Visual Hallucinations In Cerebral Lesions: A Case Report

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Hitzig in 1874, and Ferrier in 1875, experimentally outlined the visual cortex and showed that the projection fibers of the optic pathways were confined to the occipital lobe. Jackson and Beevor in 1899 reported visual hallucinations in one of their cases in which autopsy disclosed a tumor of the tip of the temporal lobe. Jackson and Beevor, therefore, were the first to show that visual hallucinations could arise from lesions of the temporal lobe. However, Henschen in 1890 published reports of 16 cases of visual hallucinations and correlated these to irritative lesions of the cortex of the occipital lobe. Kennedy in 1911 postulated that visual hallucinations might occur from reawakening of infantile memories stored in the temporal lobe by irritation produced by tumorous involvement of that lobe. In 1921, Cushing found visual hallucinations in 13 cases from a group of cases of tumor of the temporal lobe. He postulated that hallucinations were produced by irritation and destruction of the geniculocalcarine bundle in the temporal lobe. Kennedy, in discussing Cushing's paper, remarked that in his opinion crude spectroscopic hallucinations were found only in association with lesions of the occipital lobe, and the complex type only in association with lesions of the temporal lobe. This view was strengthened by the findings of Horrax and Putnam, who studied a series of cases of tumor of the occipital lobe and concluded that crude visual hallucinations were seen in such lesions. Bender and Kanzer in 1941 suggested the parieto-occipital region as being the site of origin of visual hallucinations in association with other psycho-visual disturbances, such as visual inattention, spatial disorientation, micropsia, macropsia, object agnosia and polyopia. They cited Foerster's observations: that stimulation of area 17 of Brodman produced simple visual hallucinations; that when area 19 was stimulated, the hallucinations were more complicated and that, if area 17 was stimulated for a prolonged period, initial unformed hallucinations changed into more complex forms.

Penfield reported that stimulation of the occipital cortex close to the posterior end of the calcarine fissure, when compared with stimulation of the outer convexity of the rest of the occipital lobe, surprisingly produced few differences. The descriptions used by patients following stimulation were flickering lights, dancing lights, bright lights, wheels, blue-green, and red colored discs, and so forth. He concluded that electrical or epileptic stimulation in the primary (area 17 of Brodman) and the secondary fields (areas 18 and 19 of Brodman) produces visual phenomena which are identical in character. However, he points out that the secondary visual cortex is probably a field for visual elaboration, and also that in general the calcarine image was more often colored while images produced from the secondary visual zone more often consisted of colorless light. He was able to reproduce in man complex physical illusions and hallucinations by electrical stimulation of certain areas of the temporal lobe.
Even though it is generally accepted that visual hallucinations are essentially central phenomena produced by cortical irritation, there are some authors who have reported these in lesions of the optic tract, chiasm, optic nerve and retina. Among them, mention may be made of Jolly, Pick, Posey and Spiller, Fay and Terson between 1902 and 1930. In 1940, Weinberger and Grant reviewed the literature on visual hallucinations and studied these phenomena in 129 cases of verified adenoma of the pituitary and 84 cases of hypophysial duct tumor. Among this group there were 16 cases of visual hallucinations. They concluded that visual hallucinations have no localizing value, but only represent psychological phenomena involving the total integrative activity of mind. They also indicated that the complexity of the images depends upon constitutional factors and not on cortical psychic organization.

Walsh does not agree in toto with the concept of Weinberger and Grant. He refers to the works of several authors who have reported visual hallucinations in ocular disorders such as removal of an eye, retinal hemorrhage, glaucoma, optic atrophy due to tabes, cataract before and after extraction, detachment of the retina, toxic states and also psychopathies. However, he concludes that “there are too many cases which support the proposition that formed hallucinations may arise as the result of temporal lobe involvement and that unformed ones may originate in involvements of the occipital lobe, to accept new evidence without its being further substantiated”.

Schneider and Crosby have observed visual hallucinations occurring in lesions involving or compressing the connection between the temporal and frontal lobe and in particular the uncinate fasciculus.

The following case illustrates the above possibility:

Mrs. D. S. is a 29 year old lady who was first seen in the Neurology Clinic on August 5, 1959. Her chief complaint was poor vision for two to two-and-one-half years. She had developed a blind spot in her left eye a year ago, centrally, which enlarged later and included most of the visual field except for the extreme nasal portion of the left eye. She said that vision in her right eye was not very good. Besides defective vision she also complained of formed visual hallucinations for over 9 months. She reported that she saw repeatedly eyes, snakes, spiders and birds. She saw the shadow of a man who had no face or arms, wearing a hat and an overcoat with two huge green eyes carrying snakes on his arms and dropping them on her. She saw huge spiders as big as a house and snakes as long as two miles in the sky. She often saw snakes scattered over the floor and walls and pre-historic birds zooming across the sky at her. Images were identical and not restricted to any particular portion of the visual field. She denied diplopia or halo vision. She also denied auditory, olfactory or gustatory hallucinations and also did not complain of any thought disturbance or convulsions. She did report a vague sub-occipital headache. Past medical history revealed that her left ovary, the site of a benign tumor, was removed in 1953. Menses had become scanty and irregular during the past 3 years and marked obesity had been present for over 13 years. She admitted to taking alcohol in varying amounts from time to time.

General physical examination was not remarkable except for significant obesity. Height 5'5½", weight 229 pounds, B.P. 180/110. Pulse 96/min. and regular. Positive
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Preoperative visual field showing on the left irregular concentric constriction and a large scotoma.

neurological findings were confined to her visual system. Visual acuity O.S. was reduced to counting fingers at one foot and O.D. 20/200. Visual fields O.S., the patient was able to see a moving finger simultaneously brought in from the temporal field except when it was brought in far superiorly and temporally, and O.D. appeared to be full peripherally. Ophthalmoscopic examination revealed a normal fundus on the right and temporal pallor on the left. Macular and other areas on both sides appeared to be within normal limits. Pupils were equal, round, regular, reacting to light and accommodation. There was no ptosis, diplopia or nystagmus. Extra-ocular movements were full. X-ray of skull and EEG were negative and spinal fluid findings, including pressure, were within normal limits.

She was referred to the Ophthalmology Clinic where visual fields were done peripherally using a 3/330 white object (Fig. 1). On the right, the peripheral field seemed reasonably full though there was a scotomatous area in central 5° circle. On the left, there was irregular concentric constriction with a large scotoma extending from the fixation area temporally past the blind spot. Attempts to obtain central fields on a tangent screen were unsuccessful. With a Guyton perimeter, on the right, there was just a suggestion of loss of the lower nasal quadrant when extinction technique was employed. A tumor in the region of the pituitary stalk was suspected.

She was admitted to the hospital on September 28, 1959, at which time she had pneumoencephalogram and bilateral carotid arteriograms. Pneumoencephalogram (Fig. 2) revealed a suprasellar mass deforming the anterior portion of the third ventricle.
Right carotid arteriogram (Fig. 3) showed the right anterior cerebral artery curving upwards gently on leaving the carotid and approaching the midline. The endocrine evaluation was limited to observations on the levels of free 17-hydroxycorticoids in plasma. The normal diurnal change in concentration was noted.

A left frontal craniotomy was done and the tip of the left frontal lobe was amputated for better exposure of the field. The supra-chiasmatic cistern was opened and on exploration of this region, a tumor 3 cms. in diameter was found over the left optic nerve, extending from the posterior olfactory groove to the clinoid process and part of it into the sella. The left optic nerve was decompressed by removing part of the tumor; however, no attempt was made to do a total excision and it was decided to do further removal as a second stage. The right optic nerve was not exposed. The tumor was reported as meningioma. She had an uncomplicated postoperative course except for the onset of diabetes insipidus, which was treated appropriately. Re-evaluation by Ophthalmology on the 9th postoperative day revealed marked visual improvement (Fig. 4). Her visual acuity had improved to O.D. 20/30 and O.S. 20/200. Visual fields, O.D., within normal limits. There was no suggestion of a nasal field loss even with 2 target test technique. O.S. showed an absolute scotoma of the
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Figure 3
Right carotid arteriogram showing the right anterior cerebral artery curving upwards gently on leaving the carotid and approaching the midline.

central field to 5°, and a relative inferior temporal field defect which extended from the central field to about 40° horizontally and to the midline vertically. With a red object 3/330, the patient had only a small field remaining in the inferonasal quadrant extending from approximately 10° to 20°. Her last visual field recording was done on May 17, 1960, and this showed only a small scotoma which was essentially relative, located just below and temporal to the fixation point in the left field, the right field being full. She continues to do well and has never had hallucinations from the time of her surgery. Her menstrual periods, which spontaneously returned in January, 1960, have continued at intervals of 35 to 38 days. When last seen on June 12, 1961, she said that she was still free of visual hallucinations.
SUMMARY

A case is presented of formed visual hallucinations in a 29 year old woman relieved by removal of a meningioma in the chiasmatic region and attached to the left optic nerve. Her symptoms are considered to be of temporal lobe origin and probably due to pressure on the uncinate fasciculus. The role of frontal lobectomy in this case is not clear, but it does not appear that at any time the frontal lobe itself originated the discharge. However, removal of the orbital area would destroy the cells of origin for many frontotemporal components of the uncinate fasciculus. Such fibers would degenerate and, even if there were a possible source of irritation remaining along the course of the fasciculus, it could no longer discharge to the temporal lobe over degenerated fibers.

REFERENCES


