Chapter 7

Pediatric tumors

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Although cancer is, overall, rare in childhood, it is the most common natural, nontraumatic cause of death in infants, teenagers and adolescents. Approximately 12 000 children and adolescents are diagnosed with cancer annually in the United States. The most common childhood cancers comprise leukemia (30%), brain tumors (22%), lymphoma (11%), neuroblastoma (8%), soft tissue sarcomas (7%), Wilms tumor (6%), bone tumors (5%) and other (11%). Diagnostic imaging plays a critical role in differentiating benign from malignant lesions as well as staging and re-staging tumor extent in order to plan and monitor the most appropriate stage-adapted therapy.

7A PEDIATRIC BRAIN TUMORS

Jane Kim and Soonme Cha

Introduction

Tumors of the central nervous system comprise the second most common type of pediatric malignancy, accounting for about 20% of all childhood tumors and second only to leukemia in incidence.

The basic approach to evaluating pediatric brain tumors on CT or MRI requires consideration first and foremost of the patient's age and tumor location. Additionally, specific imaging features (such as enhancement pattern, solid vs. cystic components, or hemorrhage and calcification) may help to steer the differential diagnosis.

By location, tumors occur with roughly equal frequency in the supratentorial and infratentorial compartment. Table 7.1 is an overview of the frequency of various types of brain tumors in children, grouped by supra- or infratentorial location. The following discussion will emphasize the most common tumors.

Infratentorial tumors

Medulloblastoma, cerebellar astrocytoma, brainstem glioma and ependymoma are the four most common posterior fossa tumors, and account for approximately half of all pediatric brain tumors.

Table 7.1 Brain tumor frequency in children (under 15 years)

Tumor type by location	Percentage of all brain tumors (%)
Infratentorial	50–55
Medulloblastoma	15–20
Cerebellar astrocytoma	10–15
Brainstem glioma	10–15
Ependymoma	5
Other	2–5
Supratentorial	45–50
Astrocytoma (low grade)	10–20
Astrocytoma (high grade)	5–10
Ependymoma	5
Craniopharyngioma	5
Primitive neuroectodermal tumor	1–2
Ganglioglioma/gangliocytoma	1–2
Oligodendroglioma	1–2
Atypical teratoid/rhabdoid tumor	1–2
Choroid plexus papilloma	1–2
Germ cell tumor	1–2
Pineal parenchymal tumor	1–2
Meningioma	1–2
Dysembryoplastic neuroepithelial tumor	<1
Desmoplastic infantile ganglioglioma	<1
Hemangioblastoma	<1
Pituitary adenoma	<1
Metastases	<1

Percentages are based on several large epidemiological studies, with some variability in tumor frequency among the studies (Gjerris *et al.*, 1998; Rickert and Paulus, 2001; Duffner *et al.*, 1986; Pollack, 1999).

Less common tumors include atypical teratoid/rhabdoid tumor, hemangioblastoma, teratoma and dermoid/epidermoid.

Medulloblastoma

Medulloblastomas are the most common posterior fossa tumors in children, and are highly malignant with a propensity for leptomeningeal dissemination. Medulloblastomas most commonly arise from the vermis in children, while assuming

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