Anterior third ventriculostomy: an endoscopic variation on a theme

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Some anatomical features pertaining to the fenestration site of endoscopic third ventriculostomy (ETV) identified preoperatively or intraoperatively might deter one from utilizing ETV as a treatment alternative. Relevant situations include scarred subarachnoid spaces, reduced dimensions of the prepontine cistern, and an aberrant position or shape of the basilar apex and tributaries. There currently exists some evidence indicating that these features do have real or perceived importance.1–3,6 The benefit in treating noncommunicating hydrocephalus with ETV compared with shunt placement, however, may sometimes prompt the neurosurgeon to offer this alternative in suboptimal situations. We have recently described a successful methodology for performing ETV in patients having the relative contraindication of a diminished prepontine interval.6 When endoscopic observation reveals diffuse opacity of the subarachnoid space, Dr. Oertel and colleagues4 have explored using a site other than the tuber cinereum for CSF diversion. In feasibility studies in cadavers and subsequent treatment in a limited number of patients, the lamina terminalis (LT) was used as an alternate site for ETV fenestration. With a microsurgical subfrontal approach, this method of CSF diversion was effectively utilized more than 40 years ago at Cornell University by Drs. Patterson and Bergland.5 Thus, conceptually, the use of the LT for CSF diversion is sound. The current authors, a highly qualified and experienced group of endoscopic neurosurgeons, have now explored the potential use of an endoscopic transventricular route for fenestrating the LT. They conclude that the method is safe and effective. While that conclusion is reasonable, some elaboration would be valuable.

As pointed out by Oertel and colleagues,4 the optimal surgical trajectory is different for performing ETV using the tuber cinereum or LT. Correcting the trajectory at the time of surgical intervention is potentially harmful. Thus, the ability to preoperatively differentiate candidates would be beneficial. While MR imaging is useful in assessing the environment of the prepontine cistern, the location of the basilar artery, and the relative position of the mamillary bodies, no reliable method short of cisternography exists for assessing the subarachnoid spaces. Regardless of the trajectory, some anatomical structures remain at risk using the described technique, including the column of the fornix, the optic chiasm, and some tributaries of the anterior cerebral circulation. For a more accurate assessment of potential morbidity using this anterior variant of ETV, a larger experience is required, ideally incorporating formal postoperative visual field testing and neurocognitive testing.

Even though my preference in nearly all intraventricular endoscopic surgeries is a solid lens endoscope, this device may be suboptimal for performing a transventricular fenestration of the LT. This limitation is governed by restricted excursions of the endoscope in an anterior direction by the anterior commissure and the anterior column of the foramen (Figs. 1–3). Although some compensation with a more posterior entry site may be possible, the posterior boundaries of the foramen of Monro may be limiting.

The authors advocate the described approach when the subarachnoid space below the third ventricular floor is opaque or severely scarred. It is not clear why processes that result in subarachnoid scarring (that is, meningeal...
infection or subarachnoid hemorrhage) would be limited to the prepontine cistern and not affect the interhemispheric subarachnoid space and suprachiasmatic cisterns. It is thus important to note that in some situations ETV failure will not be avoided by altering the site of communication between the intra- and extraventricular compartments. It is also important to avoid misinterpreting the membrane of Liliequist as scarred subarachnoid space once the third ventricular floor is opened. Blunt dissection through this membranous opacity is thus sometimes required for definitive clarification.

Endoscopic third ventriculostomy in treating patients with noncommunicating hydrocephalus should always be advocated when deemed appropriate and safe. The technique of ETV is evolving into a procedure that can be modified depending on certain features that would normally prevent patients from being ideal candidates. Dr. Oertel and colleagues have offered a variation on a past theme that might offer the surgeon an alternative if fenestrations at the tuber cinereum is less than ideal. The true safety and efficacy of this approach will only be known with wider use and more detailed postoperative assessment.

**References**


**Response**

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We thank Dr. Souweidane for his careful comments on our paper “Endoscopic third ventriculostomy through the lamina terminalis.” Standard ETV at the floor of the third ventricle to the prepontine cistern represents the gold-standard surgical “treatment for almost any form of obstructive hydrocephalus.” This procedure is a safe, highly reliable endoscopic operation with a low complication rate. It can almost always be successfully accomplished via the standard route including opening of the Liliequist membrane in all cases indicated (that is, all cases when it is present as an intact membrane). Thus, the immediate need to look for an alternative site for opening the third ventricle to the subarachnoid space is rather moderate. Nevertheless, almost all larger series on ETV include individual cases in which a standard ETV could not be accomplished.

The LT represents such an alternative site for ventriculostomy. Theoretically, the opening can be performed from anteriorly or from within the ventricle. Microsurgical opening of the LT from anteriorly is a well-described alternative in the treatment of obstructive hydrocephalus if a standard ETV is not feasible for whatever reason. With the arteries of the anterior circulation, including both A1 segments, the anterior communicating artery, and both A2 segments, as well as all perforators under direct view and the standard microsurgical bimanual technique available, this procedure appears safe. In contrast, the endoscopic opening from the intraventricular to the subarachnoid space as described in our paper harbors a potentially higher risk of injury to the vessels of the anterior circulation because they are not under direct view during perforation of the LT. Thus, in cases in which difficulties with the standard ETV are expected preoperatively, the authors rather prefer opening the LT by using microsurgical techniques anteriorly since this technique is well established and its surgical risk is low. Having said that, the new technique of endoscopic opening of the LT intraventricularly will be reserved for cases in which anatomical findings at the tuber cinereum during the procedure itself prohibit a successful standard third ventriculostomy. In this instance, the described technique might be a very valuable addition to the neurosurgical armamentarium in bringing such a procedure to a successful end. In any case, future investigations must evaluate the best surgical strategy (that is, application of a flexible endoscope to avoid forrnical contusion versus rigid rod-lens scopes for better surgical view taking forrnical contusion into account) and the success rate as well as the complication rate of this procedure before it can be considered a true alternative to standard ETV or microsurgical opening of the LT anteriorly.

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