

REMOTE HEMORRHAGE FROM THE SITE OF CRANIOTOMY

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ABSTRACT - Postoperative intracranial hemorrhage is a serious and sometimes a fatal neurosurgical complication. Hemorrhage occurring at regions remote from the site of intracranial operations comprises an uncommon affection, most ignored by the assistant physicians. It bares a still incomprehensive pathophysiology, despite several theories trying to explain it. Looks like a common sense that the presence of the remote site hemorrhage cannot be related to concomitant presence of hypertension, coagulopathy or undiscovered lesions. We report three cases of postoperative hemorrhages occurring in a remote site of supratentorial craniotomies, two patients presented cavernous sinus meningioma and one patient was submitted to intracranial vascular surgery.

KEY WORDS: remote site hemorrhage, craniotomy, postoperative hemorrhage.

Hemorragia à distância da área da craniotomia

RESUMO - Hemorragia intracraniana de ocorrência em pós-operatório é grave complicação das cirurgias intracranianas. O aparecimento de foco hemorrágico em regiões distantes ao sítio operatório original é considerado incomum, e muitas vezes ignorado pelos médicos assistentes. A fisiopatologia envolvida no processo não é de todo compreendida, apesar das diversas teorias já propostas. São apresentados três casos de hemorragia à distancia da área cirúrgica, no pós-operatório de dois pacientes portadores de meningioma do seio cavernoso e de um submetido à clipagem de aneurisma intracraniano.

PALAVRAS-CHAVE: craniotomia, hemorragia no pós-operatório.

One of the major complications of craniotomy and the fearing of most surgeons is hemorrhage. Postoperatively hemorrhages usually occur at the site of the operation but surprisingly it can be presented in sites remote from the original surgical access as epidural, subdural, or intracerebral hemorrhage. Although there are few reports in the literature sometimes characterized as an incidental finding, remote site hemorrhage generally bares significant morbidity and mortality.

Nowadays, with the facility of images methods such as computer tomography scan (CT) and magnetic resonance images (MRI), remote site hemorrhage plays a new role as a nosological entity in the chapter of neurosurgical complications. Despite of few previous reports, remote site hemorrhage can be appreciated as an independent pathology. We report 3 cases of remote hemorrhage from the site of craniotomy.

CASES

Case 1 - A 45-year old woman presented headaches and neck stiffness, evaluating worsening of the symptoms leading into a coma. Cerebral angiography was performed revealing a ruptured aneurysm of the anterior communicating artery. Surgical treatment of the aneurysm via the classic pterional approach was performed. After surgery, the patient was initially somewhat slow to awaken, and when she was fully awake, the neurological exam revealed a right cerebellar syndrome. Brain CT scan was obtained, revealing a small intraparenchymal cerebellar hemorrhage located at the right hemisphere. There were no signs of obstructive hydrocephalus or other associated lesions. The patient was investigated in order to access the possible causes of the cerebellar hemorrhage, but any alterations of the blood pressure or coagulopathy were found. There was no report of important surgical manipulation on the adjacent cerebral parenchyma. She was cared in a conservative manner, being discharged of the hospital shortly afterwards presenting minimal symptoms.

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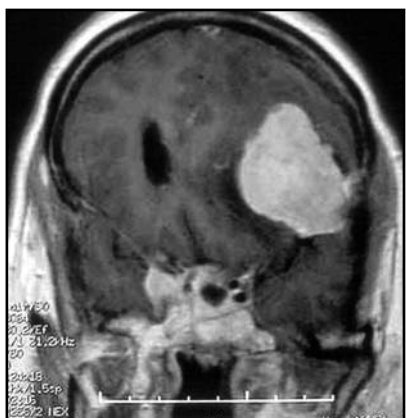


Fig 1. MR showing a volumous meningioma on the left side and mass effect. On the right side, a cavernous sinus tumour in a patient with trigeminal neuralgia.

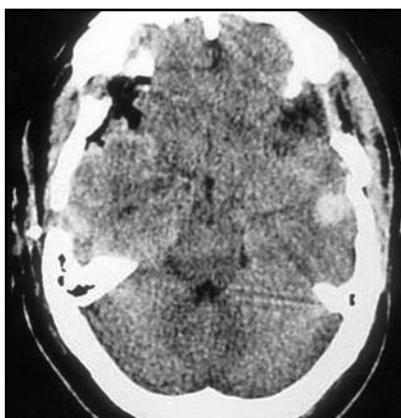


Fig 2. Immediately postoperative CT view showing a left side temporoparietal hematoma.

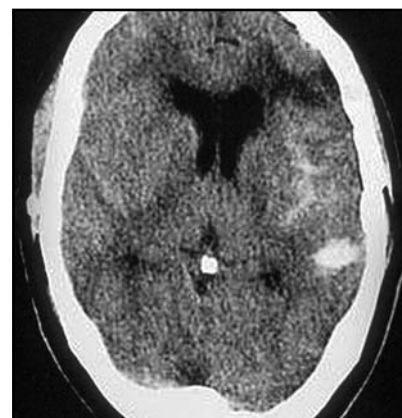


Fig 3. A CT scan reveals a subarachnoid hemorrhage in the same patient.

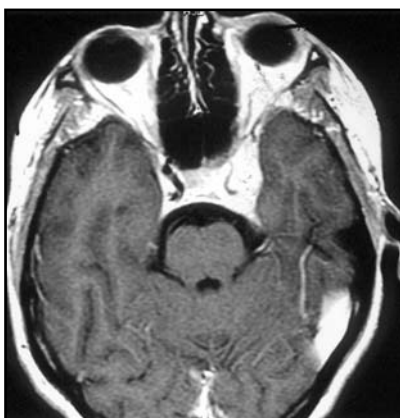


Fig 4. MRI T1, weighed image with gadolinium enhancement showing a left holocavernous sinus meningioma. Note the involvement of the internal carotid artery.

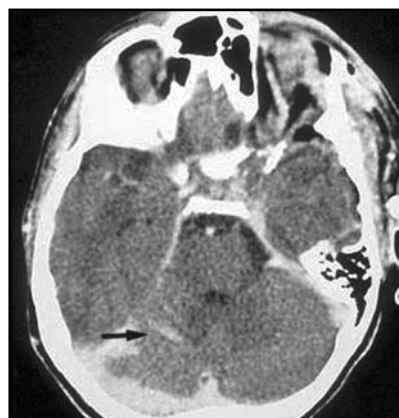


Fig 5. Postoperative CT scan reveals a small superficial cerebellar hemorrhage on the right side.

Case 2 - A 58-year-old woman with a long history of headache was admitted for neurosurgical evaluation . There was no alteration on the neurological exam. Brain CT and MRI revealed a large meningioma located on the left frontal convexity causing important mass effect and another meningioma in cavernous sinus on the opposite side. Surgical treatment was proposed. The tumor located on the convexity was totally resected leading to improvement on patient's general sintomatology. Three months later, the patient presented progressive right facial pain in territory of ophthalmic branch of trigeminal nerve associated with III nerve palsy. The patient was submitted to a right fronto-orbito-zygomatic (FOZ) craniotomy. Brain CT performed about 12 hours after surgery revealed a small lobar parietal hematoma located rostral to the previous craniotomy on the opposite side, with no associated signs of intracranial repercussion. These remote site hemorrhage was presented as an incidental

finding. The patient have had an uneventful clinical course, presenting a good outcome (Figs 1,2,3)

Case 3 - A 42-year-old woman with a meningioma in the left cavernous sinus was submitted to FOZ approach. Postoperatively, the patient presented headache, oculomotor palsy and lethargy. Brain CT performed on the next day showed an adequate resection of the tumor with the presence of frontal pneumocephalus below the site of craniotomy and a small hematoma placed on the tentorial surface of the cerebellum. No mass effects were visualized on the posterior fossa, but the frontal pneumocephalus was associated to displacement of the frontal lobe. She was submmitted to a pneumocephalus drainage, with the cerebellar lesion cared in a conservative fashion. The patient had a successful post operative course (Figs 4,5).

DISCUSSION

Postoperative hemorrhage is a well known but serious complication of intracranial procedures and usually occurs at the site of the operation. Remote cerebellar hemorrhage (RCH) occurring after supratentorial craniotomy is the most commonly described pattern of remote hemorrhage¹⁻⁶ and may occasionally cause significant neurological morbidity or even death. Mortality may reach 25% of the cases¹. Most of the cases described occurred within hours after the surgery, sometimes immediately afterwards, suggesting that most of these hemorrhages develop during or soon after surgery^{2,7}. The findings suggest that this clinical picture is unrelated to age, previous arterial hypertension, inherent or induced coagulopathies, type of primary underlying lesion, intraoperative positioning of the patients or type of anesthesia⁸.

The loss of substantial CSF volume during surgery must play a central role in the pathophysiological development of remote cerebellar hemorrhage^{1,2,4,7-9}. Suction of the CSF may cause intracranial hypotension. Further reduction of intracranial pressure leads to an increased transluminal venous pressure^{2,7,10,11}.

A growing consensus suggests that RCH is likely to be a manifestation of cerebellar venous infarction and hemorrhage. Typical location, in the superior cerebellar and verian cortex, corresponds to the territory drained by superior cerebellar veins³. The timing for the appearance of the symptoms and apparent "blossoming" on CT in the first 24 hours after surgery are not specific but are consistent with evolution of venous hemorrhage². With regard to neoplastic lesions, meningiomas have been described to be most frequently complicated by hemorrhagic postoperative manifestations, probably because of abnormal hyperfibrinolysis, but not directly related to remote hemorrhage^{1,12}.

In our cases, all patients were women, consisting in 2 cases of brain tumor (meningioma) and 1 consisted of ruptured aneurysm. One patient has presented previous arterial hypertension, but none of the hemorrhages had a typical appearance of hypertensive hemorrhage. Coagulation parameters of these three patients were normal, both pre-

and postoperatively. All patients were operated in supine position.

Cerebellar remote hemorrhage is an under-recognized complication after supratentorial neurosurgical procedures, specially those involving the opening of CSF cisterns or the ventricular system^{1,2,7}.

Although the occurrence of RCH is associated with some risk of death or major morbidity, in most cases a benign course is exhibited. Cerebellar "sag" as a result of CSF volume loss, causing transient occlusion of superior bridging cerebellar veins and consequent hemorrhagic venous infarction, is the most likely cause of RCH^{1,2}.

Not one single presurgical or surgical factor can reliably predict the occurrence of cerebellar hemorrhage after supratentorial craniotomy or remote hemorrhages at all, and the etiology of this entity still remains unclear. The most important keys to minimize the hazardous sequelae are to be aware of this potential complication, attempt to a precocious diagnosis and to provide prompt treatment in all cases.

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