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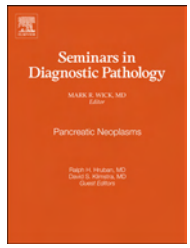

Pseudoneoplasms in the nervous system

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ABSTRACT

Pseudotumors are frequent in the nervous system and form a category of lesions that are fraught with peril for the pathologist unaware of the similarities and differences with neoplasms. The most common pseudoneoplasms in the nervous system are demyelinative, inflammatory and vascular. Even normal histology can be mistaken for neoplasm.

Introduction

A large range of common entities in the central and the peripheral nervous systems simulate neoplasms. These include infectious/inflammatory, demyelinating, vascular, and developmental lesions. Demyelinating disease even has its own terminology for tumor-like lesions (tumefactive). It is always a good idea to know what the radiologic studies show, as this takes the place of the gross examination that we are used to in the other organ systems. In these days of electronic medical records, we frequently can see the imaging for ourselves and read the report. But despite advances in neuroradiology, there is still often some debate about these lesions clinically, ending with a differential rather than a distinct diagnosis. And occasionally, the "slam-dunk" radiologic diagnosis is actually wrong, so it should always be considered as only a possibility by the pathologist. Pseudoneoplasms can be dural (mistaken for meningioma), multiple intra-axial lesions (mimicking metastases), or single-enhancing lesions (with a differential of high-grade glial neoplasms). Two points are important with most of these lesions: (1) what do we mistake it for? and (2) how do we avoid doing that?

Normal/reactive histology

There are a number of areas where normal histology can be mistaken for pathology (sometimes neoplastic), especially on frozen section. Being aware of the type and numbers of cells present in some locations, keeps this from happening. The cerebellum contains a very cellular population of small cells called the internal granular cell layer,[1] that normally makes neuronal rosette-like structures (Fig. 1A). This cellularity and architecture may lead to the incorrect diagnosis of medulloblastoma. The small cells may also be mistaken for lymphocytes, reactive or neoplastic, if we do not remember that they are a normal population there. Unlike astrocytes, oligodendroglial cells normally cluster (Fig. 1B) and should not be confused with tumor. The olfactory nerve and/or bulb are often sampled as a margin in surgeries for olfactory neuroblastoma (esthesioneuroblastoma). Unfamiliarity with the normal level of cellularity (Fig. 2) can lead to the inaccurate assumption of a positive margin with implications for adjuvant therapy. Temporal lobectomies for seizures seldom have unexpected gangliogliomas in them due to high resolution MRI, but we may be misled by the normal neuronal clusters in the transition from the hippocampus into the temporal lobe

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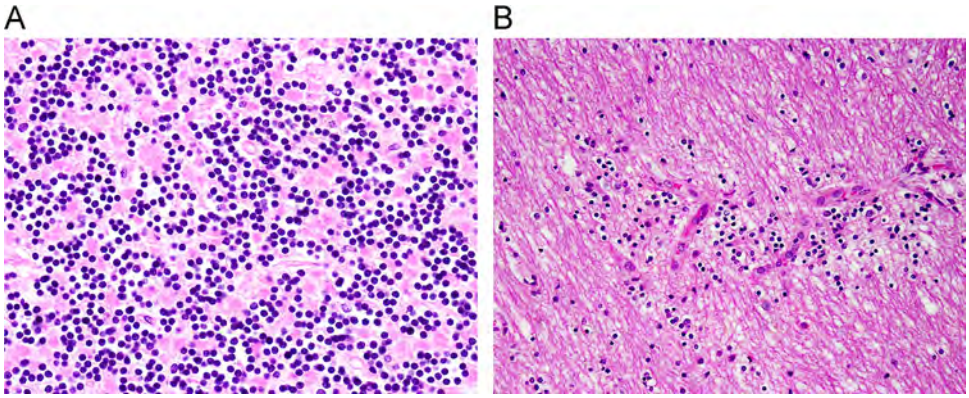

Fig. 1 – (A) These small internal granular cell neurons in the cerebellum normally make neuronal rosettes and make for very cellular-appearing sections and smears intraoperatively. (B) Oligodendrocytes normally cluster and line up along blood vessels. H&E stain, 10 ×.

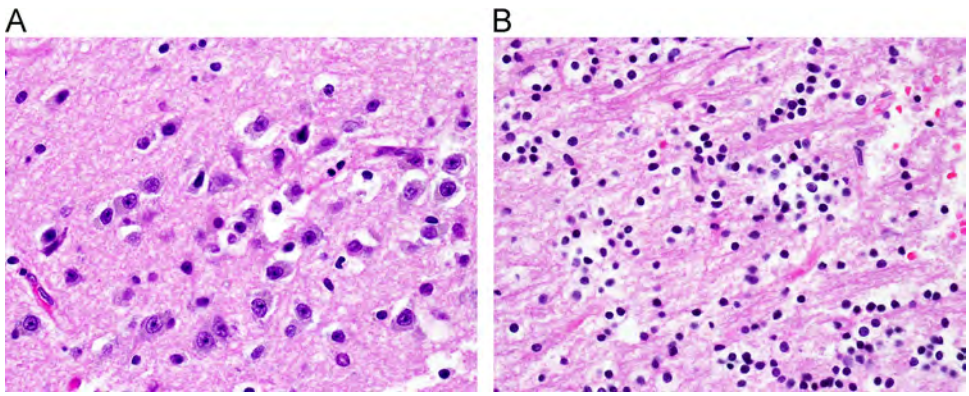

Fig. 2 – Olfactory nerve and bulb have irregular nests of both (A) large and (B) small cells normally. H&E stain, 10 ×.

neocortex (Fig. 3) or the normally large, clustered neurons in the amygdala (Fig. 4) into thinking about neoplasms if we are not familiar with the territory. Dorsal longitudinal ligament from the spine may remind us of sheets of dead cells when cut in cross section (Fig. 5), which is something we have to keep in mind whenever looking at a vertebral (sometimes labeled epidural mass) specimen, particularly when the clinical question concerns a pathologic fracture. Bone dust (Fig. 6A) from the procedure and corpora amylacea (Fig. 6B) can be misconstrued as tumor microcalcifications (Fig. 6C) or psammoma bodies (Fig. 6D); however, they all have slightly different morphology.

Astrocytosis (gliosis) is the nervous system's typical response to injury of all kinds.[2] This consists of a gemistocytic response (Fig. 7) acutely in areas where fibrillary astrocytes reside, which may with time partially resolve leaving a subtle prominence to the fibrillary astrocyte cytoplasm.

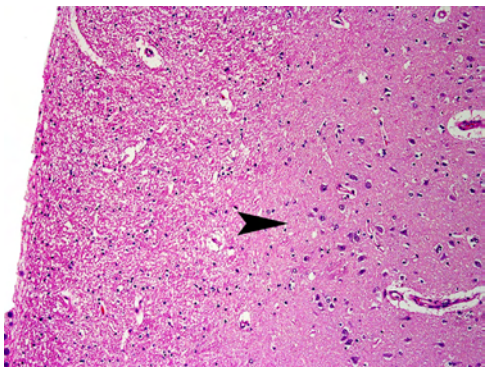

Fig. 3 – Temporal lobe has an area of transition from the three-layered archicortex of the hippocampus to the six-layered neocortex. The transition demonstrates groups of neurons in layer two (arrow), which are not normally seen in that layer anywhere else in the brain. H&E stain, 2 ×.

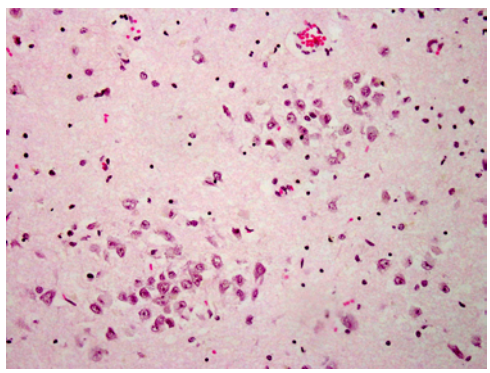

Fig. 4 – Amygdala in the medial temporal lobe always contains clusters of large neurons; both clustering and having so many large neurons would be unusual elsewhere in the peripheral/superficial cerebrum. H&E stain, 4 ×.