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Lipoma of the Quadrigeminal Cistern: Report of 12 Cases with Clinical and Radiological Features

Kuadrigeminal Sistern Lipomları: 12 Olgunun Klinik ve Radyolojik Özellikleri

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ABSTRACT

AIM: To present the magnetic resonance imaging (MRI) characteristics and clinical features of 12 patients with quadrigeminal cistern lipoma.

MATERIAL and METHODS: A series of 12 patients with quadrigeminal cistern lipoma were followed up between 2010 and 2013 at the Kayseri Training and Research Hospital's Department of Neurosurgery. MRI characteristics and clinical features of the 12 patients were evaluated.

RESULTS: A total of 12 patients were followed up. The mean age was 36.25 years (range 6 – 74 years). All patients' neurological findings were normal, except one patient had strabismus. MRI revealed a tubulonodular type lipoma in eleven patients and curvilinear type lipoma in one patient. Two patients (16.6%) had associated Chiari malformation type 1. Calcification was found only in two patients (16.6%). None of patients had a corpus callosum malformation or associated hydrocephalus. The mean follow–up period was 17.2 months (range 3–36 months) and no patient showed progression.

CONCLUSION: Intracranial lipomas are considered benign, slow-growing congenital malformations due to infiltration of adipocytes into the neural tissue and conservative management should therefore be preferred.

KEYWORDS: Lipoma, Quadrigeminal cistern, Intracranial

ÖZ

AMAÇ: Kuadrigeminal sistern lipomu olan 12 hastanın klinik özellikleri ve manyetik rezonans görüntüleme (MRG) karakteristiklerini sunmak.

YÖNTEM ve GEREÇLER: Kayseri Eğitim ve Araştırma Hastanesi, Beyin ve Sinir Cerrahisi Kliniği'nde 2010-2013 arasında kuadrigeminal sistern lipomu tanısı alan 12 hasta izlendi. 12 hastanın MRI karakteristikleri ve klinik özellikleri incelendi.

BULGULAR: Toplamda 12 hasta takip edildi. Ortalama yaş 36,25 (6-74)'di. Tüm hastaların nörolojik muayeneleri normaldi, sadece bir hastada strabismus vardı. MRG, 11 hastada tübülonodüler tip, 1 hastada kurvilineer tip lipom ortaya koydu. 2 hastada eşlik eden Chiari tip 1 malformasyonu vardı. Kalsifikasyon yalnızca 2 hastada bulundu (%16,6). Hastaların hiçbirinde korpus kallozum malformasyonu veya eşlik eden hidrosefali yoktu. Ortalama takip süresi 17,2 (3-36) aydı ve hiçbir hastada takipte progresyon saptanmadı.

SONUÇ: İntrakraniyal lipomların; benign, yavaş büyüyen konjenital malformasyon olduğu ve yağ dokusunun nöral dokuyu infiltre ettiği kabul edilir. Bu yüzden konservatif tedavi cerrahiden önceliklidir.

ANAHTAR SÖZCÜKLER: Lipom, Kuadrigeminal sistern, İntrakraniyal

INTRODUCTION

First described by Rokitansky in 1856, intracranial lipomas are very rare congenital malformations, characterized by an asymptomatic course (1, 2, 3, 6, 7). Lipomas make up only 0.1–0.5% of intracranial lesions (14, 15). They tend to be placed at the midline, most commonly in the pericallosal cistern (1, 6, 14). The quadrigeminal cistern is the second most common location for intracranial lipomas (6, 9, 10). Patients rarely present with symptoms related to the location of the lesion such as cranial nerve deficit, seizure, intractable headache, and brainstem findings. Surgical treatment is difficult because of strong adhesion to surrounding tissues (3, 14). We present the clinical features and magnetic resonance imaging (MRI) characteristics of 12 patients with quadrigeminal cistern lipoma who had been followed up between 2010 and 2013 in this article.

MATERIAL and METHODS

A series of 12 patients with quadrigeminal cistern lipoma were followed up at Kayseri Training and Research Hospital, Department of Neurosurgery between 2010 and 2013. MRI characteristics and clinical features of the 12 patients were evaluated (Table I).

RESULTS

The clinical data of the cases are displayed in Table I. A total of 12 patients (7 females, 5 males) were followed–up. The mean

Table I: Cases of Quadrigeminal Cistern Lipoma (Review of 12 Patients)

No	Age	Sex	Clinical presentation	Neurological examination	MRI findings	Associated malformation	Follow–up period (month)	Clinical and radiological course
1	31	M	Headache	Normal	Tubulonodular 12 x 5 x 15 mm	None	28	Stable
2	74	F	Loss of Consciousness	Normal	Tubulonodular 5 x 4 x 1 mm	None	36	Stable
3	47	M	Headache	Normal	Curvilinear 21 x 3 x 3 mm Calcification	None	20	Stable
4	27	F	Headache	Normal	Tubulonodular 13 x 3 x 2 mm	None	32	Stable
5	52	F	Headache	Normal	Tubulonodular 10 x 6 x 4 mm	None	6	Stable
6	22	M	Seizure	Normal	Tubulonodular 15 x 9 x 15 mm	None	18	Stable
7	22	F	Headache	Normal	Tubulonodular 6 x 3 x 1 mm	Chiari Malformation type 1	8	Stable
8	25	M	Headache	Normal	Tubulonodular 4 x 1 x 2.5 mm	Chiari Malformation type 1	8	Stable
9	74	M	Loss of Consciousness	Normal	Tubulonodular 5 x 3 x 1 mm Calcification	None	14	Stable
10	31	F	Chronic depression	Normal	Tubulonodular 8 x 4,5 x 4 mm	None	15	Stable
11	24	F	Headache	Normal	Tubulonodular 6 x 5 x 4 mm	None	18	Stable
12	6	F	Precocious puberty	Strabismus	Tubulonodular 9 x 10 x 12 mm	None	3	Stable

age was 36.25 years (range 6–74 years). We had a 6-year-old patient present with precocious puberty, one patient with chronic depression, one patient with seizure, two patients with loss of consciousness and seven patients with headache. The epileptic patient's seizures were not due to the lipoma. Neurological findings were normal in all patients, except one patient had strabismus. MRI revealed a tubulonodular type lipoma in eleven patients and curvilinear type lipoma in one patient (Figures 1A-D; 2A,B). Two patients (16.6%) had associated Chiari malformation type 1. Calcification was found in only two patients (16.6%). None of the patients had a corpus callosum malformation or associated hydrocephalus. The mean follow–up period was 17.2 months (range 3–36 months) and no patient showed progression. Surgical intervention was not considered in any patient because none of them had symptoms related to lipoma.

DISCUSSION

Lipomas are classified under "tumours of meninges" as mesenchymal benign tumours (WHO Classification 2007 ICD 8850/0). Intracranial lipomas are the consequence of the maldevelopment of embryonic primitive meninx rather than of neoplastic or hamartomatous origin. Adipose tissue does not normally exist in the central nervous system. It has been proposed that adipocytes extend in the subarachnoid space along the Virchow–Robin spaces adjacent to the pia. This leads to a close relationship between a lipoma and blood vessels and cranial nerves (3, 5, 12, 14). However they grow slowly and no malignant transformation has been reported (15).

Developments in radiological techniques have increased the number of intracranial lipoma diagnoses. Interhemispheric lipomas over the corpus callosum and quadrigeminal cistern are the most common presentation at approximately 45–50% and 25% respectively (1, 6, 14). They can be found in the cerebellopontine angle (CPA), Sylvian cistern, and less frequently on the surface of the cerebral hemispheres and cervicomedullary junction (3, 4, 6, 11, 13, 14). The most common posterior fossa location is the CPA. Intracranial

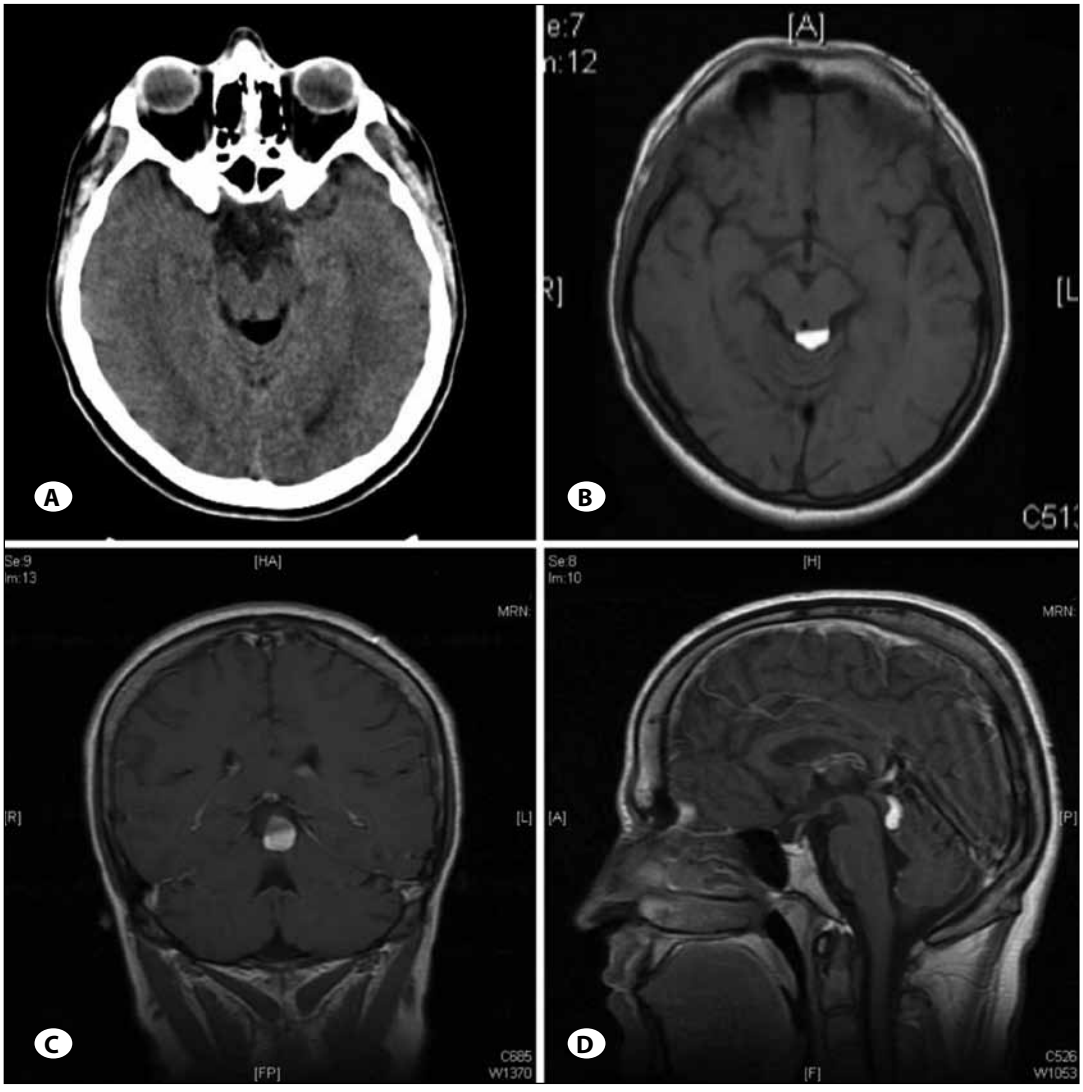

Figure 1: Tubulonodular type lipoma located in the quadrigeminal cistern. **A)** CT scan, **B)** axial T1-weighted MRI scan, **C)** coronal T1-weighted MRI scan, **D)** sagittal T1-weighted MRI scan demonstrates hyperintense lipoma in the quadrigeminal cistern.

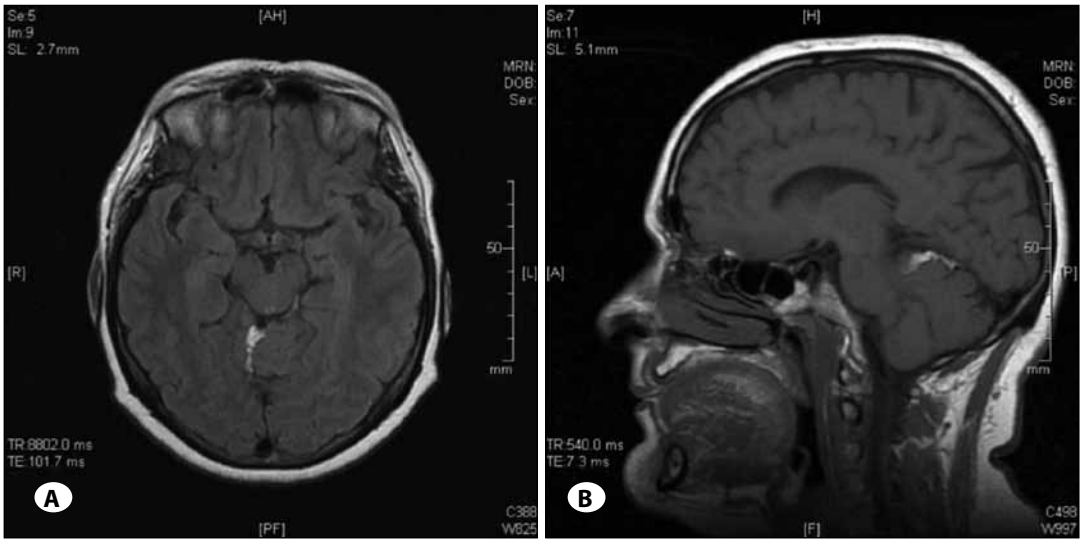

Figure 2: Curvilinear type lipoma located in the quadrigeminal cistern. **A)** axial T1-weighted MRI scan, **B)** sagittal T1-weighted MRI scan demonstrates hyperintense lipoma in the quadrigeminal and superior cerebellar cistern.

lipomas are associated with other congenital malformations such as agenesis or dysgenesis of corpus callosum, absence of the septum pellucidum, cranium bifidum, spina bifida, encephalocele, myelomeningocele, vermian hypoplasia cortical malformations, and aneurysmal malformations (6, 14, 15).

Truwit et al. published the largest related series in 1990 (12). 42 patients with 44 intracranial lipomas were evaluated retrospectively (12). Intracranial lipomas were found in the Interhemispheric area (45%), quadrigeminal/superior cerebellar cistern (25%), suprasellar/interpeduncular cistern (14%), and Sylvian cistern (5%) (12). Associated congenital malformations were reported in 55% of patients and malformations of the corpus callosum and septum pellucidum were most frequent (5, 12).

These lesions are usually asymptomatic and diagnosed incidentally. It may take a long time for symptoms to develop because of the slow growth pattern. The incidence of epilepsy is lower than estimated in the first publications (5, 10). Yıldız et al reported 24 cases with intracranial lipoma and showed a statistically significant relationship between the localisation of the lipoma and the occurrence of epilepsy. All 3 patients with a lipoma in the Sylvian cistern had seizures while the other 21 patients with lipoma elsewhere had no seizures (14). Psychomotor retardation and headache are the most common neurological manifestations (5). These tumours can cause symptoms related to their location such as cranial nerve deficit, seizure, and intractable headache. Furthermore, a quadrigeminal cistern lipoma can cause obstructive hydrocephalus (8). A quadrigeminal cistern lipoma can cause diplopia, brainstem and cerebellum compression findings and obstructive hydrocephalus can be seen (8, 15). Most of the patients in our series presented with headache and none of them had obstructive hydrocephalus. A 22-year-old male presented with generalized tonic–clonic seizures but the quadrigeminal lipoma was not the focus of these seizures.

Cranial computed tomography (CT) can easily show lipomas as homogeneously hypodense lesions like subcutaneous fat. A homogeneous mass with fat density (-40 to –100 Hounsfield) and nodular or curvilinear surrounding calcification can be seen (14).

MR signal features are similar to subcutaneous tissue (15). T1-weighted images show a hyperintense lesion. The intensity shows a homogenous decreased on the fat-suppression sequence (3). The lesion is iso-hypointense on T2-weighted images (3). There is usually no contrast enhancement (3). The chemical shift artifact generally seen on T2-weighted images is used for confirming the diagnosis of lipoma (3). The differentiation of a CPA lipoma from other adipose lesions such as epidermoid tumour, lipomatous meningiomas, and lipomatous degeneration of schwannomas can usually be made by MRI (11). CPA lipomas are described as tubulonodular or curvilinear on MRI. The tubulonodular type is more common and located anteriorly and is associated with frontofacial anomalies. Curvilinear type lipomas are usually asymptomatic even in large sizes. They are generally thinner than 1 cm, long, related with corpus callosum hypoplasia, and located posteriorly (14). Only two patients in our series had an associated malformation (Chiari type 1 in both) but a corpus callosum anomaly was found in none of patients.

The differential diagnosis of a CPA lipoma includes other adipose lesions such as dermoid/epidermoid tumour, lipomatous meningiomas, and lipomatous degeneration of schwannomas (3, 14).

There is no universally accepted approach to treating patients with intracranial lipomas after intracranial surgery. Surgery may be risky because of the close relationship with blood vessels and cranial nerves and the infiltration of adipocytes (3, 14). Subtotal resection can be considered in case of intractable drug-resistant trigeminal neuralgia, hemifacial spasm, vertigo and nausea (3). However, non-surgical treatment should be considered first because of the asymptomatic nature and incidental diagnosis of these lesions.

In conclusion, intracranial lipomas are considered as benign, slow-growing congenital malformations with infiltration of adipocytes to neuronal tissue and conservative management should therefore be considered first. There was no progression of the lesion in any patient in our series. Surgical intervention was therefore not considered.

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