Recurrent Cystic Formation in Craniopharyngioma Treated with Radioactive Chromic Phosphate

Case Report

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The problem of treating recurrent, cystic craniopharyngioma is at times an extremely trying one. When each craniotomy results in improvement of visual fields, but then when there is rapidly recurring general symptomatology and once more loss of sight occurs, both the patient and the surgeon begin to wonder if the short span of improvement is worth the hardships incident to another craniotomy. Drawing on the experience gained by others in treating neoplastic effusions of various body cavities with radioactive chromic phosphate, we decided to use this material to treat a case of recurrent cystic craniopharyngioma which had become a complete enigma to us in regard to further therapy. This has, we feel, resulted in a solution of the problem as illustrated in the following case report.

Case Report

1st Admission. TCT, No. 50479M, an 18-year-old Latin-American barber from Odem, Texas, was first seen at the University of Texas Medical Branch Hospital on Jan. 6, 1958. He had never noted any visual deficit until 1 month previously when he began to complain of falling eyesight which became increasingly worse to the point where he felt he was blind in his left eye. He could still see out of his right eye, but he required help in walking in order to avoid running into objects. For 2 or 3 weeks he had had dull headaches which at times were associated with nausea and vomiting and which were relieved by aspirin. These had become much more severe in the 3 days prior to admission.

The only significant finding in his past history was that he had been treated in a tuberculosis sanatorium for 4 years and during that period had had a thoracotomy.

When examined, he was somewhat apathetic and sluggish in his responses. With the left eye he could perceive only light and movement of hands, but in the right eye, 20/100 vision was preserved. Visual fields revealed a temporal-field deficit on the right; the left could not be tested.

Roentgenograms of the skull showed enlargement and erosion of the sella with decalcification of the clinoid processes. There was no pathologic calcification. Pneumoencephalography indicated a filling defect of the anterior part of the 3rd ventricle and the chiasmatic cistern, while arteriography confirmed the fact that a suprasellar mass was present.

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At craniotomy partial removal of a cystic craniopharyngioma was accomplished.

The postoperative course was complicated by the appearance of an extradural clot which it was necessary to evacuate. Twelve days after operation there was subjective improvement of vision in the right eye but no increase in ability to see out of the left.

2nd Admission (Mar. 29, 1959). The patient returned with a maxillary and frontal sinusitis and with an abscess in the mid-portion of the forehead. This was excised and drained, and at that time a tantalum button which had been placed in the burr hole after craniotomy was removed.

3rd Admission (Jan. 12, 1960). At this time, 24 months after the original attack on the craniopharyngioma, he returned again almost blind. He felt that this decline in vision had begun only 5 days before and was initiated by a severe, sharp, frontal headache. Indeed, on examination, he could barely discern movement of the fingers with the right eye when previously he had been able to read, and the pupils were fixed and dilated to the right. There was bilateral papilledema with optic atrophy, the latter being more pronounced on the left.

A second attack was made on the craniopharyngioma and 28-30 cc. of yellow fluid with cholesterol crystals were aspirated and what was thought to be a complete removal of the wall of the cyst was done.

4th Admission (Aug. 15, 1960). At this time, 8 months after the 2nd operation on his craniopharyngioma, he was admitted by the Endocrine Service for an extensive general evaluation. Visual fields showed blindness of the left eye and a right temporal hemianopsia. There was bilateral optic atrophy. Serum electrolytes were within normal ranges while the 24 hr. I-131 uptake was 4.8 per cent and the 24 hr. urine 17 ketosteroids and 17 hydroxysteroids were of borderline, low-normal range. Electrocardiogram showed deviation of right axis, right ventricular hypertrophy, and incomplete bundle-branch block.

It was felt that he was hypothyroid and had borderline hypoadrenal cortical activity as well as hypogonadism. The patient then was placed on methyl testosterone 25 mg. daily, cortisol acetate 12.5 mg. t.i.d., and thyroid extract with a build-up dosage to 3 gr. daily.

5th Admission (Oct. 31, 1960). Ten and one-half months after his last operation he reported with a history of progressive loss of vision in the 3 weeks prior to this time. Carotid arteriography was carried out which again indicated the recurrence of the suprasellar mass and following this air was injected into a cystic cavity (Fig. 1).

On Nov. 7, 1960, a percutaneous aspiration of the suprasellar cyst was performed and 80 cc. of xanthochromic fluid were obtained. This fluid contained 244...
cells, 54½ per cent of which were neutrophils, and protein was 51 mg. per cent. Cholesterol crystals were identified. Immediately after the aspiration, the patient's general condition improved as did his vision. On Nov. 23, he had a generalized seizure and was placed on Dilantin 100 mg. t.i.d.

6th Admission (Mar. 10, 1961). He gave a history that his right eye had improved considerably after the last aspiration so that he could read once again, and that he had had no headaches. For 1 month he had noticed decreased vision in his right eye which had become increasingly worse.

On Mar. 16, 1961, 53 cc. of xanthochromic fluid were aspirated from the cyst. However, at this puncture 1 mc. of radioactive chromic phosphate was introduced into the cavity of the cyst which was felt would deliver approximately 5,000 rads to the wall of the cyst (Figs. 2 and 3). The patient was advised to turn his head frequently to the right and to the left side and to hyperextend it but not to flex his head forward for the first few hours after the injection.

7th Admission (April 10, 1961). Twenty-five days after the instillation of the radioactive phosphorous compound, the patient was re-admitted complaining of headache of 10 days' duration. His vision also had once again begun to fail. The cyst was punctured once more and 80 cc. of fluid were removed.

Subsequent Course. The patient has been seen at various times in the Neurosurgery Out-Patient Department, but has not required further admission. When seen on Oct. 23, 1962, 18½ months after the last aspiration, and approximately 19½ months after the introduction of the chromic phosphate, he was well and active. He had had no headache, vomiting, or seizures. He felt he could see better with his right eye than at any time since the onset of his illness and at this time could perceive movement of fingers with his left eye. He had also been off all hormonal treatment for 3 months without untoward effect.

Addendum. Twenty-six months after the last aspiration, he continued to be well without evidence of recurrence of his cyst.

Discussion

The distribution of beta-radiation in the human circulatory system has been utilized for some time and the placement of colloidal radioactive particles has been employed in the serous cavities in order to combat malignant serous effusions for over 10 years. Initial investigations with radioactive gold-198 gave rise to the exploration of a better beta emitter, radioactive chromic phosphate (Cr37PO4).

Chromic phosphate has seemed the better of the two elements because it does not produce gamma radiation and has a relatively long half-life (14.3 days). There is agreement that most of the chromic phosphate is plated out homogeneously on the walls of the injected serous cavity, and while the rate and concentration of this process is variable, it is nearly complete in a few days, and its effectiveness is probably because of this plating affinity.1.5.9.12 The best effects are attained when used to combat malignant effusions which actually have tumor cells present in the fluid and the percentage of good results is uniformly higher in pleural effusions as compared to peritoneal effusions.4.6.8 Dosage has been an arbitrary matter varying from 4.8 mc. to 20 mc. but usually is of the order of 6.9 mc. for pleural effusions and 9 to 12 mc. for peritoneal effusions.4.7.12

Fig. 1. Air injected into the recurrent cyst 10½ months after 2nd craniotomy.

Fig. 2. Lateral view of cavity at the time of introduction of radioactive chromic phosphate.
Cystic Craniopharyngioma Treated with P-32

Tendency to localization of the injected substance generally has been overcome by changing the patient's position frequently during the first few hours after administration. Perryman et al.10 noted that, during the time the reaction to radiation was developing, a delay in its effect on fluid secretion occurs and it was therefore frequently necessary to perform repeated additional aspirations on the patients after the initial instillation of Cr^25PO_4.

The use of radioactive gold and yttrium 90 to produce hypophysectomy and to treat pituitary tumor has been commented on by a number of investigators.4,13,14 Radio-necrosis hypophysectomy has been utilized using from 9 to 40 mc. by transnasal, transphenoidal, or direct instillation of radioactive chromic phosphate into the substance of the pituitary gland.4,13,14 One case of craniopharyngioma treated by Riechert and Munding11 with P-32 was found in the literature and no reference could be found to the use of radioactive chromic phosphate for the treatment of recurrent cysts in cases of craniopharyngioma. In the aforementioned case neither specific information as to the clinical condition of the patient nor the results of the therapy were mentioned. Water-soluble chromic phosphate is readily obtainable under A.E.C. auspices9 and is supplied in sterile, pyrogen-free, saline solution containing 1.0 mc. of P-32 per ml.

In our case two craniotomies plus percutaneous aspiration of the recurrent cyst had resulted in only transient improvement of clinical signs. After the instillation of 1 mc. of P-32, except for one aspiration of the cyst 25 days later, the patient has required no further operation while his visual and endocrinological symptomatology have improved. This remission has been maintained to the last report, 36 months after the instillation of P-32 into the cystic craniopharyngioma. The necessity for the final puncture of the cyst probably is related to the time necessary for necrosis of the secreting cells to take place and is similar to the experience of others already noted in treating malignant effusions of other body cavities.

While aggressive surgery to remove the whole of the craniopharyngioma is the answer to the treatment of many of these tumors, when a situation of recurrent cystic formation despite adequate surgery does present itself, the above-described method of therapy with P-32 seems worthy of trial.

Summary

The problem of treating recurrent cystic cranio-
pharyngioma is presented. Such a case is de-
scribed in which two craniotomies plus percutaneous aspiration of the cyst gave only transient relief of visual and general symptomatology. After instillation of 1 mc. radioactive chromic phosphate percutaneously, only one further aspiration of the cyst 25 days later was necessary. Since that time, the patient has required no further surgical inter-
vention while his vision and general symptoms have continued to improve to this time, 36 months after the instillation of the P-32.

Fig. 3. Photomicrograph of wall of craniopharyngiomaticus cyst.
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References