Subarachnoid Hemorrhage Following Angioplasty and Stenting in a Patient with Primitive Drainage Pattern of the Basal Vein of Rosenthal

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Severe visual loss may occur in patients with pseudotumor cerebri (PTC), also known as idiopathic intracranial hypertension. Transverse sinus stenosis is 1 cause of PTC syndrome. Although the role of transverse sinus stenosis in the pathogenesis of the disease remains controversial, recent case series of transverse sinus stenting have reported very high rates of symptom response and resolution of papilledema with improvement or at least stabilization of the visual fields and visual acuity (Ahmed et al., 2011).[1] We report a previously unpublished complication of diffuse, nonaneurysmal subarachnoid hemorrhage following angioplasty and stenting in a patient with refractory PTC. **Key Words:** Pseudotumor cerebri—subarachnoid hemorrhage—idiopathic intracranial hypertension—basal vein of Rosenthal—stent—transverse sinus stenosis.

Case Report

A 51-year-old woman was referred to the interventional neuroradiology service for evaluation of venous sinus stenosis. She had been referred to neuro-ophthalmology approximately 5 years previously with bilateral disc edema and symptoms classical for pseudotumor cerebri, including multiple transient visual obscurations (TVOs) daily along with tinnitus and postural headache. The appropriate workup was performed including magnetic resonance imaging and magnetic resonance venography, which showed a dominant right transverse sinus and a partial empty sella, which was consistent with pseudotumor cerebri. The lumbar puncture had an opening pressure of 450 mm H_2O and was otherwise normal. The patient's weight was only 150 lb at the onset of the disease, and despite losing almost 10% of her body weight, the visual field showed an increase in the size of the blind spot and subsequent nasal step in the left eye over the next 4 months. Surprisingly, the patient did not have any subsequent headaches. She was diagnosed with pseudotumor syndrome and was initially managed with medication (acetylzolamide 500 mg QID; max. tolerated). The headache resolved with the acetylzolamide therapy and disconcertingly did not reoccur despite worsening visual fields, especially in the left eye. The opening pressure remained high (350-400 mm H_2O), and an optic nerve sheath fenestration (ONSF) was performed in the left eye.

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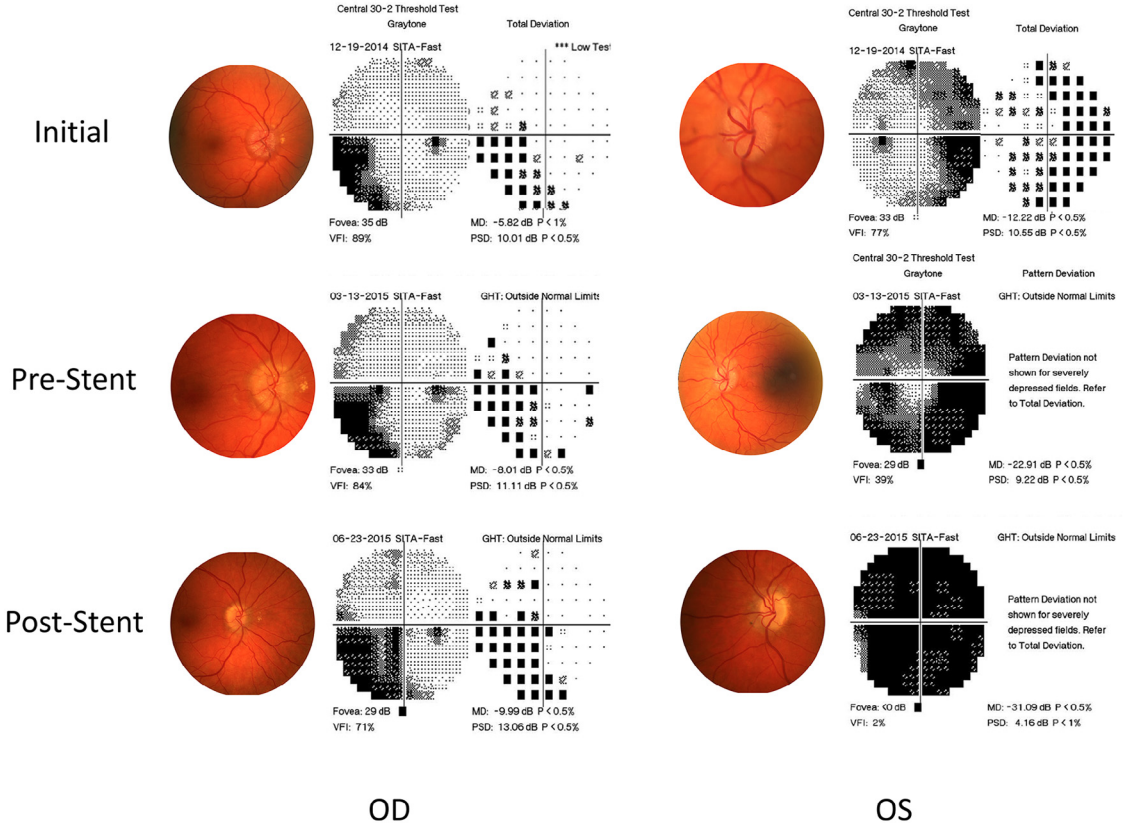

Figure 1. *Color fundus images and corresponding visual fields for the initial visit, pre stent and post stent after the shunt and hospital admission.*

Despite the ONSF, the opening pressure remained elevated at 350 mm H_2O, necessitating continued oral acetylzolamide therapy. The visual fields did stabilize with a small nasal step in the right eye and a larger nasal defect in the left eye. On examination, the amount of optic nerve edema also decreased, and the nerves showed signs of gliosis (Fig 1). The TVOs also improved, and the patient had only occasional tinnitus.

The patient remained relatively stable for the next 4 years but then returned with decreased vision in the right eye with progressive loss of the visual field and worsening of the nasal step. There was further decline consisting of increased optic nerve edema and decreased color vision in spite of maximally tolerated medical management and serial lumbar punctures. ONSF of the right eye was urgently preformed without complications. However, the initial improvement in the visual field was short-lived, and the opening pressure returned to the low 300 s mm H_2O. The color vision did not fully recover despite normalization of the visual acuity in the right eye at 20/20.

Subsequently, the vision in the left eye started to decline to 20/100, with decreased color vision and a new 2 + Relative Afferent Pupilary Defect (RAPD) left eye over the next few weeks. The visual field in the left eye was also of concern as it showed an enlargement of the nasal defect to within 5 degrees of the center. Given the continued progression and potentially poor prognosis, the patient again was investigated with neuroimaging.

The patient underwent a 4-vessel catheter cerebral angiography with pressure measurements of the sinuses (Fig 2). The angiogram demonstrated normal intracranial arteries without aneurysms, a dominant right transverse, and a hypoplastic left transverse sinus, with severe stenoses at the junctions of the transverse with the sigmoid sinuses bilaterally. The right basal vein of Rosenthal (BVR) had a primitive drainage pattern, as it drained at the distal right transverse sinus, at the segment of the severe stenosis. Manometric measurements with a Prowler Select Plus microcatheter (Cordis Neurovascular, Miami Lakes, FL) showed pressure gradients of 25 and 18 mm Hg across the stenoses at the right and the left transverse-sigmoid sinuses, respectively. Given the large pressure gradients across the venous sinus stenosis, coupled with the patient's refractory and progressive disease, angioplasty and stenting of the dominant transverse sinus was based on our literature findings of improvement in refractory cases of IIH with such a high pressure gradient.[1] Informed consent was obtained and the procedure was performed. The patient was placed on aspirin 325 mg and clopidogrel (Bristol-Myers Squibb, New York, NY) 75 mg daily, 5 days before stent placement. The stent placement procedure was performed under general anesthesia. A 6F Shuttle Select Sheath (Cook, Bloomington, IN) was used to access the right jugular