Dangers of Oxidized Cellulose in Chiasmal Surgery

Report of Two Cases

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The use of oxidized cellulose as a hemostatic agent was first described in 1945 by Frantz; its application to neurological surgery was described in 1949 by Scarff, et al. The hemostatic properties of this product depend in part upon its adhesive nature when saturated with blood and upon its capacity to swell and exert pressure. It is this capacity to swell which may cause problems when oxidized cellulose is used around the optic nerves and chiasm.

We are reporting two cases in which small amounts of this material have caused eye disturbances.

Case Reports

Case 1. A 59-year-old man was admitted to the Johns Hopkins Hospital on May 24, 1962, with a 6-month history of progressive loss of vision in the right eye and occasional, mild, vertex headaches.

Examination. The patient was cooperative but slightly euphoric and dull. There was moderate hypertension (200/100). Vision was 20/40 in the left eye and was reduced to finger counting at 1 ft in the right eye. There was visual field loss of the superior temporal quadrant in the left eye; only a small island of vision in the lower fields of the right eye was still present. There was bilateral optic atrophy, worse on the right. X-rays of the skull showed enlargement of the sella turcica. Arteriograms indicated an avascular, suprasellar extension of a tumor.

Operation. On June 1, 1962, a right frontal craniotomy was performed. A chromophobe adenoma of the pituitary was partially removed. Vigorous bleeding from within the tumor capsule was controlled by lightly packing the capsule with oxidized cellulose. Thirty-five hours later, progressive loss of vision in the left eye was noted, and the left pupil reacted only sluggishly to light. The patient was returned to the operating room where the bone flap was reopened. The tumor capsule was markedly distended with cellulose, swollen to a remarkable degree above its original size on insertion, causing significant, grossly visible compression of the optic chiasma. The cellulose was removed, and a partial right frontal lobectomy was also performed because of cerebral swelling.

Two days after this reexploration, both pupils reacted to light. On June 4, 1962, however, the right pupil was again nonreactive; by the next day, the patient had no light perception in either eye. A second reexploration was performed. No abnormalities were found at the time of this operative procedure; and the patient was ultimately discharged, blind. He remained blind until his death on March 18, 1963, when he was readmitted to the Johns Hopkins Hospital in status epilepticus with generalized sepsis of unknown etiology.

Case 2. This patient, a 40-year-old woman, noted foggy vision in the left eye in May, 1965. When examined in another hospital, the findings were normal. She was given eye drops. In September, 1965, the patient found that vision in the left eye was markedly reduced. She was again examined elsewhere, and mild left optic atrophy and temporal pallor were described.

Examination. When first seen at the Johns Hopkins Hospital in February, 1966, the patient had 2/200 vision in the left eye and 20/15 in the right eye. There was pallor of the left optic disc. She was admitted to the hospital for further diagnostic studies. Skull x-rays and brain scan were normal. Right brachial and left carotid arteriograms were negative. A pneumoencephalogram suggested what appeared to be a tiny tumor near the chiasm on the left side.

Operation. On March 9, through a left frontal craniotomy, a small meningioma, 1
cm in diameter, arising from the undersurface of the tuberculum sellae was removed from beneath the left optic nerve, which was stretched upward over the mass. The chiasm and right optic nerve were not affected. A pea-sized piece of oxidized cellulose was inserted to control bleeding from the dural attachment of the tumor when careful coagulation of the dural attachment would not stop all of the bleeding.

Six hours after operation, the patient retained good visual acuity on the right side. Twenty-four hours after operation, she began to notice slight reduction in visual acuity on the right. Twenty-eight hours postoperatively, only light perception remained in the right eye. Thirty-two hours postoperatively, she had no light perception in either eye although she remained alert and oriented without signs of increased intracranial pressure or any other neurological deficits. Both pupils were fixed to light.

The craniotomy was immediately reopened. No hematoma was found. The oxidized cellulose was noted to be markedly swollen to the size of a grape, was compressing the left optic nerve, and was impinging upon the medial aspect of the right optic nerve. The material was removed. A contusion of the right optic nerve was apparent.

The patient tolerated the reexploration quite well. The day following the reexploration, she had light perception in both eyes. On March 12, 1966, she could count fingers at 1½ feet with the right eye and had light perception in the left eye. On March 14, she could count fingers at 4 to 6 feet with the right eye and had a definite temporal hemianopsia in the right eye. On March 21, vision was 15/60 in the right eye and 15/100 in the left eye; she now had bitemporal hemianopsia. On April 26, vision was 20/20 on the right and 20/60 on the left. The field was full in the right eye. There was bilateral optic pallor, more marked on the right side.

**Discussion**

Although the first case is not clear-cut, the second case dramatically demonstrates the ability of oxidized cellulose to swell to unexpected proportions and cause local disturbance especially around the rather confining quarters of the optic nerves and chiasm. In each case, only small amounts of cellulose were used; at each reexploration, the swollen material was a true, mass lesion. Return of function in the second case was dramatic after removal of the oxidized cellulose.

From our experience in these two cases, we have avoided the use of oxidized cellulose around the optic nerves and chiasm for the control of troublesome bleeding. The material has not caused similar problems in other areas, in our experience, but could conceivably have a deleterious effect in the region of any neural foramen or in the cerebellopontine angle.

**Summary**

Two cases have been presented in which small amounts of oxidized cellulose used around the optic nerves and chiasm to control troublesome bleeding caused compression of the visual apparatus and rapid loss of vision. Removal of the material in the second case was followed by recovery of vision.

**References**