



SPECTRUM OF IMAGING CHARACTERISTICS OF INFRATENTORIAL TUMORS IN ADULTS

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ABSTRACT Infratentorial tumors in adults encompass a heterogeneous group of neoplasms with distinct imaging characteristics and varying clinical implications. Accurate radiological characterization is essential for narrowing differential diagnoses and guiding management. **Objectives:** To evaluate the spectrum of imaging characteristics of infratentorial tumors in adults and correlate radiological patterns with probable tumor types. **Methods:** A retrospective observational study was conducted on 20 adult patients with infratentorial tumors who underwent CT and MRI evaluation. Imaging parameters including lesion location, signal characteristics, diffusion restriction, enhancement patterns, perilesional edema, and mass effect were analyzed. **Results:** Metastases were the most common lesions, typically presenting as multiple lesions with ring or heterogeneous enhancement and surrounding edema. Hemangioblastomas demonstrated cystic lesions with an enhancing mural nodule, while astrocytomas showed variable signal intensity and enhancement patterns. Brainstem gliomas exhibited diffuse expansion with T2 hyperintensity and minimal enhancement. **Conclusion:** MRI plays a pivotal role in characterizing infratentorial tumors. Recognition of specific imaging patterns significantly improves diagnostic accuracy and guides clinical management. Early identification of these patterns can facilitate timely therapeutic intervention and improve patient outcomes.

KEYWORDS : Infratentorial Tumors, MRI Brain, Posterior Fossa Tumors, Hemangioblastoma, Metastases, Brainstem Glioma

INTRODUCTION

Infratentorial tumors, involving the cerebellum and brainstem, represent a unique subset of intracranial neoplasms in adults. Due to the confined anatomical space of the posterior fossa, even small lesions can result in significant mass effect, leading to early clinical manifestations such as headache, vomiting, ataxia, and cranial nerve deficits.

Magnetic Resonance Imaging (MRI) is the modality of choice for evaluating infratentorial lesions owing to its superior soft tissue contrast and ability to delineate lesion extent, internal architecture, and relationship with adjacent structures. Computed Tomography (CT) serves as an adjunct modality, particularly useful in detecting calcifications, hemorrhage, and acute hydrocephalus.

The imaging spectrum of infratentorial tumors is diverse, encompassing primary neoplasms such as astrocytomas and hemangioblastomas, as well as secondary lesions like metastases. Identification of characteristic imaging features is essential in narrowing the differential diagnosis and guiding further management.

AIMS AND OBJECTIVES

- To evaluate the imaging characteristics of infratentorial tumors in adults.
- To analyze lesion-specific radiological patterns on CT and MRI.
- To correlate imaging findings with probable tumor diagnosis.

MATERIALS AND METHODS

This retrospective observational study included 20 adult patients diagnosed with infratentorial tumors on imaging.

Inclusion Criteria:

- Patients aged >18 years
- Imaging-confirmed infratentorial neoplastic lesions

Exclusion Criteria:

- Pediatric population
- Non-neoplastic lesions (e.g., abscess, vascular malformations)

Imaging Evaluation:

All patients underwent CT and/or MRI examination. MRI protocol included:

- T1-weighted imaging
- T2-weighted imaging
- FLAIR sequences
- Diffusion-weighted imaging (DWI)
- Post-contrast T1-weighted imaging

The following parameters were evaluated:

- Lesion location (cerebellar hemisphere, vermis, brainstem)
- Signal characteristics
- Diffusion restriction
- Enhancement pattern (homogeneous, heterogeneous, ring enhancement)
- Presence of perilesional edema
- Mass effect and hydrocephalus

RESULTS

Table 1: Distribution of Infratentorial Tumors

Tumor Type	Number of Cases	Percentage
Metastases	7	35%
Hemangioblastoma	5	25%
Astrocytoma	4	20%
Brainstem glioma	3	15%
Others	1	5%

Key Findings

- Metastases were the most common lesions (35%), frequently presenting as multiple lesions with surrounding vasogenic edema.
- Hemangioblastomas (25%) predominantly demonstrated cystic morphology with an enhancing mural nodule.
- Astrocytomas (20%) showed heterogeneous signal intensity with variable enhancement patterns.
- Brainstem gliomas (15%) presented as diffuse expansile lesions involving the pons with minimal enhancement.
- Obstructive hydrocephalus was observed in cases causing compression of the fourth ventricle.

DISCUSSION

The evaluation of infratentorial tumors is primarily dependent on MRI, which enables detailed characterization of lesion morphology, internal architecture, and associated secondary changes.

Metastases, being the most common lesions in this study, typically demonstrate ring or heterogeneous enhancement with surrounding vasogenic edema, a pattern attributable to central necrosis and disruption of the blood-brain barrier. The presence of multiple lesions further supports a metastatic etiology.

Hemangioblastomas are characterized by the classic "cyst with mural nodule" configuration, with the solid component showing intense contrast enhancement. The presence of flow voids on T2-weighted imaging reflects their highly vascular nature and serves as a distinguishing feature.

Astrocytomas exhibit variable imaging characteristics depending on tumor grade. Low-grade lesions generally demonstrate T2 hyperintensity with minimal enhancement, whereas higher-grade lesions may show heterogeneous enhancement and areas of diffusion restriction, reflecting increased cellularity.

Brainstem gliomas are typically diffuse and infiltrative, leading to expansion of the brainstem without a well-defined mass. The relative absence of contrast enhancement helps differentiate them from focal neoplastic lesions.

These findings are consistent with previously described imaging patterns in the literature [1–3], underscoring the importance of recognizing characteristic radiological features for accurate diagnosis and management.

CONCLUSION

Infratentorial tumors in adults demonstrate a broad spectrum of imaging characteristics. MRI serves as the cornerstone in their evaluation, enabling accurate lesion characterization and facilitating differential diagnosis. Familiarity with specific imaging patterns is essential for radiologists to provide clinically relevant and timely diagnoses.

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