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Carcinoma metastasis mimicking meningioma. Challenges and doubts

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ABSTRACT

The scientific approach to dural metastases mimicking meningiomas holds significant relevance, as these cases pose considerable challenges to clinicians in routine practice. Differentiating between these two distinct pathologies is critical, particularly when conservative management is considered for patients diagnosed with non-surgical meningiomas. Misdiagnosis in such scenarios can lead to detrimental outcomes for the patient, underscoring the need for vigilant follow-up in cases exhibiting suspicious imaging patterns.

While biopsy could provide definitive diagnosis in uncertain cases, it is often avoided due to its inherent risks, especially in elderly patients and in cases where the meningiomas are located in surgically challenging regions. Consequently, most conservatively managed cases are presumed to be typical meningiomas, and invasive diagnostic measures are typically not pursued unless absolutely necessary [1].

However, carcinomas from various primary sites including the breast, prostate, gallbladder, larynx, and less commonly, Ewing's sarcoma or melanoma can rarely present as dural metastases, especially in the parasagittal convexity [2,3,4]. These metastases can closely mimic meningiomas both clinically and radiologically. A study of 1,000 meningioma cases diagnosed between 2004 and 2010 revealed that 20 (2%) were ultimately found to mimic, with histological diagnoses including gliosarcoma, Rosai-Dorfman disease, hemangiopericytoma, osteosarcoma, medulloblastoma, adenocarcinoma, and nonseminomatous germ cell tumours [5].

Among these, adenocarcinomas are the most common metastatic tumours mimicking meningiomas. These lesions, like meningiomas, exhibit attachment to the dura, a dural tail, and contrast enhancement [6]. Such imaging characteristics can make distinguishing metastatic tumors from meningiomas exceedingly difficult using standard neuroimaging techniques [7,8]. Even intraoperatively, dural metastases can appear identical to meningiomas, complicating diagnosis further [4]. Both conditions may share features such as a solid structure, limited diffusion of water molecules, extensive peritumoral edema, and similar contrast enhancement patterns [9].

The pathways for metastatic spread include arterial and venous routes, particularly via Batson's venous plexus [10]. Cases of cerebrospinal fluid (CSF) dissemination have not been described.

This report describes three cases of dural metastases mimicking meningiomas, with locations including the temporal region, the cavernous sinus, and the cervicothoracic dura.

Keywords
dura,
meningioma,
metastasis,
carcinoma

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Case 1.

41 years old lady with known breast cancer, mastectomy 5 years ago came for headache and MRI revealed a meningioma mimicking temporal lesion.

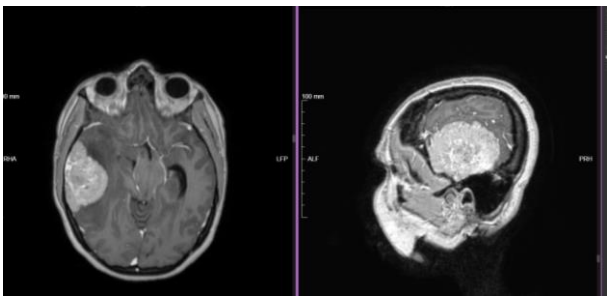

Figure 1. MRI of carcinoma metastasis mimicking meningioma.

She was selected for surgery, it was done complete removal, histological analysis was carcinoma HER2 negative with focal neuro-endocrine differentiations.

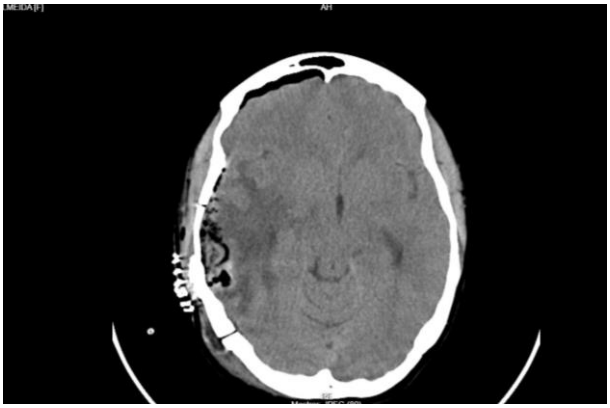

Figure 2. Postoperative CT scan showing total tumor removal.

Case 2

A 65-year-old male presented with sudden-onset, two-month progression of progressive vision loss in the right eye. Upon arrival at our service, he could only distinguish fingers at 10 cm. The ophthalmological findings were as follows: visual acuity deficit in the finger-counting maneuver (right eye), direct pupillary afferent defect (DPAR) in the right eye, and limitation of extraocular movements consistent with right third cranial nerve palsy. Fundoscopy was normal. Optical coherence tomography (OCT) showed bilateral increased retinal nerve fiber layer thickness with early ganglion cell layer loss temporally in the right macula.

He was referred for neurosurgical evaluation, which led to neuroimaging studies (head CT scan and MRI), demonstrating a right cavernous sinus lesion centered on the anterior clinoid process, extending to the sphenoid ridge and orbital apex, encasing the right internal carotid artery (ICA), and indenting the prechiasmatic segment of the right optic nerve and ipsilateral chiasm. While preparing for surgery, a mass was found in the left lung on a chest X-ray. Further investigation with a TAP CT scan revealed a solid spiculated lesion in the left upper lung lobe, with necrotic supraclavicular lymphadenopathy, bilateral adrenal metastasis (4.5 cm left, 5.0 cm right), and a lytic lesion in the right iliac bone.

The cranial lesion was removed through a right pterional craniotomy, classified as "Simpson Grade II," which revealed significant invasion of the right cavernous sinus. The conclusion of the anatomopathological report was mucinous adenocarcinoma. There was no immunophenotype that allowed for the safe identification of the primary origin. Immunohistochemistry showed immunoreaction for CAM 5.2 and K7, with only faint staining for GATA3 in the supporting cells. The study was negative for CK20, TTF1, CDX2, and SATB2, suggesting a pulmonary primary origin.

Figure 3. The initial head CT scan demonstrated a right cavernous sinus lesion mimicking meningioma.

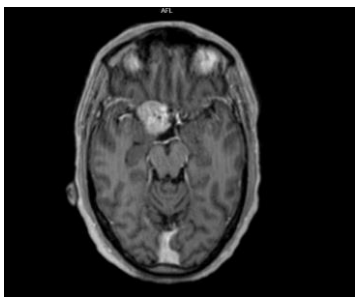

Figure 4. MRI Brain

MRI Brain confirmed a 2.9 × 2.6 × 1.6 cm right cavernous sinus lesion centered on the anterior clinoid process, extending to sphenoid ridge and orbital apex. Encasing the right internal carotid artery (ICA). Indenting the prechiasmatic segment of the right optic nerve and ipsilateral chiasm. Angiographic study: 70% stenosis of the clinoid segment of the right ICA without occlusion.

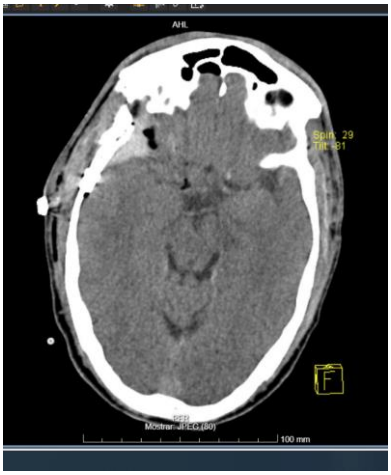

Figure 5. Postoperative CT scan, revealing removal of the mass.

Case 3

37-year-old lady with known systemic cancer, breast invasive carcinoma HER2 positive (score 3+) with negative progesterone and estrogenic receptors, treated surgically two years before diagnosing the pathological fracture Th12, associated with Th11 vertebral body infiltration.

Figure 6. Th12 pathological fracture with posterior structures infiltration and Th11 vertebral body metastasis

The main complaint was uncontrolled pain, Asia E. She was selected for surgical treatment: posterior approach, Th12 vertebrectomy, posterior fixation, and Th10-L2, arthrodesis with expandable cylinder, Th11-L1, and cement augmented screws in Th11, L1 after radio ablation of metastasis of Th11 vertebral body.

Figure 7. Postoperative CT scan: vertebrectomy Th12, good Th11 vertebral body cement filling after radio ablation.

Figure 8. Postoperative X-Ray

She did well during 2 years, reduced painkillers, using only in SOS. She came back with progressive weakness of inferior limbs and was diagnosed with intramedullary metastasis (conus)

Figure 9. Conus medullary metastasis

She was submitted to another surgery-microscopic removal of intramedullary metastasis with no neurological improve. Nine months after, a patient is almost paraplegic with recurrence of the metastasis.

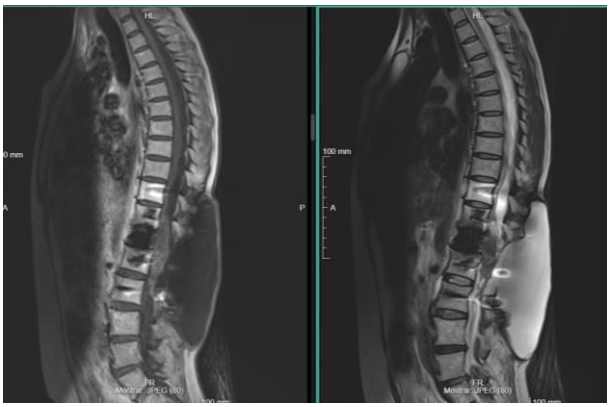

Figure 10. Medullary metastasis recurrence.

We did another attempt to remove the metastasis with good imageology result as seen in the figure.

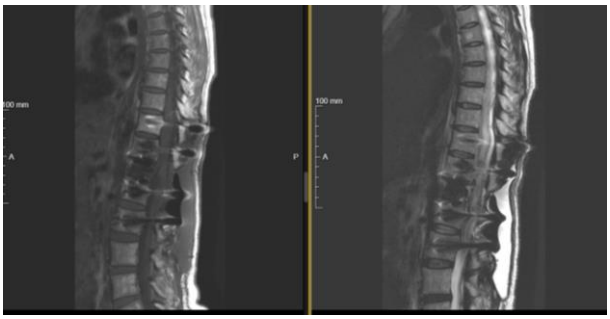

Figure 11. Postoperative MRI after second metastasis removal

But the patient was gradually worsening and another MRI revealed multiple cardiothoracic intradural and cranial metastasis with dural implantation, mimicking meningiomas. In this case we support the theory of CRF dissemination.

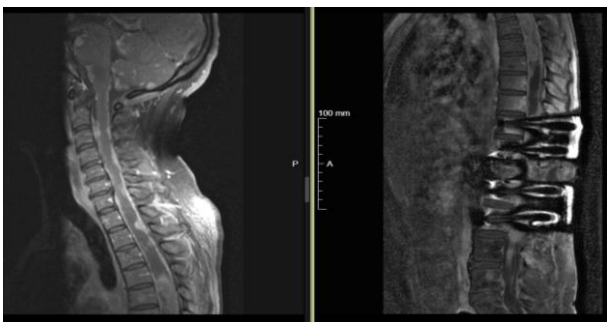

Figure 12. Cervicodorsal and endocranial dural metastasis mimicking meningiomas.

Conclusions

In cases of patients with diagnosed systemic cancer, the radiological finding of an intracranial mass with contrast enhancement must be considered as a metastasis until histological proof, even when a meningioma is suspected. And in contrast, in usual meningioma cases we should always pay attention to histological results, especially in younger patients and if metastasis is found we should check them for primary source. Metastasis misinterpreted as meningioma can delay surgery and consequently have a deleterious impact on patient care, being imperative to distinguish them from a meningioma. There is no standard algorithm treatment dural metastasis, surgical resection and radiation therapy are used in cases of dural metastasis, surgical treatment being the most efficacious, especially when the lesion is removable and systemic disease can be suppressed.

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