Transcallosal Interforniceal Approach to the Third Ventricle: The Road Less Traveled

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Introduction
Surgical resection of third ventricular masses can be technically challenging as access requires traversing key neurovascular structures. While the optimal approach is still heavily debated, microsurgical approaches provide adequate space for bimanual resection techniques. Though previously criticized for producing memory deficits, the transcallosal interforniceal approach (TIA) provides a central route into the third ventricle while sparing critical surrounding structures.

Methods
Chart Review
We retrospectively analyzed fourteen patients, including eight males and six females, who underwent transcallosal interforniceal resection of sixteen third ventricular tumors. All tumors were confirmed as residing in the third ventricle by MRI. Memory deficit was assessed with immediate recall and recall of objects 3-5 minutes later and patients were evaluated using the modified Rankin scale.

Surgical Technique
After exposing the corpus callosum within the interhemispheric fissure, a small 2-cm callosotomy is made at the midline. This is dissected down until it is possible to visualize the ependyma of the lateral ventricle. A right-sided entrance to the lateral ventricle is confirmed by identification of the septum, thalamostriate vein, and choroid plexus. A septostomy is created at the most superior margin of the septum where it meets the corpus callosum. This allows entry into the left ventricle, which is followed by identification of the left choroidplexus along the ventricular floor.

The microscope is then aimed in an anterior to posterior direction until it is possible to visualize the posterior aspect of the corpus callosum. After identifying the leaflets of the septum pellucidum and visualizing both fornixes, the fornices are gently spread using a microburette spread technique. The lateral position provides beneficial gravity assistance during foraminal spread. This allows visualization and entrance into the tela choroidea. It is then possible to visualize both internal cerebral veins and the arachnoid forming the roof of the posterior third ventricle, dissection of which allows entrance into the third ventricle (Figure 3).

Results
The average age at surgery was 35.75 years. Average post-operative stay was 11.3 days (range: 2 days–61 days), and average follow-up was 6.5 months (range: 0 months–35 months). Pathologic diagnosis included eight colloid cysts, two World Health Organization (WHO) grade II astrocytomas, two WHO grade III astrocytomas, one papillary tumor of the pineal region, one central neurocytoma, one ependymoma, and one glioneuronal tumor. Ten tumors were located in the anterior region, two in the middle region, and four in the posterior region of the third ventricle. Gross total resection was achieved in ten cases, near-total resection in one case, and subtotal resection in five cases. Average modified Rankin score following surgery was 0.5 (range: 0–3). Complications included two cases of supplementary motor area syndrome, one case of minor short-term memory, and one case of panhypopituitarism.

Discussion
The TIA was used for resection of both cystic and solid tumors located in the anterior, middle, and posterior compartments of the third ventricle, indicating that the surgeon is capable of achieving gross total resection in both the anterior and posterior compartments. This is the largest reported series of colloid cysts resected utilizing this approach. Our results indicate that TIA can be utilized for the resection of both cystic and solid tumors throughout the third ventricle with optimal tumor access and good neurological and cognitive outcomes. With proper patient selection and a high level of surgical familiarity, this approach does not significantly increase the risk of memory deficit when compared to other approaches.