Chronic, Traumatic Intraconal Hematic Cyst of the Orbit Removed Through the Fronto-orbital Approach

—Case Report—

Akira IWATA, Takashi MATSUMOTO, Mitsuhiro MASE, and Kazuo YAMADA

Department of Neurosurgery, Nagoya City University Medical School, Nagoya

Abstract

A 22-year-old male presented with a chronic encapsulated intraorbital hematoma 3 months after blunt trauma to his left eyeball. Ophthalmological examination found the best corrected visual acuity was 4/20 in the left eye, and 20/20 in the right eye. The orbit exhibited exophthalmus and inability of the eye to move above the horizontal level. Orbital magnetic resonance imaging showed a fairly well-demarcated area in the medial aspect of the orbit appearing as hyperintense on T₁-weighted images and iso- to hyperintense on T₂-weighted images. This area was believed to be hemorrhage. No other abnormalities were found. The diagnosis was hematic cyst. The cyst was approached through a left fronto-orbital route and its location identified within the periorbita and orbital fat. The cyst was removed partially. Histological examination demonstrated cystic accumulation of blood and breakdown products in a non-epithelium-lined fibrous capsule, compatible with hematic cyst. The presence of hemosiderin in the cyst wall suggested that the cyst was a chronically enlarging lesion. Hematic cysts of the orbit usually present as subperiosteal mass months to years after trauma. Surgical removal of the cyst wall rather than needle aspiration is recommended to prevent recurrence.

Key words: hematic cyst, hemorrhage, orbit, trauma, fronto-orbital approach

Introduction

Hemorrhage within the orbit occasionally occurs after trauma. If spontaneous resolution does not occur, a localized space-occupying mass called a hematic cyst may be found and require surgical removal. Post-traumatic hematic cysts are typically chronic and located subperiosteally.^{2,10,13,19,20,22} Hematic cysts may arise spontaneously in intraconal^{1,3,6)} or subperiosteal¹⁾ orbital locations or as chronic subperiosteal orbital masses,^{1,2,10,13,21)} but usually occur 10 days to 20 years after orbital trauma.^{15,19,20,22)} Six post-traumatic hematic cysts occurred among 764 orbital lesions at Mayo Clinic from 1948–1980.⁷⁾

We describe a case of an intraconal orbital hematic cyst with chronic onset secondary to blunt orbital trauma which was removed through the fronto-orbital approach.

Case Report

A 22-year-old male developed left eyelid edema and noted double vision on upward gaze 16 days after blunt trauma to the left eye. After he consulted an ophthalmologist, prednisolone was administered orally with reduction of proptosis and edema. His vision and eye movement improved for a month, but deteriorated again. Three months after trauma, he again noted double vision and visual disturbance, and was referred to us for surgical treatment.

Ophthalmological examination showed his best corrected visual acuity was 4/20 in the left eye, and 20/20 in the right eye. He had exophthalmus, 4 mm proptosis of the left eye, and inability to gaze upward above the horizontal level. Funduscopic examination found prominent left choroidal folds.

Orbital magnetic resonance (MR) imaging showed a fairly well-demarcated area in the medial aspect

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Author's present address: A. Iwata, M.D., Division of Neurosurgery, University of Pennsylvania Medical Center, Philadelphia, Pennsylvania, U.S.A.

Fig. 1 Magnetic resonance images of the orbit, (left) one month after trauma showing the intraconal well-demarcated cyst compressing the left optic nerve laterally and medial rectus muscle medially, (center) 3 months after trauma showing increased compression of the left optic nerve by cyst, and (right) after operation showing complete disappearance of the cyst.

of the orbit appearing as hyperintense on the T₁-weighted images and isointense or hyperintense on the T₂-weighted images 1 month (Fig. 1 left) and 3 months (Fig. 1 center) after the trauma. This area was believed to be hemorrhage. No other abnormalities were found. The diagnosis was hematic cyst.

The lesion was approached through a left fronto-orbital craniotomy with removal of the medial two-thirds of the orbital rim on June 15, 1998. A fracture of the orbital roof and a tear in the periorbital were identified. After removal of the orbital roof, the medial part of the periorbital was found to be redish-brown. A blunt needle (20 gauge) was inserted into the cyst and approximately 2.5 ml of dark blood was aspirated. The fluid was placed in a test-tube, but did not clot after an hour. The cyst was located within the periorbital and orbital fat, not subperiosteally. An attempt was made to dissect the cyst wall, but it had adhered tightly to the muscle cone or optic nerve, and so part of the cyst wall was left in place.

Postoperatively, his vision improved to 20/20, and ocular movement improved to minimal limitations in upward gaze. The exophthalmus and choroidal folds resolved completely. Orbital MR imaging one month after the operation showed complete disappearance of the cyst (Fig. 1 right).

Histological examination showed the lesion consisted of a cyst containing some old, dark blood. Adherent orbital fat surrounded the entire cyst. The cyst wall was composed of fibrous connective tissue located parallel to the cyst lumen (Fig. 2 upper left). Many fine capillaries were present within the cyst wall. Macrophages were most prominently located in the outer cyst wall (Fig. 2 upper right). No major

Fig. 2 Photomicrographs of the excised portion of the cyst wall, showing (upper left) a thick layer of fibrocollagenous tissue with pigmented macrophages, (upper right) macrophages as immunopositive cells contained pigmented deposits, (lower) an area of darkly staining pigmented deposits indicating hemosiderin. Endothelium or epithelium is not seen. upper left: HE stain, original magnification $\times 125$; upper right: anti-macrophage immunostain, original magnification $\times 250$; lower: Berlin blue stain, original magnification $\times 250$.

vessels appeared to be present. Staining for hemosiderin was most strongly positive within the outer cyst wall (Fig. 2 lower).

Discussion

Review of 21 cases of cystic orbital lesions containing blood showed that 13 cases were either subperiosteally located or close to the nearby periosteum. Only three of the 21 cysts were within the muscle cone and only one patient had a known history of trauma with acute onset.⁴⁾ Our patient also had a "chronic" intraconal hematic cyst with an exact history of trauma, whereas the previous patient had an acute intraconal orbital hematic cyst within 9 days after trauma.⁴⁾

The term "hematic cyst" refers to a cystic accumulation of blood or blood breakdown products in a non-epithelium-lined fibrous tissue capsule.^{3,7,17)} Painless and nonprogressive unilateral proptosis is a common sign of chronic hematic cyst. "Blood cyst" usually describes bleeding into cavernous hemangiomas, lymphangiomas, or dermoid cysts.^{11,14,18)} Such blood cysts are lined by epithelium and usually located in the intraconal region. "Hematocele" is an inexact term describing either acute or chronic, or primary or secondary, accumulations of blood.¹⁷⁾ "Cholesterol granuloma" is a post-inflammatory pseudotumor without epithelial elements, not necessarily related to trauma, and located in the superotemporal aspect of the orbit.¹⁶⁾ The microscopic appearance of cholesterol granuloma is similar to hematic cyst, but hematic cyst is a more appropriate term because remote trauma is usually a predisposing factor.⁷⁾ There is some confusion in nomenclature surrounding this entity.¹⁵⁾ The term chronic cyst has been proposed to define specifically nonacute cystic accumulation of blood breakdown products surrounded by a granulomatous reaction, and with a fibrous pseudocapsule lacking an epithelial or endothelial lining.¹³⁾

The pathogenesis of hematic cyst is unclear. The cause may be chronic subperiosteal hemorrhage,¹⁰⁾ or bleeding arising within the bony diploe and ultimately breaking out into the subperiosteal space.¹²⁾ Orbital fat necrosis follows injury of the orbit.¹⁴⁾ The result is a solid mass characterized histologically by a granulomatous reaction area of fat necrosis. Three cases of spontaneous hemorrhage occurred within the rectus muscle, and resolved spontaneously in a few weeks.⁵⁾ The bleeding may have arisen within the extraocular muscles into the intraconal space as in our case.

The mechanism leading to the enlargement of hematic cysts is unknown, but probably related to that of chronic subdural hematoma. The outer membrane of chronic subdural hematoma contains a high concentration of tissue plasminogen activator, which causes fibrinolytic activity and may lead

to recurrent hemorrhage.⁸⁾ This process is aided by the anticoagulant effect of fibrinogen degradation products found in the fluid.⁹⁾

Subacute hematomas in the central nervous system are characterized by hyperintense rings on both T₁- and T₂-weighted images due to accumulation of methemoglobin in the periphery.⁵⁾ The differential diagnosis includes neoplasms and inflammation. However, the diagnosis should be easily established based on the clinical presentation combined with the computed tomography and MR imaging. Some cases of orbital hemorrhage develop into chronic hematic cysts and the differentiation from expanding neoplasm often requires surgical exploration.

Needle aspiration of the blood from the hematic cyst results in almost immediate resolution of all orbital and ocular problems.^{20,23)} Hematic cyst may recur after needle aspiration. The majority of spontaneous hemorrhage demonstrated by venographic or pathologic examination contains venous anomalies.¹¹⁾ Therefore, needle aspiration of hematic cyst would appear to be more dangerous than entire removal. However, full excision of the cyst wall is not possible due to the intricate adherence to surrounding tissue. The surgical approach should use standard orbital incision to provide optimal visualization, with complete removal of the mass as the surgical goal.¹³⁾ In our case, we chose the fronto-orbital approach to obtain a good view of the upper-medial orbit and achieve favorable cosmetic results. We attempted to completely excise the cyst wall, which adhered closely to the surrounding orbital tissue, but only partial removal was possible. Good surgical exposure of hematic cysts of the orbit with removal of a portion of the fibrous wall and hemostasis appears to be the most beneficial approach.

Histological examination of the cyst consistently found a fibrous pseudocapsule surrounding granulomatous reaction to blood breakdown products, including hemosiderin and lipid-laden macrophage, and lacking epithelial or endothelial lining. The presence of hemosiderin in the cyst wall suggests that the cyst was a chronically enlarging lesion.

The prognosis for such patients is favorable for visual acuity, resolution of globe displacement and diplopia. Recurrence of pure chronic hematic cyst has not been recorded, and has not occurred to date in our patient.

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Address reprint requests to: A. Iwata, M.D., Department of Neurosurgery, Nagoya City University Medical School, 1 Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya 467-8601, Japan.