Chapter 14

Intra-axial brain tumors

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Abstract

There is a wide variety of intra-axial primary and secondary brain neoplasms. Many of them have characteristic imaging features while other tumors can present in a similar fashion. There are peculiar post-treatment imaging phenomena that can present as intra-axial mass-like lesions (such as pseudoprogression or radiation necrosis), further complicating the diagnosis and clinical follow-up of patients with intracerebral tumors. The purpose of this chapter is to present a general overview of the most common intra-axial brain tumors and peculiar posttreatment changes that are very important in the diagnosis and clinical follow-up of patients with brain tumors.

INTRODUCTION

Intra-axial brain tumors are responsible for significant morbidity and mortality and include a wide variety of pathologic subtypes with variable biologic aggressiveness. These tumors range from pseudotumoral lesions such as the dysplastic gangliocytoma of cerebellum (Lhermitte–Duclos disease: LDD) to highly malignant and aggressive tumors such as glioblastoma. Despite advances in diagnostic techniques, some of these primary tumors carry a dismal prognosis and limited response to current treatment protocols. The aim of this chapter is to present a general overview of the most relevant intra-axial brain tumors, currently available advanced imaging techniques, and frequently encountered diagnostic imaging problems after treatment of these neoplasms.

EPIDEMIOLOGY

Based on the 2005–2009 Central Brain Tumor Registry in the United States statistical report, glial tumors constitute approximately 29% of all intracranial tumors and 80% of malignant brain tumors (Dolecek et al., 2012). The most common intra-axial glial tumor is glioblastoma (54% of all gliomas; Dolecek et al., 2012). Astrocytomas and ependymal tumors constitute approximately 6.3% and 2.0% respectively of all intracranial tumors. Oligodendrogliomas represent about 1.8% of all intracranial tumors (Dolecek et al., 2012). Lymphoma is responsible for 2.2% of all primary brain tumors. Embryonal tumors constitute the most common histologic type (followed by pilocytic astrocytoma) during early childhood (0–4 years), while pilocytic astrocytoma becomes the most common type in later childhood and early adolescence (5–14 years) (Dolecek et al., 2012). Glioblastoma is the second most common intracranial tumor (after meningioma) in the 55–84-year age groups.

SUBTYPES

Astrocytic tumors

GLIOBLASTOMA (WORLD HEALTH ORGANIZATION (WHO) GRADE IV)

Clinical aspects

This is the most common and lethal primary cerebral neoplasm, responsible for 82% of malignant gliomas (Dolecek et al., 2012; Omuro and DeAngelis, 2013).