Orbital Varix Diagnosed by Color Doppler Flow Imaging

—Case Report—

Shoichiro KAWAGUCHI, Hiroyuki NAKASE, Hiroshi NOGUCHI, Taiji YONEZAWA, Tetsuya MORIMOTO, and Toshisuke SAKAKI

Department of Neurosurgery, Nara Medical University, Kashihara, Nara

Abstract

A 66-year-old male presented with an angiographically occult orbital varix. Angiography and phlebography failed to demonstrate the lesion. Computed tomography angiography showed the varix, but not the vascular flow. Color Doppler flow imaging clearly demonstrated the well-defined varix with slow flow velocity, as well as the precise anatomical location. We recommend color Doppler flow imaging as one of the differential diagnostic tools for intraorbital vascular lesions.

Key words: Doppler flow imaging, orbital phlebography, orbital varix

Introduction

Orbital vascular diseases are occasionally treated by neurosurgeons and sometimes present difficulties in diagnosis and management. The most common orbital vascular lesions are capillary hemangioma, cavernous hemangioma, lymphangioma, and hemangiopericytoma. Orbital varix is the most common venous malformation of the orbit, constituting 13.4% of all primary orbital mass lesions and 4.3% of all causes of unilateral exophthalmos. Orbital varix is either a local dilatation of an otherwise normal venous system or a series of abnormal venous channels affecting the superior and/or inferior ophthalmic vein. Orbital varices may be congenital anomalies or secondary ectasias of pre-existent orbital veins. Congenital orbital varices most often present with unilateral intermittent proptosis which is exaggerated by Valsalva maneuver, jugular vein compression, coughing, nose blowing, or placing the head in a dependent position. The diagnostic characteristics are based on computed tomography (CT) and angiographical findings, including orbital phlebography. However, phlebography may result only in partial filling or no filling of the varix. Such lesions are difficult to diagnose as a varix.

We describe a case of angiographically occult orbital varix diagnosed by orbital color Doppler flow imaging.

Case Report

A 66-year-old male gradually experienced double vision with swelling of the eyelid and chemosis in the right eye 2 months before admission. He then had ocular proptosis in the right eye. The patient visited his home doctor, but was referred to our hospital for further examination and treatment.

On admission, the patient complained of double vision with downward gaze and conjunctival swelling in the right eye. Neurological examination found right chemosis, right ocular proptosis, and mild disturbance in right eye movement with downward gaze. Conjunctival congestion, eyelid swelling, and ocular proptosis were not exaggerated by changes in the head position or Valsalva maneuver. Herter exophthalmometry measured a 3-mm outward displacement of the right eye. His visual acuity was 0.05 on the right and 0.9 on the left. Funduscopic findings, visual fields, and ocular tensions were normal on both sides.

Radiography of the skull and orbit was normal. CT without contrast enhancement showed a high density mass in the upper part of the right orbital cavity, which was enhanced homogeneously after the injection of contrast medium (Fig. 1). Three-dimensional CT angiography showed a dilated tortuous mass located in the upper part of the orbit and below the superior rectus muscle (Fig. 2). Right carotid an-
An ophthalmologic examination showed no marked abnormalities. Orbital phlebography was performed with injection of contrast medium into bilateral frontal veins. The superior orbital vein was narrowed and slightly deviated in the medial inferior direction on the right, but no marked vascular lesion was identified (Fig. 3).

Real-time color Doppler flow imaging of the right orbit showed a well-defined structure (Fig. 4). The flow within this structure was slow away from the probe (depicted in blue) with partial thrombosis. The venous-like flow did not depend on respiration distress. The flow velocities in the lesion were 3 cm/sec.
at minimum and 4 cm/sec at maximum.

His clinical symptoms were not typical of orbital varix, and carotid angiography and orbital phlebography did not reveal any vascular lesion. However, CT angiography showed findings compatible with varix of the superior ophthalmic vein, but not the real flow in the varix. Color Doppler flow imaging showed the flow velocity and flow direction of varix, and was conclusive in the morphological and dynamic aspects. Therefore, the diagnosis was angiographically occult orbital varix. He was conservatively treated with predonine 10 mg/day for 7 days. Two weeks later, the chemosis was almost resolved. The right ocular proptosis and diplopia with downward gaze gradually improved, but were not resolved. However, he had no problem with his daily activities, and he was discharged from our hospital without further treatment.

### Discussion

Patients with primary orbital varices typically present with unilateral intermittent exophthalmos which changes with the posture and during the Valsalva maneuver, and is often associated with diplopia and retrobulbar discomfort or pain. Our patient had diplopia with downward gaze and exophthalmos not changing during positional movement and Valsalva maneuver, and his diplopia had persisted for about more than 3 months with gradual resolution. This phenomenon was probably due to a thrombosis formed by long-standing blood collections, as suggested by the color Doppler flow imaging and orbital phlebography findings. Therefore, our case did not show the typical clinical symptoms of orbital varix, and was one of the diagnostic problems. However, we were able to exclude other intraocular vascular or tumor lesions as hemangioma, cavernous hemangioma, lymphangioma, and hemangiopericytoma.

The characteristic CT appearance of an orbital varix is a round or lobulated intracoronar or extracoronar mass with intense contrast enhancement, which enlarges with increased venous pressure. CT can also detect a phlebolith, hemorrhage, or an acutely thrombosed varix. CT with contrast medium may also detect a phlebolith, hemorrhage, or an acute thrombosis formed by long-standing blood collection. However, venography may result only in partial filling or no filling at all of the varix. CT angiography showed findings compatible with varix of the superior ophthalmic vein, but not the real flow in the varix. Phlebography of orbital varix typically shows an irregular segmental dilatation of the venous outflow system or a local saccular dilatation. Therefore, venography may result only in partial filling or no filling at all of the varix. CT may be a more sensitive tool for detecting such lesions. In our case, CT and three-dimensional CT angiography showed typical findings of the orbital varix, which were useful for identifying the correct anatomical location, size, and nature of the lesion. However, orbital phlebography yielded no useful information in our case. Therefore, orbital color Doppler flow imaging was used as the final diagnostic tool.

Orbital sonography has become a mainstay for the evaluation of suspected orbital diseases. Recently, the value of color Doppler flow imaging has been demonstrated in the evaluation of suspected intraocular and extraocular lesions, localization of foreign bodies, detection of retinal/choroidal detachment, and measurement of various intraorbital structures. Invasive modalities, such as orbital venography and cerebral angiography, are used to diagnose orbital varix, but false negatives do occur. In a case like ours, orbital sonography and color Doppler flow imaging are useful to diagnose and evaluate orbital vascular lesions, because the flow direction and velocity, and the inner part of the lesion are visualized. In our case, color Doppler flow imaging showed a dilated mass with partial thrombosis in the retrobulbar region that exhibits slow venous flow away from the probe. The flow direction of the lesion was toward the cavernous sinus, which meant the preservation of the physiological flow direction of the intraorbital venous system. Therefore, we could exclude the lesions with dilated veins resulting in abnormal flow direction such as carotid cavernous fistula. The flow velocity of the central retinal vein has a mean maximum velocity of 6.1 cm/sec and mean minimum velocity of 3.8 cm/sec. The mean flow velocities of the varix in our patient were 4 cm/sec at maximum and 3 cm/sec at minimum. We also measured the velocity of the superior ophthalmic vein on the contralateral side as 6 cm/sec at maximum and 4 cm/sec at minimum. Therefore, the flow velocities in the varix were low compared to normal values. We recommend color Doppler flow imaging as one of the differential diagnostic procedures for intraorbital mass lesions.
References


Address reprint requests to: S. Kawaguchi, M.D., Department of Neurosurgery, Nara Medical University, 840 Shijo-cho, Kashihara, Nara 634, Japan.