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Case Report

Infantile Dermoid Cyst in the Lateral Wall of the Cavernous Sinus: A Case Report and Literature Review

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Dermoid tumors originating from the cavernous sinus are typically intradural, and thus, presentation with ophthalmoplegia is uncommon. Infantile dermoid tumors originating from the interdural space of the lateral wall of the cavernous sinus are also very rare. We herein present a 4-year-old infantile case of a dermoid cyst that was embedded in the lateral wall of the cavernous sinus. The patient presented with oculomotor nerve palsy. Magnetic resonance image demonstrated a well-circumscribed oval lesion inside the lateral wall of the left cavernous sinus. The lesion had two solid components that were hyperintense on T1- and T2-weighted images and was associated with a cystic mass that included fluid with the same signal intensity as cerebrospinal fluid. Gross total removal via a frontotemporal approach was performed. The symptoms markedly recovered in the 6-month follow-up. To the best of our knowledge, there have only been two reports of infantile dermoid cysts in the lateral wall of the cavernous sinus. We herein describe their clinical characteristics with the previous review and introduce surgical tips for the resection.

Keywords: cavernous sinus, dermoid cyst, dermoid tumor, oculomotor nerve

Introduction

Dermoid cysts are rare tumors that account for less than 1% of intracranial tumors.[1–3] They are benign congenital tumors that are considered to originate from the ectopic inclusion of epithelial cells during closure of the neural tube in the 3–5 week of embryonic development.[1,4,5] Dermoid cysts are mostly infratentorial lesions and rarely occur in the supratentorial compartment[1,6]; their preferred location is the suprasellar region.[1,6] Supratentorial dermoid cysts are generally diagnosed in patients in their 20s and 30s[7–9] and are rarely located in the cavernous sinus.[7–20] Dermoid cysts localized in the lateral wall of the cavernous sinus are very rare and have only been reported in seven cases, including two infantile cases.[9,14] We herein present a case of an infantile dermoid cyst that occurred in the interdural space of the lateral wall of the cavernous sinus and clinical characteristics with a literature review.

Case Report

A 4-year-old boy presented with a 1-month history of left ptosis. An ophthalmological examination showed left third cranial nerve palsy with crossed diplopia, upper-eyelid ptosis, anisocoria with left slight mydriasis, conjugate deviation to the left, and a sluggish left pupillary light reflex (Fig. 1C). Magnetic resonance images revealed a well-circumscribed oval lesion inside the lateral wall of the left cavernous sinus. The lesion had two solid components that were hyperintense on T1- and T2-weighted images and was associated with a cystic mass that included fluid with the same signal intensity as cerebrospinal fluid (Figs. 1A and 1B). There was no enhancement on T1-weighted images obtained after an injection of gadolinium. The solid lesion was suspected to be a lipid-rich mass. The left oculomotor nerve was compressed antero-laterally over the cystic mass. The differential diagnosis was a dermoid cyst, arachnoid cyst, third nerve neurinoma, teratoma, cystic glioma, or craniopharyngioma. Clinical and radiological findings supported the diagnosis of a dermoid cyst, teratoma, or craniopharyngioma. Therefore, direct surgery was offered as the best treatment. The patient underwent surgical removal of the lesion after his parents provided informed consent according to our institutional code of ethics.

Left frontotemporal craniotomy was performed after a curvilinear skin incision was made behind the hairline. The dura mater was opened with a C-shaped incision, and the arachnoid layer was microsurgically dissected to open the anterior half of the Sylvian fissure. The left internal carotid artery and left optic nerve were visualized, along with a whitish mass bulging through the lateral wall of the cavernous sinus. The third nerve was swollen and extended (Fig. 2A). The outer layer of the lateral wall and oculomotor pore were observed. The lateral side of the oculomotor pore was incised to the third nerve and the inside of the lateral wall of the cavernous sinus was exposed. The whitish tumor mass was located inside the lateral wall of the cavernous sinus and was progressively removed in a piecemeal manner from the inner side of the capsule without bleeding. The tumor consisted of a whitish lipid-rich soft material with hair tufts. The dense, milky, and greasy fluid was aspirated and numerous white hair tufts were removed from the inner side of the firm capsulated lesion (Fig. 2B). At the end of gross-total removal, the third nerve was decompressed.

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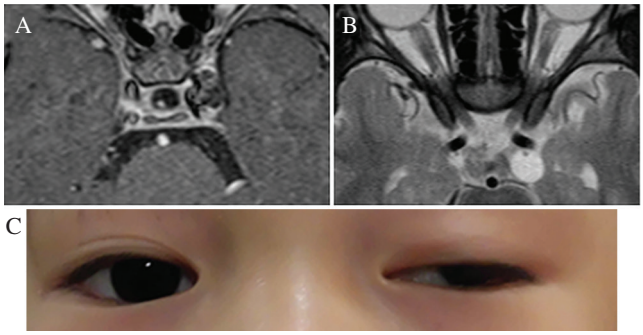

Fig. 1 Preoperative MRI showing the left interdural cavernous sinus dermoid cyst (A) T1-weighted image, (B) T2-weighted image. A T1-weighted image showing a smooth, oval, hypointense lesion inside the lateral wall of the cavernous sinus. A T2-weighted image showing a solid mass associated with the cystic lesion at the posterior portion. Preoperative ocular findings (C). Left third cranial nerve paresis was presented with upper eyelid ptosis and the lateral deviation.

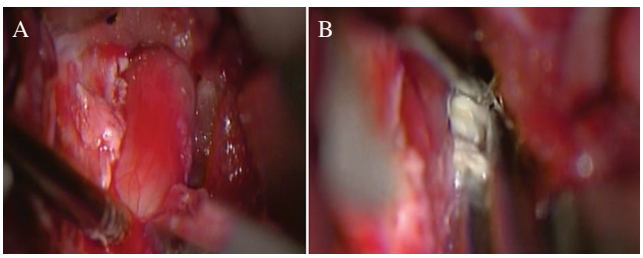

Fig. 2 Microsurgical intraoperative findings showing a reddish swollen third nerve (A) and whitish dense inclusions with white hair tufts (B).

The post-operative course was uneventful and ptosis gradually improved. The patient was discharged 14 days after surgery with no new neurological issues. A pathological examination confirmed that the tumor was a dermoid cyst with abundant keratotic material and columnar epithelial cells (Fig. 3A). Marked mitosis and nuclear dysplasia were not observed. Three months after surgery, magnetic resonance imaging (MRI) showed gross-total removal with decompression of the cavernous sinus and neurovascular structures without tumor recurrence (Fig. 3B). By the 6-month follow-up, ptosis and the ocular movement disturbance had gradually recovered (Fig. 3C).

Discussion

Dermoid cysts have thick walls lined by a keratinized squamous epithelium and supported by a well-formed dermis containing skin appendages, such as hair, hair follicles, sebaceous and sweat glands, and teeth or nails, which are considered to originate from ectodermic remnants.[1,2,7] Cyst material may vary in consistency depending on the ratio of the various elements within the wall.[1,7] Dermoid cysts are typically located near midline structures, and mostly occur in patients in their 20s and 30s.[8,18] They are generally located in the infratentorial compartment, while the suprasellar, parasellar, temporal,

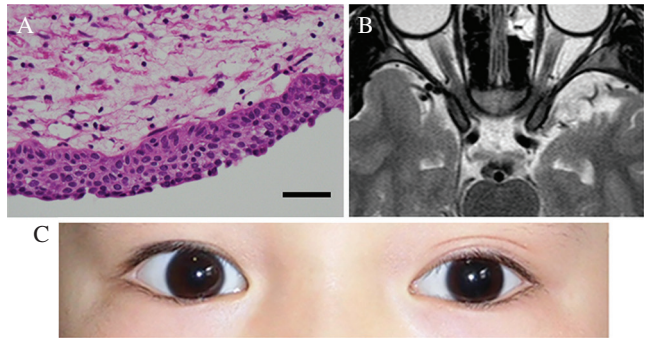

Fig. 3 A pathological examination revealed dermoid cysts with stratified columnar epithelial cells and goblet cells (Hematoxylin and eosin staining in (A), bar; 40 μm). Postoperative magnetic resonance T2-weighted image showing the disappearance of the solid lesion and cystic mass (B). Postoperative ocular findings (C). Upper eyelid ptosis and the lateral deviation improved after surgery.

and frontobasal regions are commonly affected in the supratentorial compartment.[18]

Extradural or interdural dermoid cysts originating from the cavernous sinus are very rare.[8,10,13,19–21] To the best of our knowledge, there have only been two case reports of infantile interdural cavernous sinus dermoid cysts (Table 1).[9,14] The lateral dural wall of the cavernous sinus is composed of two layers, the outer dural layer and inner membranous layer.[21] Tumors arising from components of the lateral dural wall are located between these two layers and are classified as interdural.[14,19]

In the present case, a tumor located in the interdural cavernous sinus and was approached along to the third cranial nerve via trans-sylvian approach. Tumor capsule was destroyed at the posterior portion of the third cranial nerve and the inside was evacuated. Incision of the lateral wall of cavernous sinus contributed to the mobilization of the third cranial nerve and the broad operative field to remove without venous bleeding. As surgical tips, deliberate incision of the lateral wall along to the third nerve was important to secure safer surgery and preservation of function of the third cranial nerve. Maintaining tumor capsule formation was important to keep attentive manipulation for the cranial nerve and not to litter the tumor pieces arachnoid space.

The main surgical challenge associated with our patient was the difficulty in achieving total removal of the lesion. The capsulated tumor adhered to the medial side of the swollen third nerve. Total removal of the capsule after aspiration of the inclusions was difficult. The attenuation of diplopia and third nerve weakness with no new deficit in our patient were attributed to the safe removal of the dermoid cyst. Even though total removal is ideal, it may not be possible in all cases. Lunardi et al. and Yaşargil et al. reported no recurrence even after subtotal excision.[8,20] Yaşargil et al., in their landmark series of 43 operated patients with dermoids and epidermoids, reported meningitis and transient cranial nerve palsies as the most common postoperative complications.[20] Tun et al. also demonstrated that the recurrence rate after subtotal removal was slightly low.[19] High risk

Table 1 Infantile interdural cavernous sinus dermoid cysts

Author	Age	Sex	Clinical findings	Localization	Approach	Removal	Complication	Follow-up (months)	Outcome
North KN[9)]	4	Boy	Oculomotor palsy	Interdural	N/A	Total	No	12	Full recovery
Giordano F[14)]	5	Boy	Headache, diplopi, ptosis	Interdural	Frontotemporal	GTR	No	12	Partial recovery
Present case	4	Boy	Ptosis	Interdural	Frontotemporal	GTR	No	6	Partial recovery

GTR: gross total removal, N/A: no applicable.

of morbidity has to be considered in the difficult cases in which the lesion adheres to neurovascular structures.

In conclusion, interdural cavernous dermoid tumors need to be evaluated radiologically to develop an appropriate surgical strategy. Complicated anatomical structures surrounding to the lesion should be preoperatively examined and the extent of the adhesion to the basal neurovascular structure should be intraoperatively evaluated during removal of the lesion.

Informed Consent

The patient has consented to submission of this case report to the journal.

Conflicts of Interest Disclosure

We have no potential conflict of interest.

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