Cerebellopontine angle lesions

Epidemiology

Cerebellopontine angle (CPA) lesions account for up to 10% of all intracranial tumors.

Vestibular schwannoma, Cerebellopontine angle meningioma, and Cerebellopontine angle ependymoma account for most.

1. Vestibular schwannoma: (80–90% of CPA lesions)

2. Cerebellopontine angle meningioma: (5–10%);

3. ectodermal inclusion tumors

a) Cerebellopontine angle epidermoid cyst (cholesteatoma): 5–7%. High signal on DWMRI. Tumor passing from the posterior fossa to the middle fossa though the incisura is highly suggestive of epidermoid

b) dermoid

4. metastases

5. neuroma from cranial nerves other than VIII

a) trigeminal neuroma: expands towards Meckel’scave

b) facial nerve neuroma:may arise in any portion of the VIInerve,with a predilection for the geniculate ganglion. Even in these tumors, hearing loss tends to precede facial paresis. Hearing loss may be sensorineural from VIII nerve compression from tumors arising in the proximal portion of VII (cisternal or internal auditory canal (IAC) segment), or it may be conductive from erosion of the ossicles by tumors arising in the second (tympanic, or horizontal) segment of VII. Facial palsy (peripheral) (p. 582) may also develop, usually late c) neurinoma of lowest 4 cranial nerves (IX, X, XI, XII)

6. arachnoid cyst

7. neurenteric cyst: rare. May secrete mucin

8. cholesterol granuloma (distinct from epidermoid)

9. lipoma

10. aneurysm: PICA, AICA, vertebrobasilar

11. dolicho basilar ectasia

12. cysticercosis

13. extension of:

a) brainstem or cerebellar glioma

b) pituitary neuroendocrine tumor

c) craniopharyngioma

d) chordoma&tumors of skull base

e) fourth ventricle tumors(ependymoma,medulloblastoma)

f) choroid plexus papilloma: from 4th ventricle through foramen of Luschka

g) glomus tumor

● glomus jugulare

● glomus tympanicum

h) primary tumors of temporal bone(e.g.sarcoma or carcinoma).

Cystic lesions of the CPA

1. arachnoid cyst: same intensity as CSF on all MRI sequences, homogeneous

2. epidermoid cyst: ★ high signal on DWMRI differentiates this from arachnoid cyst

3. dermoid cyst: high intensity areas on T1WI similar to fat; usually midline

4. cystic schwannoma

5. cholesterol granuloma: ★ ≈ only lesion that is high signal on T1WI (due to blood breakdown products; exception: the rare “white” epidermoid). Also high signal on T2 weighted image. Usually extradural, especially near petrous apex. Bone destruction is common

6. neurenteric cyst: nonenhancing. Low intensity on DWMRI

7. choroidal cyst

8. cysticercosis: enhancing nodule (scolex)

Differentiating neuromas of V, VII and VIII cranial nerves

All 3 of these tumors may present in the CPA and may cross from posterior fossa to middle fossa, but they tend to do so in different manners. Vestibular schwannomas show “transhiatal” extension by passing through the tentorial hiatus medially. Most trigeminal neuromas show “transapicopetrosal” extension by crossing into the middle fossa via the petrous apex (although some show transhiatal extension). When facial neuromas cross, they tend to spread across the midpetrosal bone, which is characteristic for facial neuromas.4 When a facial neuroma enlarges the IAC, unlike a vestibular schwannoma, it tends to erode the anterosuperior aspect of the IAC.

Classification

Cerebellopontine angle lesion classification.

Clinical features

see Cerebellopontine angle syndrome.

CPA tumors are estimated to be the secondary cause for up to 9.9% patients with trigeminal neuralgia.

Diagnosis

Cerebellopontine angle tumor diagnosis

Differential diagnosis

Cerebellopontine angle tumor differential diagnosis

Audiologic evaluation

The most common chief complaint in patients diagnosed with CPA tumors was asymmetrical hearing loss, with most frequent accompanying symptoms being tinnitus in patients with vestibular schwannoma (VS) and dizziness in those with other types of CPA tumor. The most frequent patterns of hearing loss were the descending type in patients with VS and the flat type in patients with non-VS tumors ($p < 0.05$). Pure tone thresholds tended to increase more in patients with VS than non-VS tumors according to tumor size, and pure tone averages were significantly higher in patients with VS than non-VS tumors of 11-25 mm in size ($p < 0.05$) [1].

Cerebellopontine angle tumors in infants and children

A plethora of tumor types occur in childhood at the CPA/CMF and a review indicated 50 % were benign in histology. High rates of lower cranial nerve morbidity were experienced but their dysfunctions were often recovered or compensated in 2 years. However, one should be cognizant of these complications and conduct resection with appropriate surgical approach, intraoperative monitoring, and surgical microscope [2].

Treatment

see Cerebellopontine angle tumor treatment.

Case series

2016

Twenty-four patients with pathologies at the cerebellopontine lesion were studied. General anesthesia was maintained with fentanyl and propofol. A monopolar stimulator was used at amplitudes of 0.05 to 0.1 mA. Both acoustic and visual signals were displayed as vocalis muscle electromyographic activity using endotracheal tube surface electrodes.

The average number of rootlets was 7.4 (range, 5-10); 75% of patients had 7 or 8 rootlets. As many as 6 rootlets (2-4 in most cases) were responsive in each patient. In 23 of the 24 patients, the responding rootlets congregated on the caudal side. The maximum electromyographic response was predominantly in the most caudal or second most caudal rootlet in 79%.

The majority of motor fibers of the lower cranial nerves run through the caudal part of the rootlets at the cerebellomedullary cistern, and the maximal electromyographic response was elicited at the most caudal or second most caudal rootlet [3].

A study included 171 patients with otologic symptoms who were diagnosed with CPA tumors, including 116 with VS and 55 with other types of CPA tumors. Factors analyzed retrospectively included tumor type, size, and location and the results of audiometric examinations.

The most common chief complaint in patients diagnosed with CPA tumors was asymmetrical hearing loss, with most frequent accompanying symptoms being tinnitus in patients with VS and dizziness in those with other types of CPA tumor. The most frequent patterns of hearing loss were the descending type in patients with VS and the flat type in patients with non-VS tumors ($p < 0.05$). Pure tone thresholds tended to increase more in patients with VS than non-VS tumors according to tumor size, and pure tone averages were significantly higher in patients with VS than non-VS tumors of 11-25 mm in size ($p < 0.05$) [4].

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