Giant Quadrigeminal Cistern Lipoma: A Case Report and Literature Review

Lipoma gigante de cisterna quadrigeminal: Relato de caso e revisão da literatura

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Abstract

We report the case of a giant lipoma of the quadrigeminal cistern in a 30-year-old female patient with headache, nausea, vomiting, and phono and photophobia. Despite the large size of the tumor, conservative treatment was chosen. Intracranial lipomas are rare benign tumors commonly associated with congenital anomalies, and their origin is related to an incorrect embryonic development. The diagnosis is made mainly by cranial computed tomographyand magnetic resonance imaging. The treatment of lipoma can be surgical or conservative, and there is no single treatment for the different patients' cases.

Keywords
- lipoma
- tectum mesencephali
- resonance imaging

Resumo

Relatamos o caso de um lipoma gigante de cisterna quadrigeminal em uma paciente de 30 anos, do sexo feminino, com cefaleia, náusea, fono e fotofobia, no qual se optou pelo tratamento conservador. Os lipomas intracranianos são tumores benignos raros comumente associados a anomalias congênitas, e sua origem relaciona-se ao mau desenvolvimento embrionário. A investigação diagnóstica é feita predominantemente através da tomografia computadorizada e ressonância nuclear magnética do crânio, e não existe um tratamento único para os diferentes quadros dos pacientes.

Palavras-chave
- lipoma
- teto do mesencéfalo
- imageamento por ressonância magnética

Introduction

Intracranial lipomas are rare, corresponding to about 0.1 to 0.5% of brain tumors[1–7] and are found, mainly, in the pericallosal and quadrigeminal cisterns, which represent, respectively, about 45 to 64% and 13 to 25% of intracranial lipomas.[1,2,8–11] Its origin is related to inadequate embryonic development, due to the involution of the primitive

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meninge[1–4,6–8,10–12] commonly associated with other congenital malformations.[1,3–12] These lesions are generally asymptomatic, due to slow growth,[1,4–6,8–12] so that differentiation to a malignant character has never been reported.[1] The fact that the majority of those who have intracranial lipomas do not present symptoms makes the diagnosis difficult, causing it to occur accidentally, often among patients who have other pathologies.[1,4–6,8–12] The asymptomatic course, associated to the microscopic constitution of lipomas, composed of adipose tissue surrounded by vascular elements,[1] leads many doctors to opt for conservative treatment instead of surgery, although there are cases in which surgery is necessary, such as in patients with severe symptoms.[1,2,4,6,8,10–12] However, there is no universally accepted approach to treat intracranial lipomas, since a disease has a variable course; therefore, a choice of management must be made individually. The present case report concerns a patient with a giant quadrigeminal cisternal lipoma, who received conservative treatment, due to the absence of serious symptoms, despite the size of the lesion.

Case Report

A 30-year-old woman presented with a complaint of moderate hemicranial headache, usually in the afternoon, associated with nausea, vomiting, and phono and photophobia. These symptoms worsened with physical activity, and there were no alterations at bedtime. There was also a long-standing visual aura report. Two months earlier, she developed a change in the headache pattern, now stronger in the occipital region, without nausea, vomiting, or aura; thus, it was necessary to seek the emergency room to receive intravenous medications. The patient denied diplopia, visual cloudiness, or other signs. In the diagnostic investigation, the skull computed tomography (CT) showed a median nodular formation, with fat density and dense material measuring $2.2 \times 2.0 \times 2.5$ cm, located in the topography of the perimesencephalic cistern, which may correspond to a lipoma or dermoid cyst. The skull magnetic resonance imaging (MRI) (►**Fig. 1**) showed an extra-axial oval formation measuring $2.2 \times 1.9 \times 1.9$ cm, with a fat-like signal in all sequences located in the cistern of the quadrigeminal plate, without uptake of contrast or diffusion restriction, also suggesting as diagnostic possibilities a lipoma or a dermoid cyst. A proton spectroscopy study was performed to better elucidate the diagnosis, which revealed an extra-axial lesion in the quadrigeminal/pineal cistern, measuring $2.5 \times 2.0 \times 1.7$ cm, according to the images of the usual protocol, without evidence of brain metabolites in this topography. These characteristics strongly suggested the possibility of a lipoma. Conservative treatment was the option adopted by the team.

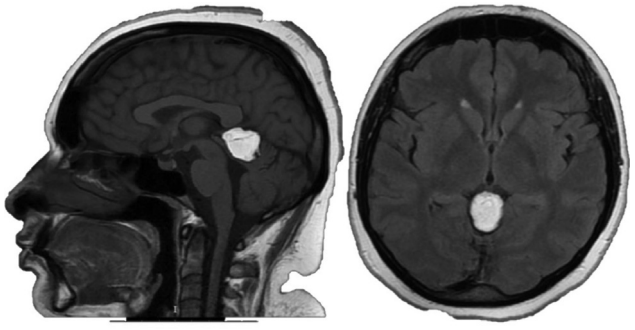

Fig. 1 Brain MRI FLAIR weighted image.

Literature Review and Discussion

Intracranial lipomas correspond to rare benign tumors, whose etiology is not fully elucidated.[1–7] There are a lot of theories about the origin of these lesions, and the prevalent hypothesis suggests that its etiology is related to inadequate development of the primitive meninges.[1–4,6–8,10–12] In addition, there is an inadequate development of the subarachnoid spaces.[7] This condition allows that nerves and vessels pass through the tumors.[7] When lipomas are located in the quadrigeminal cistern, they are generally asymptomatic or associated with mild symptoms, such as headache.[1,4–6,8–12] However, patients may manifest diplopia and hydrocephalus, due to possible compression in the cerebral aqueduct, causing signs of increased intracranial pressure.[1,2,6–13] In addition, in cases of extensive quadrigeminal lipomas, brainstem and cerebellum compression may occur, causing Parinaud syndrome and cerebellar symptoms.[1] The patient in question presented headache, nausea, vomiting, as well as phono and photophobia. Often, patients with lipoma may present associated congenital malformations, which are responsible for the appearance of some symptons.[1,3,7,9,10] Lipomas of the quadrigeminal cistern, however, are not frequently related to embryological abnormalities, as opposed to lipomas of the corpus callosum.[2,3,7–10,12] The diagnosis of lipomas is commonly accomplished through CT and MRI of the skull.[1,4–12] Confirmation made by histopathological analysis is not generally used, since the findings of these imaging tests, associated with the patient's clinical condition and the differential diagnosis are tools that show characteristics strongly suggestive of lipomas.[12] On CT, these lesions appear with marked homogeneous hypodensity and with fat density (-40 to -100 Hounsfield).[1,2,4,5,7–9,11] In MRI, in T1-weighted sequence, lipomas appear in hypersignal, whereas in T2, they present isohypointensity.[1,2,4–12] In a fat-sat T2 sequence, there is a homogeneous decrease in the lipoma region, due to its abundant adipose content.

These imaging methods are essential for the differential diagnosis, which includes other adipose lesions, such as a dermoid tumor. On the CT, both have similar characteristics, showing an aspect of hypodensity, with variation in the values acquired on the Hounsfield scale, since dermoid tumors show rates between 20 and 40 HU. On the MRI, these two lesions are also similar, as they produce high signal intensity in T1-weighted images and low signal intensity in T2. Dermoid tumors, however, unlike lipomas, may not be homogeneous on resonance, due to the presence of skin and hair.[1,2,4,5,7,9,12]

The treatment of intracranial lipomas differs according to the patient's condition and clinical manifestation, and there is no single and universal management for the resolution of these tumors. In this context, surgery to remove the tumor is

Table 1 Quadrigeminal Cistern Lipoma Reports

Article (author; year)	Gender	Age	Symptomatology	Measure	Treatment
Ammor and Ajjal; 2015[13]	M	55	Headache and complex partial seizures	3 × 2.7 cm	Conservative
Mashiko and Shibata 2014[14]	M	51	No symptoms related to lipoma**	–	Conservative
Ono et al.; 1998[15]	M	7	Seizures	–	Conservative
Baeesa et al.; 1996[16]	F	15	Headache associated with nausea and vomit	1.5 × 1.5 × 2.0 cm	Surgery - partial excision
Baeesa et al.; 1996[16]	F	Neonate	Asymptomatic	1.4 × 1.0 × 1.0 cm	Conservative
Nikaido et al.; 1995[17]	M	65	Involvement of abducent nerve	3.3 × 3.0 × 3.0 cm	Surgery – total excision
Kawamata et al.; 1995[5]	M	Neonate	Hydrocephalus	1.2 × 1.0 × 9.0 cm	Surgery*
Kapoor et al.; 2015[11]	M	31	Asymptomatic	–	Conservative
Kapoor et al.; 2015[11]	M	36	Headache e dizziness	–	Conservative
Kapoor et al.; 2015[11]	M	42	Headache	–	Conservative
Majumdar et al.; 2013[2]	M	10	Headache. vomiting associated with eyelid fall	2.5 × 2 × 1.5 cm	Surgery*
Chaurasia et al.; 2017[12]	M	19	Headache. visual disorders. hydrocephalus	2.1 × 1.9 cm	Surgery*
Rahman e Arshad.; 2014[18]	F	3	Headache	–	Conservative
Yilmaziar et al.; 2005[1]	M	37	Nausea. vomiting and headache	3 × 3 cm	Surgery–total excision
Ogbole et al.; 2019[19]	M	70	Headache and transient loss of consciousness	1.3 × 0.9 cm	Conservative

*Surgery performed for symptom relief without tumor excision.
**The patient had symptoms, but these were not caused by the lipoma.
Note: Only papers with case reports were included in the table.

usually performed in severely symptomatic patients, in order to prevent neurological deterioration.[1,2,4,6,8,10–12] In individuals with severe hydrocephalus secondary to lipoma obstruction, for example, it is possible to perform a bypass surgery in order to relieve symptoms,[2] while in those who have a marked mass effect, a resection of the tumor[1] can be chosen.[2,4,6,8,10–12]

Thus, when a surgical treatment is chosen, great caution and detail is necessary, since the tendency of the lipoma to adhere neural tissue and the presence of adjacent vascular elements makes this technique risky, so partial resection is recommended by many authors.[1–3,6]

In cases of asymptomatic individuals or those presenting mild symptoms, it is necessary to consider conservative treatment in the first instance, due to risks and difficulties of surgery, related to the fact that lipomas have a slow growth, which makes surgical management to be, many times, an unnecessary and dangerous approach.[1,2,4,6,8,10–12] Thus, as the patient in the case has an extensive lipoma, measuring 2.5 × 2.0 × 1.7 cm, but did not present very severe symptoms or signs of neurological deterioration, conservative treatment was chosen.

Several cases of patients with lipoma in the quadrigeminal cistern were selected for this literature review, following a search in the Pubmed, Cochrane Library, Scielo, and Scopus databases. Only papers with case reports were included, which are shown in ►**Table 1**. In the analysis of articles, it was observed that the manifestation of symptoms in individuals who have lipoma in this location is variable, but a large number of subjects presented headache. Moreover, due to the presented difficulties of surgical treatment, this approach was not applied to all the patients. It was observed that the excision of the tumor mostly occurred when there were alarming signals, such as those with a mass effect. However, the choice of treatment is not unique either, and the most frequently observed treatment choice in this analysis was conservative, so that surgery was an effective alternative, especially for symptom relief.

Conclusion

Intracranial lipomas are tumors characterized by slow growth and strong adherence to vascular structures and neural tissue, leading the neurosurgeon to reflect and be cautious to indicate the most appropriate conduct for the individual. Our case report concerns an extensive quadrigeminal cistern lipoma in which conservative treatment was chosen due to mild symptoms presented by the patient. In conclusion, the size of lipoma is not a determinant factor for the choice of treatment. It is necessary to analyze the patient

clinical presentation to elect the most pertinent approach for each situation.

Conflict of Interests
The authors have no conflict of interests to declare.

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