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ORIGINAL COMMUNICATION

Intracranial lipomas and epilepsy

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Abstract *Introduction* Intracranial lipomas are rare, mostly congenital lesions. Sporadic case reports suggest an association with focal epilepsy. *Methods* All admissions to our epilepsy monitoring unit who had had brain MRI were reviewed for intracranial lipomas during 6 consecutive years. *Results* Five patients with intracranial lipomas were identified (0.14%). Lipomas were located in the midline (3 cases), in the tectal region [1], and over the parietal cortex [1]. Another intracranial pathology was identified in two patients causing the epilepsy in these cases (head trauma and hemimegaencephaly). In two other cases the Video EEG monitoring findings were not congruent with the location of the lipoma, but no other explanation for their epilepsy was found. In one patient a large midline lipoma extending into the right lateral ventricle was thought to be the cause of the patient's right hemispheric seizures. No other clinical symptoms or complications of the lipomas were noted. *Discussion* Intracranial lipomas are rare, incidental, often asymptomatic findings and usually located near the midline. In only one of our five patients was the lipoma interpreted as the definite cause of the epilepsy.

Key words lipoma · epilepsy · seizure · MRI

Introduction

Rokitansky was the first to describe a lipoma of the corpus callosum in 1856 on autopsy [16]. Since then over 200 cases of intracranial lipomas have been reported. Although several case reports mention seizures as an associated symptom [2, 9] only one study from 1980 reported and analyzed the clinical and EEG characteristics of patients with intracranial lipomas and seizures [8]. No information is available on the incidence of intracranial lipomas in patients with epilepsy.

Methods

3500 consecutive patients who underwent video-EEG monitoring at the Cleveland Clinic Foundation were reviewed for the presence of intracranial lipomas on MRI. The patient population consisted of 75% with focal epilepsy (temporal: 48%, extratemporal: 19%, non-classifiable focal: 8%), 5% with generalized epilepsy, 1% with multifocal epilepsy, and 19% with non-epileptic seizures. Clinical history, interictal and ictal Video-EEG-recordings with scalp and sphenoidal electrodes and imaging studies of patients with intracranial lipomas were reviewed.

Results

Five patients (0.14%) with intracranial lipomas were identified. Lipomas were located in the midline close to the corpus callosum (3 cases), near the tectum [1], or overlying the lateral parietal convexity [1].

Two of the five patients had additional intracranial pathology as a cause of their epilepsy (head trauma and hemimegaencephaly). In two other cases the semiological and electrophysiological monitoring findings were

not congruent with the location of the lipoma, but no other explanation for their epilepsy was found (Table 1). In one patient a large midline lipoma extending into the right lateral ventricle was thought to be the cause of the patient's right hemispheric seizures (Fig. 1a and b).

Discussion

In our series intracranial lipomas occurred in 0.14% of epilepsy patients. Lipomas could be linked to the patient's epilepsy in only one out of five patients. No other clinical manifestations or complications were found. Our results suggest, that intracranial lipomas are frequently only incidental findings in patients with epilepsy. In only one out of five patients was the etiology of the epilepsy attributed to the intracranial lipoma.

The incidence of intracranial lipomas in our series corresponds to findings in other studies that report an incidence of lipomas ranging from for 0.1% [22, 24] to 0.5% [3] of all brain tumors. However, the incidence appears to be higher than in a series of 17500 patients who underwent CT of the head, which demonstrated intracranial lipomas in 0.06% of all patients [14], representing 0.34% of all intracranial tumors in this series [14]. Increased incidence of intracranial lipomas in patients with epilepsy may be related to higher incidence of intracranial abnormalities and malformations in this patient population in general as compared with patients undergoing a CT.

Although several case reports mention seizures as an associated symptom [2, 9] only one previous study from 1980 reported and analyzed the clinical and EEG characteristics of patients with intracranial lipomas and seizures [8]. In this study, Gastaut et al. reported four patients with seizures and intracranial lipomas of the corpus callosum. However, only two of these patients had recorded seizures, both in the temporal region.

In a pediatric case series only one out of 20 patients had epilepsy as a presenting symptom [10]. Several authors report seizures in association with intracranial lipomas [2, 4–7, 11, 15, 17–19, 21, 22], but almost no information is available on the EEG seizure localizations. In our series, the lipoma was thought to be the cause of the patient's right hemispheric seizures in only one out of five patients. This patient had a large midline lipoma extending into the right lateral ventricle in the vicinity of the seizure onset zone. However, this patient also had agenesis of the corpus callosum, which may also have accounted for his seizures. Causes of epilepsy in our patient with a large intracranial lipoma may include associated cortical malformation, mass effect, or ischemia [5, 8, 21].

The majority of previously reported intracranial lipomas are found in the corpus callosum region and the plexus choroideus [5]. Other locations include the base of the cerebrum, the brainstem, the cerebellum, the roots of the cranial nerves, the ventral aspect of the diencephalic structures, the choroid plexus, and the dorsal aspect of the midbrain [5]. In our series, lipomas were located in the midline close to the corpus callosum (3 cases), near the tectum [1], and overlying the lateral parietal convexity [1]. This corresponds with findings in a retrospective review of MR findings in 42 patients. In this study intracranial lipomas were found interhemispheric (45%), quadrigeminal and superior cerebellar (25%), suprasellar and interpeduncular (14%), in the cerebellopontine angle (9%), and in the sylvian cisterns (5%) [21]. However, a more recent study on MRI findings in 32 consecutive lipomas from 30 patients indicated a more lateral location in 19 patients (59%) [1].

In addition to seizures, other associated presenting clinical features consisted of developmental delay [2],

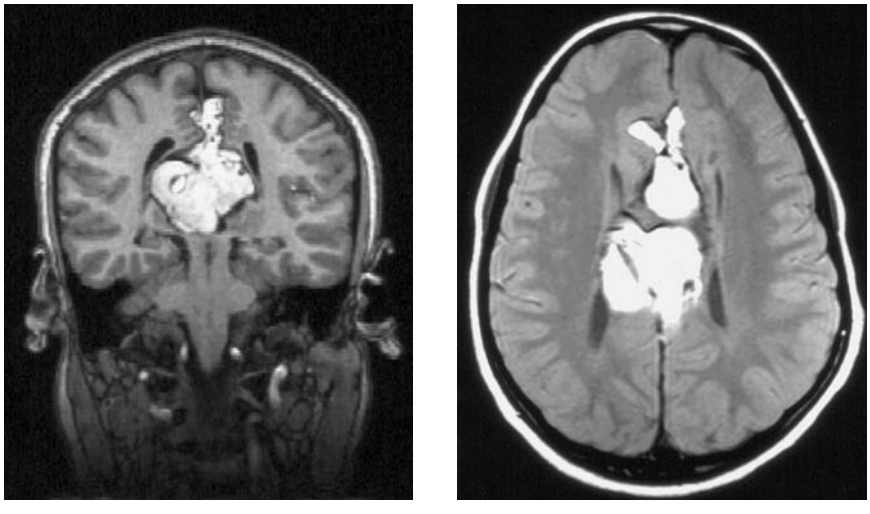

Fig. 1 Coronal (**a**) and transverse (**b**) MRI demonstrating a large midline lipoma with extension into the right lateral ventricle and agenesis of the corpus callosum in a 10 year old boy (case 1). Images were acquired with a 1.5 T Magnetom Vision (Siemens). (Parameters: **Fig. 1a:** TR 11.4, TE 4.4, TA 5.41; **Fig. 1b:** TR 8000, TE 105.0, TA 3.36)

Table 1 Five patients with intracranial lipomas and epilepsy

Age(years), handedness & sex	Lipoma on MRI	Associated findings on MRI	Epilepsy (etiology)	Age at onset of epilepsy	Ictal EEG	Seizure frequency	Seizure semiology	Interictal epileptiform discharges	Associated clinical symptoms
10 left-handed male	Midline, with extension into the right lateral ventricle	• Agenesis of the corpus callosum • High riding third ventricle	Symptomatic right hemisphere epilepsy (due to lipoma)	4 years	Lateralized right hemisphere, maximum fronto-central	1–2/week	Aura of uprising tickling followed by complex repetitive movements of the right arm and left hand dystonic posturing	Sharp wave, left centro-parietal	• Developmental delay
54 right-handed female	Right parietal convexity	none	Focal epilepsy (unknown)	15 years	Type I: right frontal Type II: left temporal	1/year 1/day	Type I: Sustained left head version Type II: hand and mouth automatisms	Sharp waves, multiregional, right and left temporal, right frontal	None
39 right-handed male	Pericallosal, above the splenium of the corpus callosum	• Right cerebellar arachnoid cyst • Diffuse volume loss	Left temporal epilepsy (unknown)	36 years	Left temporal	1/month	Oral and hand automatisms with loss of consciousness	Sharp wave, left temporal	None
32 right handed female	pericallosal, underneath the splenium of the corpus callosum	none	Symptomatic left hemisphere epilepsy (due to head trauma)	9 months	No seizures recorded	4/year	Right head and eye version followed by generalized tonic clonic seizure	Sharp wave, lateralized left, maximum fronto-central	• Headache • Depression
4 months old male	Tectal lipoma, in the posterior fossa	• Right hemimegalo-encephaly and lissencephaly • Left parietooccipital volume loss • Right hemispheric band heterotopia • Right cerebellar dysplasia	Symptomatic right hemisphere epilepsy (due to hemimegalo-encephaly)	1 day	Lateralized right hemisphere	4–5 clusters/ day	Generalized tonic seizure followed by an epileptic spasms	Hypsarrhythmia, lateralized right hemisphere	• Epidermal nevus syndrome • Macrocephaly • Right hemifacial enlargement • Left hemiparesis • Developmental delay

hemiparesis [1], and headache [1] in our series. This corresponds with findings in previously reported cases. The most common presenting symptoms in a review of 85 previously reported cases were seizures (50%) aside from mental defect (20%), hemiparesis (13%) and papilledema (2.5%) [9]. Other symptoms can include tinnitus or headache [5]. Approximately 50% of all cases were asymptomatic [9]. Rarely, large lipomas can cause clinical signs of compression and hydrocephalus [3, 8, 12].

MRI shows a homogeneous, hyperintense mass on T1 weighted images and an iso- to hypointense lesion on T2 weighted images [1, 21] (Fig. 1). Chemical shift artifact can usually be seen on proton density or T2 weighted images [1] and can help to confirm the diagnosis [13]. Additionally, occasional small hypointense lesions due to calcifications can be found on T2 weighted images [1, 21, 23].

The surgical removal of these lesions was not successful in previous series. In a review of 21 patients who underwent surgery, only 5 improved after surgery. Ten of these 21 patients died and one patient had severe deficits after surgery [20]. Epilepsy is unlikely to be relieved by surgery and should be treated with anticonvulsant therapy [9]. In pharmacologically refractory cases, localization of the epileptogenic zone may be followed by epilepsy surgery.

Our study confirms previous reports suggesting that lipomas themselves may not be likely to cause epilepsy. Considering the selection bias and the retrospective approach of our study, this conclusion may only apply to medically difficult to treat epilepsy patients who are evaluated for epilepsy surgery.

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