Cerebellar cavernomas mimicking brain metastases in a patient with previous breast cancer: a diagnostic and therapeutic challenge

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Introduction

Cerebral cavernous malformations (CCMs) are low-flow vascular lesions composed of dilated capillary channels without intervening brain parenchyma. They are usually supratentorial, cerebellar localization is uncommon.
The radiological appearance of hemorrhagic cavernomas may overlap with that of metastatic lesions, particularly in patients with a history of treated malignancy.
We describe a case of multiple cerebellar cavernomas presenting with acute symptoms and radiological features initially suggestive of metastases, emphasizing the diagnostic and therapeutic challenges involved.

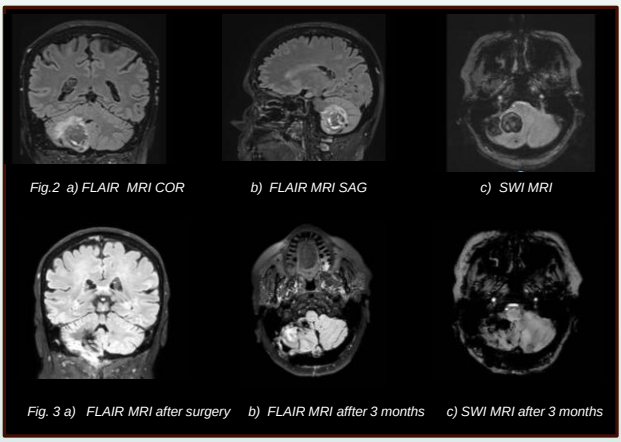

Fig.2 a) FLAIR MRI COR *b) FLAIR MRI SAG* *c) SWI MRI*

Fig. 3 a) FLAIR MRI after surgery *b) FLAIR MRI affter 3 months* *c) SWI MRI after 3 months*

Case description

A 64-year-old woman with a previous history of left breast cancer (Luminal B, HER2-positive, treated with surgery, chemotherapy, and radiotherapy in 2011) and cutaneous melanoma was admitted for vertigo, diplopia, and postural instability.
An initial non-contrast CT (NCCT) revealed multiple right cerebellar lesions with perilesional edema and mass effect on the fourth ventricle. Given her oncological background, metastatic disease was suspected.
Brain MRI (T2-FLAIR and SWI) demonstrated a cluster of hemorrhagic cavernous malformations with mass effect on the brainstem, and no contrast enhancement.
Tumor markers were within normal limits, and total-body CT excluded extracranial disease.
The patient's symptoms worsened, and she was transferred to the Neurosurgery Unit of Pescara. Digital subtraction angiography excluded arteriovenous malformations, and surgical resection of the cavernomas was performed.
Genetic testing for familial cavernomatosis (CCM2, KRIT1, PDCD10, PIK3CA) was negative, suggesting a sporadic form.
Postoperative MRI (3-months follow-up) revealed postsurgical gliotic and hemosiderinic changes in the right posterior fossa and a small residual cavernoma (~6 mm) adjacent to a developmental venous anomaly (DVA), a frequent association reflecting a shared venous drainage pattern. No new hemorrhagic foci or enhancement were detected. The patient remained asymptomatic and neurologically stable.

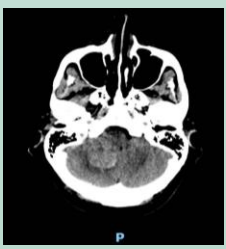

Figure 1: First Head CT

Discussion

Cerebellar cavernomas are rare and may mimic neoplastic lesions, especially in patients with a history of malignancy. The differential diagnosis with metastases can be particularly challenging when lesions are multiple and hemorrhagic. SWI- MRI plays a crucial role in differentiating CCMs from neoplastic or vascular lesions by revealing characteristic "popcorn-like" hemosiderin rims and the absence of surrounding tumor infiltration. Although genetic mutations in KRIT1, CCM2, and PDCD10 genes are responsible for most familial forms, a significant proportion of cases are sporadic, often associated with a history of radiation exposure or de novo occurrence. The coexistence of cavernomas with developmental venous anomalies is well recognized and likely reflects a shared embryological origin of abnormal venous drainage.
Surgical excision is indicated in cases of progressive neurological symptoms or mass effect. The favorable postoperative course in this patient underscores the importance of a multidisciplinary management combining neurology, neuroradiology, and neurosurgery.

Conclusions

Cerebellar cavernous malformations are an uncommon cause of posterior fossa lesions and may radiologically resemble metastases, especially in oncological patients. Accurate differential diagnosis requires high-resolution MRI with SWI sequences and clinical correlation.
Genetic testing can aid in excluding hereditary forms. Surgical removal is curative in symptomatic cases, and follow-up imaging remains essential to confirm complete resection and stability.

Main references

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