Endoscopic septum pellucidotomy

The septum pellucidum is a bilateral thin membranous structure representing the border between the frontal horns of the lateral ventricles. Its most examined components are the septal veins due to their surgical importance during endoscopic septum pellucidotomy (ESP), which is a well-accepted method for surgical treatment of unilateral hydrocephalus. It is widely accepted that the septum pellucidum contains nerve fibers as well, but interestingly, no anatomical study has been addressed to its neural components before. The aim of a study of Barany et al. from the Department of Anatomy, Histology, and Embryology, Semmelweis University, Budapest, Hungary. Department of Neurosurgery, Katharinenhospital, Friedrich-Alexander University Erlangen, was to identify these elements as well as their relations to the septal veins and to define major landmarks within the ventricular system for neurosurgical use.

Nine formalin-fixed human cadaveric brains (18 septa pellucida) were involved in this study. A central block containing both septa pellucida was removed and frozen at -30°C for 2 weeks in 7 cases. The fibers of the septum pellucidum and the adjacent areas including the venous elements were dissected under magnification by using homemade wooden spatulas and microsurgical instruments. In 2 cases a histological technique was used to validate the findings of the dissections. The blocks were sliced, embedded in paraffin, cut in 7-µm-thick slices, and then stained as follows: 1) with H&E stain, 2) with Luxol fast blue combined with cresyl violet, and 3) with Luxol fast blue stain combined with Sirius red.

The septum pellucidum and the subjacent septum verum form the medial wall of the frontal horn of the lateral ventricle. Both structures contain nerve fibers that were organized in 3 groups: 1) the precommissural fibers of the fornix; 2) the inferior fascicle; and 3) the superior fascicle of the septum pellucidum. The area directly rostral to the postcommissural column of the fornix consisted of macroscopically identifiable gray matter corresponding to the septal nuclei. The histological examinations validated the findings of the authors' fiber dissections.

The nerve elements of the septum pellucidum as well as the subjacent septum verum were identified with fiber dissection and verified with histology for the first time. The septal nuclei located just anterior to the fornix and the precommissural fibers of the fornix should be preserved during ESP. Considering the venous anatomy as well as the neural architecture of the septum pellucidum, the fenestration should ideally be placed above the superior edge of the fornix and preferably dorsal to the interventricular foramen [1)].

1)
Barany L, Meszaros C, Ganslandt O, Buchfelder M, Kurucz P. Neural and vascular architecture of the septum pellucidum: an anatomical study and considerations for safe endoscopic septum pellucidotomy. J Neurosurg. 2019 Aug 2:1-10. doi: 10.3171/2019.5.JNS19754. [Epub ahead of print] PubMed PMID: 31374555.