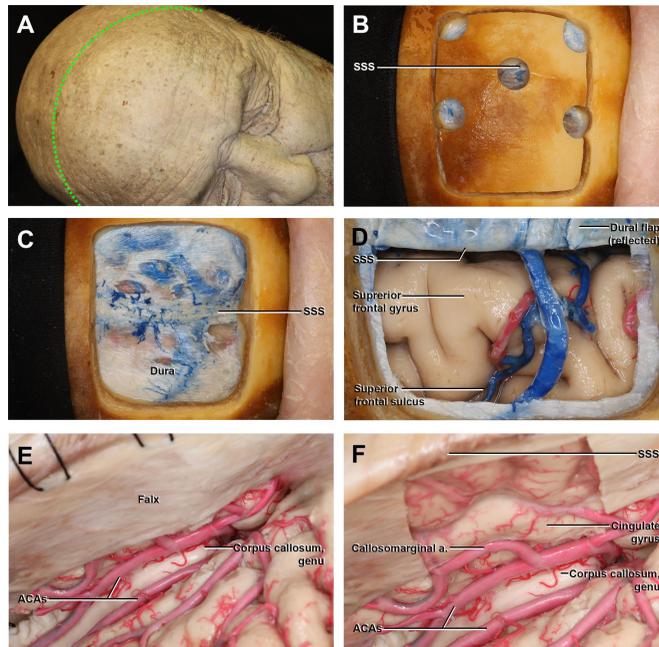
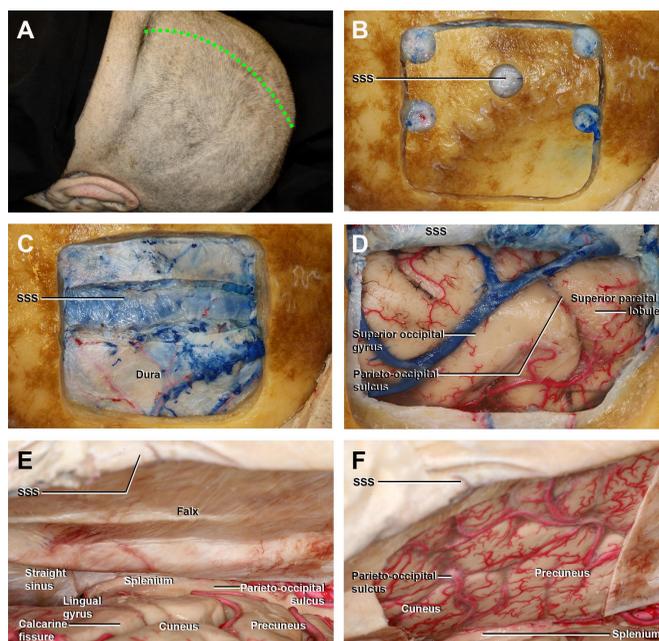
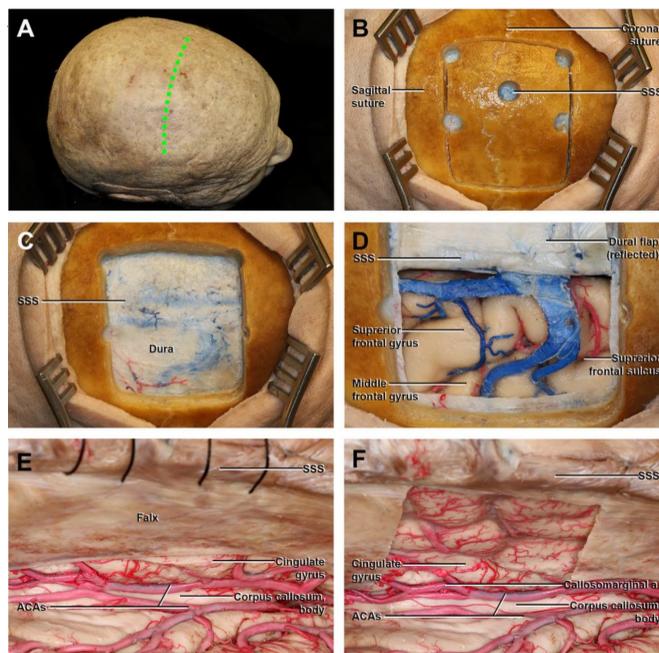


Figure 1. Interhemispheric approach: anterior-third. **A-** Positioning and skin incision. The specimen is placed in the simulated lateral position with the side of the hypothetical lesion up. The vertex of the head is angled 45-degrees upwards to simulate maximal gravitational retraction of the down hemisphere. **B-** Burr holes and craniotomy. A craniotomy centered at the midpoint between the glabella and the coronal suture is then performed. **C-** Dural exposure. The contralateral dura, the full width of the SSS, and approximately 1-2 cm of the contralateral dura should be exposed. **D-** Dural reflection medially. **E-** Dissection of the interhemispheric fissure until the genu of the corpus callosum is reached. **F-** Falcine incision. The falx is resected, and the contralateral hemisphere is resected as lateral as possible from the most superior portion of the exposure down to the genu of the corpus callosum (resection of cortex not pictured).



Figures 2 (above) & 3 (below). Interhemispheric approaches in the middle and posterior-thirds. The craniotomies, interhemispheric dissections, falcine resections, and contralateral measurements proceed in a similar fashion as in the interhemispheric approach in the anterior-third. One can appreciate, however, that the trajectories of the approaches aim toward the body (middle-third) and splenium (posterior-third) of the corpus callosum rather than its genu. It is also clear that the SSS progressively increases in width the more posterior the approach is along the interhemispheric fissure. The draining veins entering the SSS are most numerous in the middle-third of the interhemispheric fissure.

Abbreviations: A. = Artery; ACAs= Anterior cerebral arteries; SSS= Superior sagittal sinus.

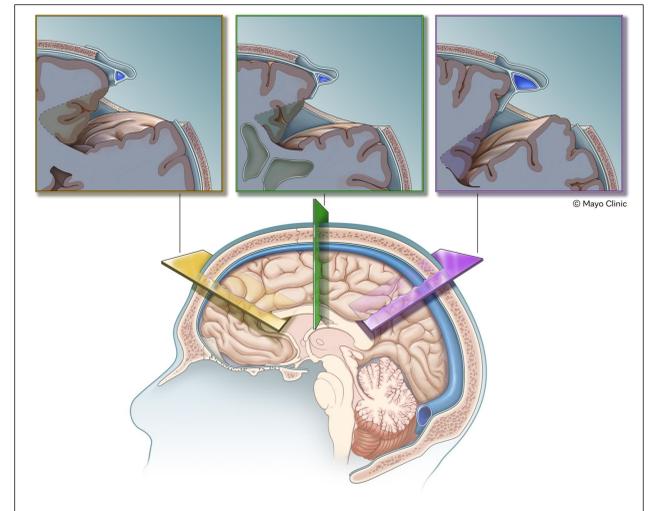


Figure 4. Illustration depicting the lateral and superior limits of visualization at the anterior (yellow), middle (green), and posterior (purple) thirds of the interhemispheric fissure when the contralateral transfalcine approach is utilized. As one can appreciate, the more posterior along the interhemispheric fissure that the approach is, the larger the SSS becomes and, thus, the superior extent of visualization progressively decreases.

| | Anterior-third | Middle-third | Posterior-third |
|--|----------------|--------------|-----------------|
| Superior point of visualization | 4.8 (2-7) | 9.7 (7-14) | 12.6 (8-15) |
| Lateral point of visualization (corpus callosum) | 22.9 (18-38) | 22.4 (16-31) | 21.3 (17-28) |

Table 1. Superior and lateral limits of exposure using the contralateral transfalcine approach in the anterior, middle, and posterior-thirds of the interhemispheric fissure. All distances represent millimeters.

ILLUSTRATIVE CASE

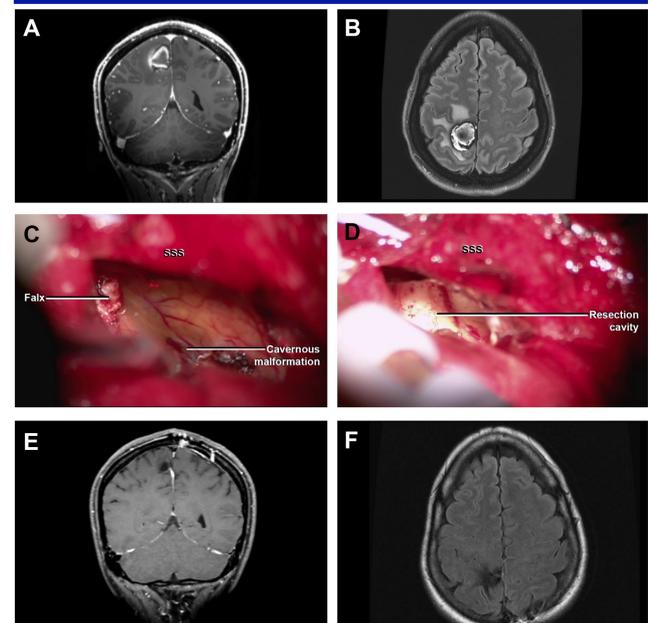


Figure 5. Illustrative case. **A-** Preoperative coronal T1-weighted magnetic resonance image with contrast demonstrating a heterogeneously enhancing mass in the right primary sensory cortex. The lesion extends 22 mm lateral to midline and its most superior portion is 12 mm below the most superior aspect of the cortex. The lesion presents closest to interhemispheric surface of the brain. **B-** Preoperative axial T2-weighted FLAIR magnetic resonance image demonstrating substantial edema surrounding the lesion. **C-** Intraoperative image looking the contralateral (right) mesial frontal lobe after a left sided interhemispheric dissection and resection of a falcine window. **D-** Resection cavity after complete resection of the cavernous malformation. **E&F-** Postoperative coronal T1 and axial FLAIR magnetic resonance images at three-month follow-up demonstrating total resection of the lesion.

Abbreviations: SSS= superior sagittal sinus.

CONCLUSIONS

Using the contralateral transfalcine approach, the superior limit of visualization of the contralateral hemisphere is approximately 10 mm inferior to the superficial aspect of its cortex. The lateral reach afforded is approximately 20 mm lateral to midline at the depth of the approach. The more posterior the approach is along the interhemispheric fissure, the more limited the superior and lateral accesses to the contralateral hemisphere are due to the increasing caliber of the superior sagittal sinus.