7.1 Introduction

The subtemporal approach is historically known as the standard approach for the treatment of tumoral, vascular and inflammatory lesions of the middle cranial fossa, the tentorium, the anterior and middle tentorial incisura, the upper-third of the clivus and the petroclival region.

This approach had been recognized universally for many years as the best way to treat basilar artery (BA) apex, P1 and P2 posterior cerebral artery (PCA) and superior cerebellar artery (SCA) aneurysms until the introduction of the pterional approach in 1976 by Yasargil et al. [1].

Continual advances in surgical anatomical studies of the skull base in the last 15 years have led to the technical evolution of this approach, allowing its extension towards adjacent areas and permitting the development of extended subtemporal approaches, obtained by zygomatic, orbital, temporal or frontotemporoorbital osteotomies and petrous apex resections. Knowledge of the topographic anatomy of the cranial region, where the varying surgical corridors described in this chapter must be prepared, is as fundamental as continual practice by cadaver dissection.

For a more detailed anatomical study of the middle cranial fossa, study of the anatomical works of Rhoton is recommended [2].

The discussion in this chapter of the surgical techniques of the subtemporal approach includes a section describing the anterior subtemporal approach, which can be used to expose the anterior portion of the middle cranial fossa and the anterior and middle incisural space lesions, a section describing the posterior subtemporal approach, which is used to reach lesions of the posterior portion of the middle cranial fossa and the middle incisural space until the conjunction with its posterior portion, corresponding to the ambient cistern, and sections describing variants of the extended subtemporal approach that deal with specific pathologies, their topographic location and their extension from the middle cranial fossa towards adjacent areas.

7.2 Surgical Pathology

7.2.1 Meningiomas

The standard subtemporal approach and its variations are most frequently requested for sphenoidal wing meningiomas, followed by Yasargil’s T1- and T2-type tentorial tumors arising from the inner ring of the tentorium [3] (Fig. 7.1). The subtemporal approach can be used for petroclival meningiomas that do not extend below the upper clivus. For lesions extending above and below the tentorium situated on the tentorial edge or in the petroclival area, only those with a small infratentorial component can be removed by the subtemporal approach.

Meningiomas originating from Meckel’s cave (MC) are uncommon and account for approximately 0.5% of all intracranial tumors and 1% of all intracranial meningiomas. Samii et al. [4] classified these tumors into four distinct types according to extension and involvement.
of the surrounding structures of MC: type I includes tumors mainly confined to MC; type II includes MC meningiomas with major extension into the middle fossa with or without extension to the cavernous sinus (CS); type III includes MC meningiomas with major extension into the cerebellopontine angle (CPA); and type IV includes MC meningiomas with extension both into the middle fossa and into the CP angle with or without infiltration of the CS.

Meningiomas affecting MC may extend in different directions and may therefore show distinct surgical problems.

In the surgical decision-making process, the following factors must be considered: (1) tumor mass extension into the neighboring structures, principally into the CPA and middle fossa; (2) the presence of CS infiltration and carotid artery encasement; (3) typical images of en plaque tumor growing; and (4) petrous apex erosion and involvement of the petrous bone. Cranial nerve (CN) impairment, especially of III, IV and VI CNs, can provide additional information about tumor invasion of the CS [4].

### 7.2.2 Schwannomas

Schwannomas arising from the intracranial portion of the trigeminal nerve are rare, accounting for 0.07–0.33% of intracranial tumors and 0.8–8% of intracranial schwannomas [5]. These tumors may arise from the trigeminal nerve root, the gasserian ganglion (GG), or one of the three peripheral branches, indicating that trigeminal schwannomas may grow into one, two, or all three distinct compartments: the subdural (CPA), interdural (lateral wall of the CS and MC) and epidural or extracranial (orbit, pterygopalatine fossa and infratemporal fossa) spaces. These tumors are often seen extending into multiple cranial fossae: the posterior, middle and infratemporal fossa and the orbit. Yoshida and Kawase classified these tumors into three types in relation to the compartment involved: type M (14.8%) including middle fossa tumors originating from the GG or the peripheral branch at the lateral wall of the CS (Fig. 7.2); type P (18.5%) including posterior fossa tumors originating from the root of the trigeminal nerve; and type E (3.7%) including tumors arising from the ex-

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**Fig. 7.1 a, b** Axial T1-weighted MR images after gadolinium injection show multiple meningiomas with a large right tentorial meningioma in part extending into the lateral incisural space. **c** Same patient. Sagittal T1-weighted MR image after gadolinium injection of the tentorial meningioma. In the frontal region a large frontal meningioma is evident. **d–f** Postoperative axial, sagittal and coronal T1-weighted MR images after gadolinium injection show complete removal of the frontal and tentorial tumors. **g** Intraoperative photograph after tumor removal shows the preserved trochlear nerve; the integral nerve is lifted from the surface of the brainstem, against which it was previously compressed by the tumor. Histological diagnosis: atypical meningioma