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Epidemiology and Pathology of Intraventricular Tumors

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Intraventricular tumors present a diagnostic challenge to the clinician because of a broad differential diagnosis with significant variability in tumor type between adult and pediatric populations. This expansive differential diagnosis includes choroid plexus papillomas and carcinomas, ependymomas, subependymomas, subependymal giant cell astrocytomas, central neurocytomas, meningiomas, and metastases as well as a number of cysts, inflammatory lesions, and other rare neoplasms. Posterior fossa ependymomas, subependymal giant cell astrocytomas, and choroid plexus tumors are more likely to appear in childhood, whereas subependymomas, central neurocytomas, intraventricular meningiomas, and metastases are more frequent in adults. This article reviews the epidemiology, the pathologic characteristics, and the primary diagnostic considerations of each tumor type.

Intraventricular Neurocytomas

Janet Lee, Susan M. Chang, Michael W. McDermott, and Andrew T. Parsa

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Central neurocytomas (CNCs) are World Health Organization II benign central nervous system (CNS) neoplasms first described in 1982 by Hassoun and his colleagues. Hallmark features of CNC include (1) occurrence in the lateral ventricle of young adults, (2) a well-circumscribed isodense to hyperdense mass with contrast enhancement on CT and isointense to hyperintense compared with normal brain parenchyma on T1- and T2-weighted MRI, (3) resemblance to oligodendroglioma on light microscopy, (4) neuronal origin seen in electron microscopy and immunohistochemistry, and (5) favorable prognosis with benign biologic behavior. CNCs comprise 0.1% to 0.5% of all CNS neoplasms based on pathologic review at several neurosurgery centers. A population-based incidence has not been established, in part because of the paucity of cases. Given its recent distinction as a unique tumor and its low incidence, most reports of CNC are from the pathologic literature with little data regarding its management. Furthermore, many early cases of CNC were misdiagnosed, and treatment was based on the presumed diagnosis of oligodendroglioma or ependymoma. Accordingly, this article presents a comprehensive review of the literature and proposes a management paradigm for the treatment of CNC.

Surgical Approaches to Tumors of the Lateral Ventricle
Richard C.E. Anderson, Saadi Ghatan, and Neil A. Feldstein

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Tumors of the lateral ventricles comprise a relatively rare heterogeneous group of lesions in children and adults. They arise from the ependyma and subependyma that line the ventricles, from the choroid plexus arachnoid and epithelium, or from ectopic tissue rests that have become trapped within the ventricle or its lining. Although the lateral ventricles are among the most surgically inaccessible areas of the brain, numerous operative approaches to the ventricles have been developed. This article first discusses the clinical manifestations and differential diagnosis of lateral ventricular tumors. Relevant regional anatomy and general operative strategies for these lesions are then discussed, with particular focus on the following approaches: frontal, temporal, and parietal transcortical approaches and anterior and posterior interhemispheric approaches.

Surgical Approaches to Posterior Third Ventricular Tumors
Alan P. Lozier and Jeffrey N. Bruce

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Advanced microsurgical techniques combined with improved neuroanesthetic and postoperative critical care have made aggressive surgical resection a mainstay in the management of posterior third ventricular and pineal region tumors. Although a variety of approaches to the posterior third ventricle have been designed, three are in common use. The infratentorial-supracerebellar approach takes advantage of a natural corridor between the cerebellum and the tentorium. Supratentorial approaches include the interhemispheric-transcallosal and occipital-transtentorial approaches. Refinements in surgical technique have led to a more favorable outlook for patients with these uncommon tumors.

Endoscopic Adjuncts to Intraventricular Surgery
Sandeep Kunwar

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Recently, endoscopic intraventricular surgery has been performed successfully in several clinical series. Although the therapeutic results must be compared with conventional surgery, neuroendoscopy seems to be a safe surgical technique when performed by surgeons with appropriate experience and refined endoscopic tools. Rigid or flexible endoscopes equipped with various-sized working channels should be selected depending on the nature of the pathologic findings. The well-proven tenets of microsurgery must not be sacrificed for the sake of more rapid surgical time and noninvasiveness; thus, endoscopic surgery must adhere to the principles of microsurgery. The improved visualization and lower morbidity have established neuroendoscopy in the management of specific disease processes, such as obstructive hydrocephalus. Its further use in the management of intraventricular cysts and tumors is dependent on long-term follow-up and the development of even better instrumentation.

Intraventricular Meningiomas
Michael W. McDermott

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Meningiomas arising in the ventricular system are rare; yet, when they do present clinically, they are often large, most often within the atrium, and most frequently on the left. For all these reasons, they are tumors for which it is difficult to achieve the perfect surgical result: complete removal of a benign tumor without complications or new neurologic morbidity. With a thorough understanding of the anatomy of structures around the ventricle, selection of the proper surgical approach, and use of modern neurosurgical techniques, however, modern-day surgical results should be superior to those of the past.

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Intraventricular metastases are a unique challenge for neurosurgical oncologists. This paper describes the clinical features and surgical management strategies of intraventricular metastases based on a review of the literature and an analysis of 35 patients treated in the Department of Neurosurgery at The University of Texas M.D. Anderson Cancer Center over the last 10 years. Intraventricular metastases comprise 0.9–5% of intraparenchymal metastases. Renal cell carcinoma has the highest propensity of all primary tumors to metastasize to the ventricle. The trigone of the lateral ventricular is the most common location with the ventricle for metastases to occur, presumably due to the high concentration of choroid plexus in the region. Despite the deep location, surgical resection can be achieved safely in most cases. The survival of surgically treated patients is comparable to that of patients with intraparenchymal metastases.	
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