

Guided Surgery with Intraoperative Ultrasonography and Endoscopy in Multiple Occipital Brain Abscess

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Abstract

Introduction: Brain abscess is a focal infection of the brain parenchyma, in which different treatment methods are used, most authors agree that conservative methods with antibiotic therapy are effective in the cerebritis phase, while in the encapsulated phases the Minimally invasive surgery is the best option. Objective: To describe the clinical, imaging and surgical characteristics in patients with multiple brain abscesses.

Case Report: Male, white, 20-year-old, right-handed patient, with a history of molar infection 3 months prior, comes to the emergency department of our hospital due to intense headache and tonic-clonic seizures. widespread. Tomography and cranial resonance studies were performed, which demonstrated the presence of multiple brain abscesses that were successfully treated using an occipital approach with endoscopic support and trans-surgical ultrasonographic guidance.

Discussion: In the international literature consulted, the largest number of patients with brain abscesses are treated by conservative measures, in cases in late encapsulation phases where drugs do not penetrate the capsule, surgical alternatives are the most recommended, which depend on size, location, proximity to the ventricular system and number of lesions.

Conclusion: Brain abscess is a neurosurgical entity, in which surgery by minimally invasive methods associated with exact localization techniques and antibiotic therapy is the most effective treatment alternative.

Keywords: Multiple brain abscess; intraoperative ultrasonography; endoscopy.

Introduction

Brain abscess is a focal suppurative brain infection within the brain parenchyma that initially begins as cerebritis and later develops into a collection of pus within a well-vascularized capsule that isolates the purulent collection from the rest of the brain with abundant perilesional edema. ^(1, 2, 3)

Regarding its pathophysiology, risk factors are assessed such as: otitis media, mastoiditis, frontoethmoidal and sphenoidal sinusitis, dental infections and infections of the soft or bony parts of the scalp, distant primary infections such as lung abscess, empyema, bronchiectasis, bacterial endocarditis and gastrointestinal infections, on the other hand predisposing diseases such as human immunodeficiency virus (HIV), congenital heart disease with right-left shunt and a history of penetrating head trauma or brain surgery favor the development of this disease. Its production mechanisms are: contiguous suppuration foci, hematogenous dissemination or direct traumatic or surgical introduction. ^(4, 5, 6, 7)

On one day a necrotic center and cell matrix appear, on imaging there is a hypodense lesion with ring enhancement, the early and late encapsulation phases take place between the tenth and fourteenth day and from the fourteenth day respectively, where a necrotic center, neovascularization, capsule is observed. reticular, gliosis with perilesional edema. (8, 9)

Due to the above, it was decided to describe the clinical, imaging and surgical characteristics in a patient with multiple brain abscesses.

Case Report

A 20-year-old male patient, with no personal pathological history of the disease, who began with a 1-month-old headache that progressively worsened, with pulsating characteristics, predominantly of the right hemicranium, which increased in intensity in the evening. He presented two episodes of generalized tonic-clonic seizures, which is why he was brought to our hospital.

Physical exam. (Positive)

Glasgow Coma Scale: 15 points

Isochoric and isoreactive pupils.

No focal motor defect

Left homonymous hemianopsia (explored by confrontational visual field examination)

Fundus eye: presence of bilateral papilledema. (Frisen scale 4)

In the Brain CT-Scan, two space-occupying lesions in the shape of a ring were observed in axial slices that presented homogeneous hypodensity inside with a well-defined and regular hyperintense area outside, accompanied by large perilesional edema that collapsed the atrium and body of the right lateral ventricle. , in the right parieto-occipital region. A: Right posterior parietal lesion: 2.05x2.31x1.55 cm for a volume of 3.67 cm³. B: Right occipital lesion: 3.51x3.38x3.20 cm, volume: 18.9 cm³. (Fig 1)

In the Simple Brain MRI of 0.35T. A: T2 weighting, axial section, a hyperintense rounded lesion is observed inside with regular borders in the right occipital region that contacts the falx cerebri, and abundant perilesional edema. B and C: T2 weighting, coronal slices, showing two cystic lesions with a hypointense capsule with well-regular edges. D: T1 weighting, sagittal section: the two lesions with a cystic appearance, hypointense with a hyperintense capsule and large perilesional edema in the occipital and right posterior parietal region are specified. (Fig 2)

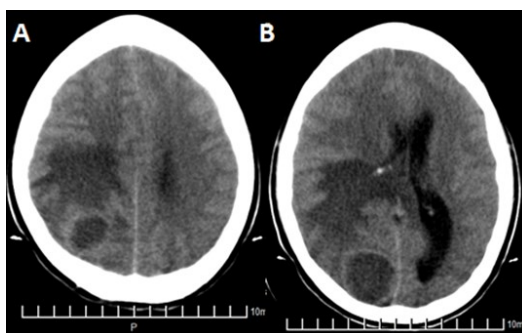


Figure 1: Simple Brain Ct-Scan.

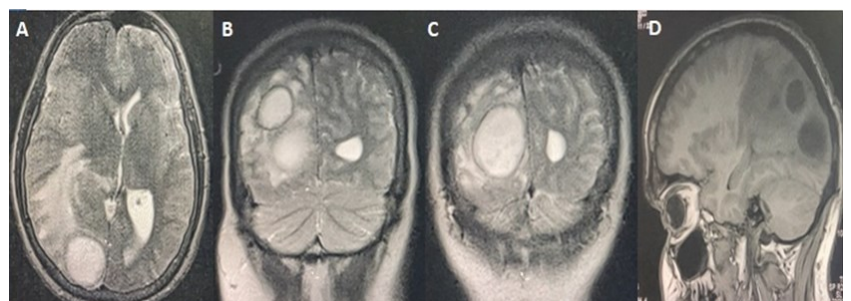


Figure 2: Simple Brain MRI.

Given the imaging results obtained where a regular capsular lesion with the appearance of a ring can be seen, the possibility of a right parieto-occipital multiple brain abscess in the late encapsulation phase was raised as the first diagnostic possibility and a high-grade glial tumor lesion as a second alternative. diagnostic, the questioning was deepened where the history of a previous molar abscess (3 months before) was collected, presenting no history of mastoiditis, sinusitis, otitis or other infection.

Complementary tests were carried out to determine the presence of immunodeficiency where the serology and HIV studies were negative.

After a collective discussion, it was decided to perform an occipital approach with the support of intraoperative ultrasonography and endoscopic magnification.

Figure 3. **A:** Surgical planning of the right parieto-occipital craniotomy. **B:** Intraoperative ultrasound showing the two rounded cystic lesions in relation to the previous imaging findings. **C:** Ultrasound-guided puncture of the cystic lesions, where purulent material was extracted and the previous diagnostic impression was confirmed. **D:** Extraction of the two capsules of the brain abscesses under endoscopic magnification. **E:** Macroscopic pieces of the capsules of the two brain abscesses. **F, G, H, I:** 24-hour post-surgical skull MRI, FLAIR weighting, T2, T1, axial, coronal and sagittal slices respectively, where total excision of the lesion is observed with residual edema from surgical manipulation, in Axial slices show the right ventricular atrium, which was not visible in pre-surgical studies. **J, K:** Biopsy of the extracted capsule where blood vessels are observed in the periphery with the presence of macrophages and neutrophils in the center, demonstrating the presence of areas of inflammatory exudate.

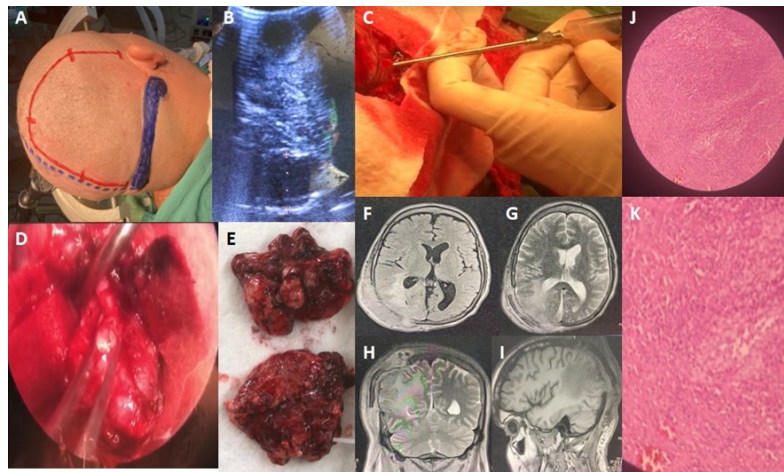


Figure 3: Surgical Procedure.

The post-surgical evolution was uneventful, she had a 14-day hospital stay where treatment was started with antibiotic therapy (Ceftriaxone/Vancomycin/Metronidazole), anticonvulsants and cerebral antiedema. The left homonymous hemianopsia that she already presented in her pre-surgical evaluation persisted.

The culture of the secretion was positive for *Staphylococcus Aureus*, sensitive to the antibiotics with which it was treated, and the result of the capsule biopsy corresponded to the diagnosis of brain abscess.

Discussion

In the treatment of brain abscess, conservative modalities (antibiotic therapy, antiedema, anticonvulsants) and surgical treatment are the most accepted options in the conduct of these patients. ⁽¹⁰⁾ Although good results have been described with hyperbaric oxygen therapy. ⁽¹¹⁾

Within the surgical modalities, other authors apply minimally invasive treatment such as puncture and aspiration of the abscess, mainly in deep and eloquent locations, where better results are demonstrated than treatment with antibiotic therapy only in comparative studies. ⁽¹²⁾

Support with means of exact localization such as stereotaxy with or without a frame (neuronavigation) and intraoperative ultrasonography improve the rate of capsular resection and puncture of the purulent collection, likewise decrease morbidity and mortality. ^(13, 14)

In a meta-analysis published by Lannon et al ⁽¹⁵⁾ where the surgical modality of puncture with aspiration is compared versus intraparenchymal excision, it is shown that there were no statistically significant differences in terms of mortality, reoperation and postoperative functional results.

On the other hand, the use of endoscopic methods prove to be safe and easy to apply to access deep lesions with the least possible brain damage. ^(16, 17)

Other factors that are analyzed when deciding on surgical treatment is the size of the lesion and the proximity to the ventricular system due to the risk of rupture and opening of its purulent content within the ventricular system, it is defined that in abscesses greater than 2, 5 cm surgery is most effectively recommended. ⁽¹⁸⁾

Conclusion

Brain abscesses constitute a neurosurgical entity, in which surgery by minimally invasive methods associated with exact localization techniques and antibiotic therapy constitutes the most effective treatment alternative.

Conflict of Interest

The authors declare no conflict of interest.

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