Epidermoid tumour within the collateral sulcus: A rare location and atypical presentation

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Abstract

Epidermoid tumours (ETs) are uncommon benign lesions that may grow by spreading in the subarachnoid space of the basal cisterns and expanding to conform to the shape of specific sulci and fissures. A temporobasal location is very rare, and there have been no reports regarding single sulcus involvement of ETs. We describe the case of an ET located on the basal surface of the temporal lobe, predominantly within the collateral sulcus, which separates the parahippocampal gyrus medially from the fusiform gyrus laterally. We report the case of a 25-year-old woman with complex visual hallucinations. MRI of the brain revealed a right temporobasal mass lesion, hypointense on T_1-weighted and hyperintense on T_2-weighted images, with minimal contrast enhancement, on the basal surface of the temporal lobe. Right-sided anterior temporal lobectomy, along with microsurgical removal of the collateral sulcus ET were performed with consequent resection of mesial temporal structures (the region of the hippocampus, parahippocampal gyrus, and amygdala). It is important to consider ETs when treating lesions on the basal temporal lobe, since the inferior surface of the temporal lobe, more specifically the collateral sulcus, may be a convenient space for ETs to localize. Total surgical resection should be the goal in these cases; however, the surgical approach may be tailored to include the resection of mesial temporal lobe structures when seizure is the predominant presenting symptom.

Keywords: Collateral sulcus; Epilepsy; Epidermoid tumour; Microsurgical anatomy

1. Introduction

Intracranial epidermoid tumours (ETs) are rare, benign lesions that are derived from ectopic inclusions of epithelial cells during the closure of the neural tube.[1] The cerebellopontine angle (CPA) is the most common location of intracranial ETs, followed by the parasellar region, middle fossa and diploe, respectively.[2] A temporobasal location with predominant single sulcus involvement has not been reported for these tumours. We describe the case of an intracranial ET, located within the collateral sulcus on the basal surface of the right temporal lobe. We discuss the differential diagnosis and the treatment modality for the this patient, who presented with complex visual hallucinations.

2. Case report

2.1. Presentation

A 25-year-old woman presented to our clinic with a 2-month history of complex-partial seizures, which involved complex visual hallucinations. The visual hallucinations involved the passage of legible handwriting, written on white paper with a black pen. She could not read the writing, although the writing was generally regular in pattern. Fatigue and autonomic symptoms such as vertigo, nausea, vomiting and sweating also occurred during the seizures, followed by headache. The frequency of seizures did not change in spite of antiepileptic medication. The patient's birth history was normal and there was no history of trauma or infection. There were no significant neurological findings on physical examination, except for a left superior quadrantanopsia, which was only discovered following a detailed neuro-ophthalmologic examination.

Cranial MRI revealed a right temporobasal heterogenous mass lesion, which was hypointense on T_1-weighted and hyperintense on T_2-weighted images with minimal contrast enhancement (Fig. 1). The mass was located on the basal surface of the temporal lobe within the collateral sulcus, which courses between the parahippocampal gyrus medially and the fusiform gyrus laterally. The lesion was protruding towards the floor of the temporal horn. There was no mass effect on the crus cerebri or upper midbrain.

2.2. Operation

The lesion was approached via a standard anterior temporal lobectomy procedure. The patient was placed in

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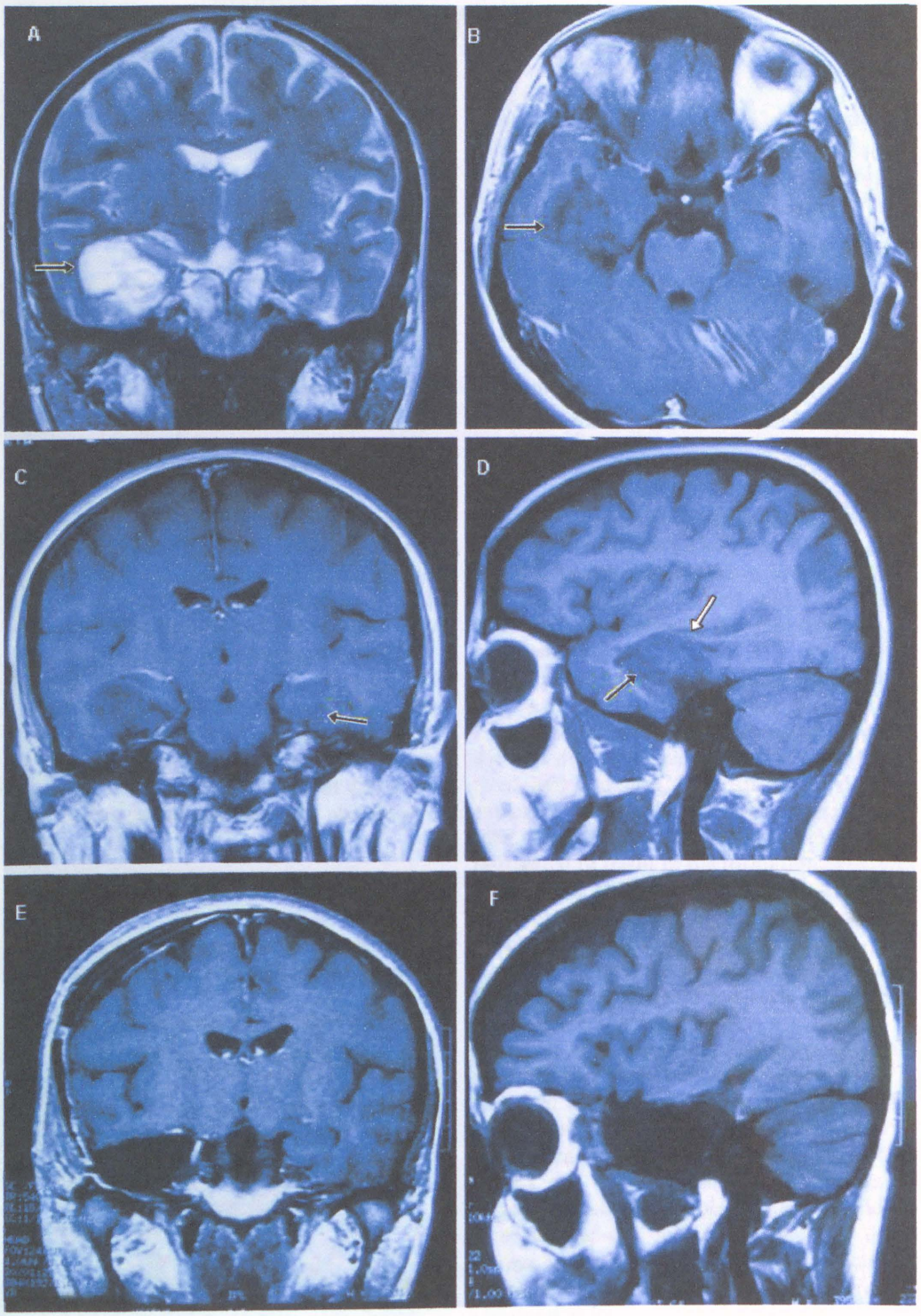

Fig. 1. Pre-operative coronal, axial and sagittal MRI views of the collateral sulcus epidermoid tumour. (A) Coronal T_2-weighted and (B) gadolinium-enhanced axial MRIs show the location of the tumour (black arrows) within the collateral sulcus. (C) Gadolinium-enhanced coronal MRI view. The contralateral collateral sulcus has been marked with a black arrow to help localise the exact site of the epidermoid tumour on the basal temporal lobe. (D) Gadolinium-enhanced sagittal MRI view, showing a heterogenous mass on the inferior surface of the right temporal lobe within the collateral sulcus (black arrow). The lesion is protruding towards the floor of the temporal horn of the lateral ventricle and elevates the head and the anterior part of the body of the hippocampus (white arrow). (E,F) Post-operative (E) coronal and (F) sagittal T_1-weighted MRI, showing total microsurgical resection of the tumour. With the aim of controlling the seizures, the amygdala, the anterior two-thirds of the hippocampus and the accompanying parahippocampal gyrus were resected during the anterior temporal lobectomy.

a supine position and the head was rotated 80° away from the right side. A question mark incision and a frontotemporal craniotomy, with a low temporal exposure was performed, allowing adequate exposure of the Sylvian fissure and the vein of Labbe. No cortical abnormality was observed on the lateral surface of the temporal lobe following the dural opening. The neocortical removal through the middle and inferior temporal gyri extended posteriorly, approximately 4 cm from the temporal tip. The lateral part of the pearly tumour was exposed near the fusiform gyrus. The tumour was followed medially towards the parahippocampal gyrus within the depths of the collateral sulcus. The tumour could be followed towards the lateral ventricle, to the collateral eminence, the prominence overlying the collateral sulcus that forms the lateral part of the floor of the temporal horn. Resection of the remaining part of the tumour within the fusiform gyrus was carried out through the collateral eminence. Total removal of the lesion, including the tumour capsule, was achieved. Our intraoperative findings confirmed the diagnosis of an ET. Subpial removal of the uncus and the temporal amygdala, along with the temporal pole, were performed as the next step. As the final step, the choroidal fissure was opened and the anterior two-thirds of the hippocampus and parahippocampal gyrus were removed subpially (Fig. 1E,F).

The early postoperative course was uneventful and the patient was discharged on the fourth post-operative day without any post-operative seizures. Histologically, the cyst wall consisted of stratified squamous epithelium and connective tissue (Fig. 2). The pathologic diagnosis was epidermoid tumour.

3. Discussion

ETs are lesions with a benign clinical nature, reportedly representing about 1% of all primary intracranial neoplasms.[3,4] These tumours are potentially curable and, therefore, radical surgical resection should be the primary goal when treating ETs.[1,5]

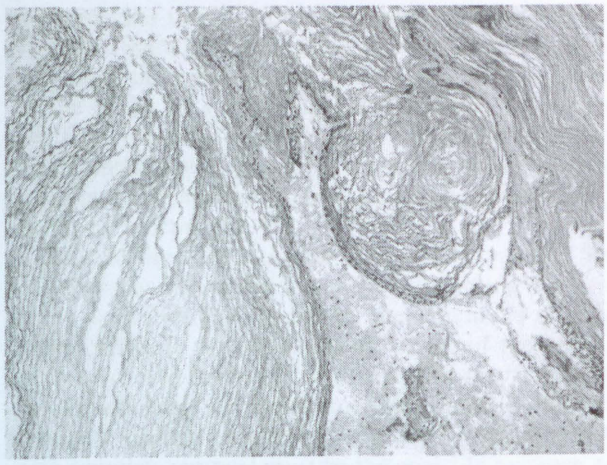

Fig. 2. Haematoxylin-eosin staining of the collateral sulcus epidermoid tumour (original magnification × 250). This low-power view of the cyst wall and the surrounding brain parenchyma demonstrates that the cyst is lined by well-differentiated highly keratinising squamous epithelium. There is no dysplasia or mitotic activation.

The CPA is the most frequent location for intracranial ETs, as 40% of all these tumours are found at this site.[1] ETs may also be located within the parasellar region and the middle cranial fossa (18%), and around the perimesencephalic cisterns. These tumours tend to spread along normal cleavage planes, and slowly fill any available subarachnoid space, including the cisterns, fissures and ventricles.[1,2,4,6]

Intraparenchymal and cortical localisation of ETs is extremely rare.[7–17] A meticulous review by Iaconetta et al. in 2001 revealed 34 cases of intracerebral epidermoids, 11 of which were located in the frontal lobe (39.2%), 12 in the temporal lobe (42.8%), three in the parietal lobe (10.7%), one in the occipital lobe and one in the thalamic region.[7] However, a temporobasal location with predominant single sulcus involvement has not been reported for these tumours. In our case, the intracranial ET on the basal surface of the right temporal lobe was predominantly located within the collateral sulcus, which courses between the parahippocampal gyrus and the fusiform gyrus.

The pathogenetic mechanisms involved in the formation of ETs on the surface, or within the brain are still unclear. ETs are thought to arise from ectopic inclusions of epithelial cells during the closure of the neural tube between the third and the fifth week of foetal development.[17] Cell entrapment from the mesectodermal origin of the neural crest within the primitive cerebral hemisphere has been postulated to result in the formation of such rare intracerebral lesions. It has also been proposed that, as the neural tube closes and divides from the cutaneous ectoderm, the cells that are left in and around the neural tube ectoderm lead to the occurrence of these tumours in various locations, such as cerebral surfaces, ventricles and cerebral parenchyma.[7,10,18]

It has been proposed that deep-seated intraparenchymal ETs can project into the cavity of the lateral ventricles, and appear to be intraventricular.[19] However, only a few cases of ETs located within the lateral ventricles have been reported.[20–25] In our case, the location of the ET was within the depths of the collateral sulcus, located between the parahippocampal and fusiform gyri. The tumour did not originate from the brain parenchyma or the lateral ventricle, but extended into the floor of the temporal horn of the lateral ventricle through the collateral sulcus.

In contrast to epidermoids at the CPA or in the suprasellar region, where the diagnosis is generally certain after imaging, the diagnosis of the presented case was only apparent during dissection of the lesion at the time of the operation. The signal intensity of the ETs on MRI is generally very close to that of cerebrospinal fluid, and these tumours usually present as a cystic lesion on MRI, having an epidermis-like cyst wall containing keratin and epithelial

debris.[26,27] Radiological differentiation of epidermoids from other cystic lesions, particularly arachnoid cysts harbouring xanthochromic, proteinaceous and haemorrhagic components can be challenging. On MRI, epidermoids and arachnoid cysts usually appear hypointense on T_1-weighted images and hyperintense on T_2-weighted images.[28] The usefulness of diffusion-weighted imaging (DWI) in these conditions was first reported in 1990.[29] On DWI, an arachnoid cyst tends to have the same intensity as cerebrospinal fluid, whereas an epidermoid is brightly hyperintense.[28] MRI studies with fluid attenuated inversion recovery (FLAIR) and constructive interference in steady state (CISS) can also be used along with conventional MRI sections.[7,10,28]

In the present case, the lesion showed non-homogenous low-signal intensity on T_1-weighted images and non-homogenous high signal intensity on T_2-weighted images, with no apparent contrast enhancement or cystic appearance (Fig. 1A–D). In contrast to the typical presentation of ETs, the lesion within the collateral sulcus was not a cerebrospinal fluid-like mass and did not insinuate into any of the supratentorial perimesencephalic cisterns around the region. The imaging pattern of our case did not resemble that of intracerebral ET, or that of cystic astrocytoma, arachnoid cyst or dermoid cyst, which generally have similar radiological findings. Because of these imaging characteristics and the location of the lesion, a low-grade tumour of glial origin was more likely to be the pre-operative diagnosis, and the possibility of an ET was almost ignored in pre-operative evaluation.

We think that the basal temporal lobe, specifically the collateral sulcus, may have been an alternative location for the ET because of the anatomical characteristics of this sulcus. The collateral sulcus is one of the most constant sulci of the brain and provides a gateway to the temporal horn of the lateral ventricle. The sulcus expands as it approaches the floor of the temporal horn of the lateral ventricle. Since ETs may grow by spreading the adjacent gyri along the subarachnoid space and expand to conform to the shape of specific sulci and fissures, the extensive depth of the collateral sulcus on the inferior surface of the temporal lobe, compared with that of neighbouring sulci, may explain the occurrence of this tumour on this particular sulcus.

ETs usually adhere to and surround the normal neural and vascular structures instead of disturbing these anatomic structures and, therefore, these tumours may grow by spreading in the subarachnoid space of the basal cisterns, sulci, and fissures.[2–4] Although ETs may have a thick capsule adherent to the surrounding brain parenchyma, these are benign tumours, and radical surgical resection with complete removal must be the goal.[3] In our case, total surgical resection, including the capsule, could be achieved through an anterior temporal lobectomy.

Taniguchi et al. reported a case of epileptic laughter associated with deep right temporal epidermoid cyst.[15] This patient was free of seizures following a standard temporal lobectomy and complete tumour removal. The choice of the surgical approach in our case was largely influenced by the presence of the complex-partial seizures. With the aim of controlling the seizures, the amygdala, the anterior two-thirds of the hippocampus and the accompanying parahippocampal gyrus were resected during the anterior temporal lobectomy, along with total microsurgical removal of the collateral sulcus ET. The patient has been free of seizures since the operation.

In conclusion, the inferior surface of the temporal lobe, more specifically the collateral sulcus, may be a convenient space for ETs to localize, and these tumours should be included in the differential diagnosis of any lesion on the basal temporal lobe. Total surgical resection should be the goal for lesions on the basal temporal lobe as in all cases of ETs. However, due to the close proximity of this location to the mesial temporal lobe structures and its intimate relationship with seizures, the surgical approach should be tailored to include resection of the hippocampus, parahippocampal gyrus and amygdala in patients presenting with epilepsy.

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