Chiasmapexy for the correction of traction on the optic nerves and chiasm associated with their descent into an empty sella turcica

Case report

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A patient recovered full vision after evacuation of a chromaphobe adenoma and subsequent irradiation, but experienced delayed visual loss in the left eye associated with descent of the diaphragm of the sella and the optic nerves and chiasm into the tumor bed. More normal anatomical relationships were restored by inserting silicone sponge beneath the diaphragm of the sella. Vision improved rapidly thereafter and has been maintained for more than 3½ years.

KEY WORDS pituitary adenoma · empty sella · optic chiasm · chiasm displacement · chiasmapexy

PROGRESSIVE impairment of vision, beginning some time after surgery or irradiation for a pituitary adenoma and associated with descent of the optic nerves and chiasm into the tumor bed, has been described by Colby and Kearns, Poppen, Hartog, et al., Svien and Colby, and Lee and Adams. We are reporting a case in which we were able to restore nearly normal anatomical relationships and vision by inserting silicone sponge beneath the diaphragm of the sella to support it and thus the optic nerves and the chiasm in a more normal position.

Case Report

This 54-year-old white woman was admitted to the Colorado General Hospital on November 16, 1965, for evaluation of visual disturbance and headaches. For the last 4 years before admission she had noted progressive visual difficulties, including decreasing ability to see any objects in the left temporal field and a general decrease in acuity in the left eye. About 1 year before admission she had difficulty in seeing objects in her right temporal field, associated with a general decline in acuity so that it became impossible for her to drive or read. About this time she also had some episodes of vertigo of short duration and occasional double vision for distant objects.

Examination. Neurological abnormalities were confined to the visual system. There was bitemporal hemianopsia, and visual acuity with glasses was 20/25 on the right and 20/80 on the left. Pertinent laboratory studies included normal electrolytes, blood
Chiasmapexy for optic nerve traction in empty sella

**FIG. 1.** Lateral x-ray films of the sella turcica. **Upper Left:** Before removal of the pituitary tumor. The dorsum is destroyed inferiorly, and the thin dense superior portion is displaced posteriorly. **Upper Right:** Seven days after tumor removal. **Lower Left:** Twenty days after tumor removal. An antero-inferior linear and angular movement of the dorsum into the sella has progressed from the previous film. **Lower Right:** At 14 months after operation the dorsum has become stable. The sella is enlarged to occupy the entire sphenoid sinus, with intact cortical margins.

urea nitrogen and creatinine, serum cholesterol 270 mg/100 ml, PBI 4.6 μg/100 ml, T3 uptake 24%, 17-hydroxysteroids 7.1 mg/24 hr, 17-ketosteroids 4.5 mg/24 hr, serum cortisol 4.2 μg/100 ml (a.m.) and 8.4 μg/100 ml (p.m.). Plain skull films revealed a grossly enlarged and eroded sella turcica (Fig. 1 upper left), and pneumoencephalography revealed elevation of the third ventricle due to a large suprasellar mass (Fig. 2).

**Operation.** After a left frontal exposure, the diaphragma was opened and a large pituitary tumor evacuated. Histologically it was a chromophobe adenoma. Between December 12 and January 7, 1966, the patient received a total of 4200 rads of cobalt-60 in 24 increments through 7 X 7 cm bitemporal fields centered over the pituitary fossa. Cortisone was given, 12.5 mg, twice daily, and thyroid replacement 100 mg once daily. Roentgenograms on the 7th and 20th days after operation showed the thinned dorsum sellae to have moved forward and downward toward the tumor bed (Fig. 1 upper right and lower left).

**Postoperative Course.** Vision improved rapidly and on February 18, 1966, acuity was 20/20 bilaterally, and there was no defect in the visual fields to a 2 mm white object. In October, 1966, the patient complained of diminishing vision in the left eye over a period of several weeks. Acuity on the left was 20/70 while that on the right was unchanged. The visual fields seemed intact to testing with a white object but there was a temporal hemianopsia on the left with
FIG. 2. Preoperative pneumoencephalogram, November 24, 1965. Lateral view of the sella and suprasellar regions, automogram. The third ventricle and the frontal poles of the lateral ventricles are elevated and splayed about the large suprasellar extension of the adenoma.

red objects. Her vision was observed for several months before she was readmitted to the hospital January 29, 1967.

Second Examination. There was slight if any change in the configuration of the sella turcica since the last examination (Fig. 1 lower right). Pneumoencephalogram repeated on February 2, 1967, showed ventricles and subarachnoid spaces that were enlarged compared with the earlier examination; the third ventricle had descended into the large sella turcica (Fig. 3).

Second Operation. On February 17, 1967, the left frontal craniotomy was reopened. The diaphragm of the sella was found to be depressed into the sella turcica and the left optic nerve was tethered down by the left anterior cerebral artery, which was densely adherent to the diaphragm just medial to the nerve. Normal saline was injected through the diaphragm and this temporarily raised it and released tension on the left optic nerve. Accordingly, the diaphragm was incised and many small pieces of silicone sponge were inserted beneath it until the optic nerve seemed to have been restored to a more or less normal position.

Second Postoperative Course. Recovery was uncomplicated. On February 23, color vision in the half field had returned and by March 3, 1967, acuity had improved to 20/30 + on the left. In September, 1967, acuity in both eyes was 20/20 and the fields were full. On March 1, 1967, pneumoencephalography was repeated, and the third ventricle was found to have been restored to a more normal position (Fig. 4). When last examined October 9, 1970, the patient's only complaint was fatigue, but she was working 14 hours a day, every day, as a cook. There was wrinkling of the perioral skin. The visual fields were full to a 2 mm white object and her visual acuity was 20/25—2 on the left and 20/20—2 on the right.

Discussion

The empty sella turcica may occur in primary and secondary forms. The primary form is considered to result from incomplete development of the diaphragma sellae and includes cases referred to as “arachnoid cyst” or “diverticulum,” and may be a manifestation of a more serious dysraphia. The sella turcica is usually symmetrically enlarged, but normal or asymmetric configuration may be observed. On cisternography, gas or other contrasting material enters the sella from the subarachnoid space or, as in our case, may be a combination of subarachnoid and third ventricular extensions.

There has been no agreement upon the mechanism by which the visual system is involved; vascular injury, irradiation, and scarring and traction have been suggested. It may be that no single mechanism is common in all cases. In ours, the pneumo-
Fig. 3. Pneumoencephalogram, February 2, 1967, 14 months postoperative. Left: Lateral autoradiogram and corresponding line drawing. Right: Caldwell frontal hypocycloidal tomogram and corresponding line drawing. In the line drawings, 1 = infundibular recess of the third ventricle, 2 = the level of the diaphragm of the sella as judged by the inferior margin of the subarachnoid space, 3 = the subarachnoid space, and 4 = the hypothalamus. There has been ventricular and subarachnoid enlargement since the November 24, 1965 study. The elongated optic and infundibular recesses of the third ventricle, with bilateral projections of the subarachnoid space, descend 8 mm beneath the interclinoid plane into the sella turcica, to the level of the diaphragm sellae. The infundibular recess is abnormally squared, and the depressed chiasmatic notch indicates an intrasellar location of the optic chiasm. The hypothalamus is inferiorly coned by retraction into the sella.
Fig. 4. Pneumoencephalogram, March 1, 1967, 13 days following second operation. Lateral autotomogram. There has been restoration to approximately normal third ventricular anatomy. The superior movement of the optic recess measures 15 mm, of the infundibular recess 14.5 mm, of the apex of the chiasmatic notch 10.5 mm, of the anterior commissure 6.5 mm, and of the inferior surface of the frontal horns 5 mm. This reemphasizes the impressive inferior coning of the diencephalon present on the February 2, 1967, pneumoencephalogram (Fig. 3).

graphic and operative findings indicated a traction injury, and it is only in that circumstance that the procedure described may be of benefit.

References


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