TREATMENT OF INTRASELLAR TUMOURS BY RADON

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In a case of intrasellar adenoma the first complaint is usually of ill-defined eye trouble; the fields of vision are examined and a scotoma assuming hemianopic form is found. In women amenorrhoea commonly precedes the changes in the visual fields by several years; scotometry should be included in the routine investigation of this abnormality. An alteration in the features, which are becoming leonine, denotes an early stage of acromegaly. The patient is referred for *x*-ray examination; an enormous dilatation, out of all proportion to the mildness of the symptoms, is revealed. This is the syndrome to which the following observations apply.

To implant radon seeds by means of the orbito-nasal route is easy, and may prove more effective than an abortive attempt to remove either a very large or a malignant tumour. The appearance in a skiagram of a calcified wall of a suprasellar cyst would be a contra-indication; one must make a careful selection from the larger intrasellar growths. Contributions to which references are given below show that the methods to be discussed have passed beyond an experimental stage.

Surgical Anatomy of the Paranasal Route

What room can be made between the orbital fascia and the mucoperiosteum of the nose?

The inner walls of the two orbits are parallel, and the width between them varies with the interpupillary distance—for example, if this distance is two and a half inches the distance between the laminae papyraceae is about one and a quarter inches. The nasal passages are narrow; the space is mainly occupied by the cellular lateral masses of the ethmoid. Partial resection of the latter can be effected submucously quite easily by working from the orbit. If the mucoperiosteum is torn in the sphenothmoid recess the opening will serve for drainage. Thus the sphenoid sinus can be reached by a unilateral or a bilateral excavation. The outer walls of the two orbits are at right angles to each other. This enables one to displace outwards the orbital fascia and its contents for nearly half an inch with the aid of a suitable retractor (see figure).

Orbital retractor.

A slowly growing adenoma expands the body of the sphenoid to a mere shell, and, unless the fabric is altered in this manner it is futile to attempt excochleation. One cannot practise upon normal skulls. Anatomical variations are frequent. The optic nerves may actually tunnel through the sphenoid sinus instead of passing through a normal optic foramen (Onodi). In acromegaly the air sinuses are large. From the internal canthus to the pituitary body is about the length of an index finger.

Preservation of the olfactory sense is a consideration to be borne in mind. On the inner wall of the orbit an imaginary line connecting the anterior and posterior ethmoid foramina indicates the level of the cribriform plate.

Operative Technique

The nose is cocaineized and the skin is infiltrated with novocain and adrenaline. Intravenous sodium evipan provides anaesthesia of suitable duration. The eyelids of the more defective eye are temporarily closed with a suture.

To avoid the angular vein I now make a median vertical incision down to the bone, and retract the periosteum and orbital fascia outwards. Usually the only vessel requiring tying is a transverse communicating venule which crosses the bridge of the nose, and the exposure is equally good for one or both sides.

Commencing beside the lachrymal sac, the inner wall of the orbit is removed, and the operation proceeds as described by Chiari. To obtain maximal exposure it is well to detach the pulley of the superior oblique muscle from the trochlear fossa. The muscle balance was tested with the Maddox rod a week later in one case and found to be normal. The patient should be warned that diplopia may persist for a few days. Division of the ascending process of the superior maxilla, so effective in giving the *coup de grâce* in frontal sinus suppuration, is unnecessary. The ease with which the objective can be reached, in the absence of inflammation in the sinuses, is remarkable. The use of antiseptics containing bismuth or other substances liable to set up secondary radiation is avoided.

The next step is to pick away the carapace of the adenoma, allowing it to prolapse from the base of the brain. Montmollin writes of the Chiari operation: "In a few dramatic cases we have witnessed from the moment of incision of the dura mater a sort of physiological birth by intracranial pressure." The dangers of undue interference with such processes are well known. Aspirate, or inject radon seeds by all means, but do not attempt removal unless conditions appear exceptionally favourable. This is my opinion at present. The straight incision supported by the bridge of the nose is easy to close with perfect apposition, and soon becomes inconspicuous.

Insertion of Radon Seeds

The seeds can be inserted either at the time of operation or later in the *x*-ray room; the former is the safer plan. The line runs from the region of the inner canthus towards the external occipital protuberance. The external auditory meatuses are the best fixed points for measurements. When the needle touches the dorsum sellae there is a gritty sensation which is unmistakable. Any dorsum sellae containing sufficient lime salts to show in a skiagram can be felt with a blunt needle. If there is no dorsum sellae the case is probably one of internal hydrocephalus or of suprasellar cyst, and unsuitable for treatment by radon.

X-ray examinations are indispensable. Stereoscopic shift should be one inch for every ten inches of tube distance. The tinfoil embedded in film cartons can be fixed by seccotine to the skin between the surface landmarks. With the aid of stereoscopic films or coloured anaglyphs one can almost rehearse the operation in three-dimensional optical projection. An alternative plan is to solder the seeds to phosphor bronze wire, a method successful in the treatment of tic douloureux.

Those who prefer to use radium itself should consult contributions to which reference is given.

Dr. Chester Williams of Bradford kindly assists me with these operations, bringing radon seeds. The irradiation

tion causes a loss of cells from the glandular area, the acini becoming almost empty and the stroma compressed. Interstitial radon appears to me as suitable a mode of irradiation as any that is available at present for combination with a decompressive operation of access.

Illustrative Case

The rapidity of restoration of the fields of vision in the following case (referred by Dr. Priestley of Leeds) was in striking contrast to their insidious restriction.

A woman, aged 29, who had had amenorrhoea for eight years, complained of failing vision in April, 1934; R.V. 6/36, and L.V. 6/9. The temporal half of the right field was lost absolutely. The fixation point was spared. In the left field there was a temporal hemiopic scotoma for small test objects. The optic disks were pale. A skiagram showed a distended sella turcica, the posterior wall of which was reduced to an upright lamina.

With the co-operation of Dr. Chester Williams six radon seeds were implanted. The patient went home on the seventh day and found that while facing the fire she could once again see her husband sitting in his armchair on her right-hand side. A temporal island had reappeared in her left field of vision.

Further improvement occurred. The right field of vision became gourd-shaped and the left normal. The patient could look after her home and play tennis; when seen in July, 1935, she was setting off for a seaside holiday. In January, 1936, the vision of the right eye was 6/9 and of the left 6/5. Examined with the perimeter, both fields of vision were found normal, though with small test objects a temporal scotoma could still be demonstrated in the upper part of the right visual field. The pituitary facies was less apparent. On x-ray examination in February, 1936, Dr. Rowden reported that the radon seeds were more closely grouped together. He considered this to indicate that the tumour had shrunk. In June, 1936, the only complaint was of a slight increase in weight. Endocrine therapy was being considered. The patient felt well and energetic.

Summary

If the sella turcica has been so distended as to expand the body of the sphenoid to a shell, surgical access can be obtained by displacing the orbital fascia and contents outwards and removing the ethmoidal cells. Radon seeds can then be inserted. The operation is easy, and, although certain intricacies could scarcely be foreseen without experience, all but the final stage of the operation will be familiar to many readers.

In order to avoid the angular vein and to permit bilateral access if necessary, a median interorbital incision is recommended. A "teaspoon" retractor is illustrated.

A case of a woman able to play tennis two years after operation is described.

Chiari's operation has been practised extensively in Switzerland by Nager and his colleagues.

I confess that latterly I have been attracted back to the intracranial route. I do not exclusively prefer either method, but would choose whichever I thought held out the best prospect in any individual case.

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Clinical Memoranda

Rhythmical Agranulocytosis

This case is at present incomplete and is published now with the hope of suggestions as to investigation and treatment.

CASE REPORT

The patient, a married woman aged 43 years, came to me on October 6th, 1936, complaining of small ulcers in the mouth, accompanied by some feeling of malaise; there had been several attacks of a similar type recently. She stated that she was in perfect health except at the time when she had these ulcers; there was then a slight rise of temperature, between 99° and 100° F. (on one occasion 101° F.) and the slight feeling of malaise; no other disability was apparent. In 1919 and 1926 attacks of recurrent ulcers of the mouth, lasting for periods of some months, had occurred following a state of "poor health."

The present series appears to have started on July 25th of this year, when she had an attack described as influenza; seventeen days later this was followed (August 11th) by an attack of tonsillitis. No ulceration in mouth was noticed. On August 29th, eighteen days subsequently, ulcers in the mouth started, lasting until September 5th. A second crop of ulcers started on September 15th—a seventeen-day interval. This attack coincided with a menstrual period at which time she reports the ulcers are apt to be worse. The next attack started with an abortive ulcer on September 30th, with a full ulcer on October 4th—that is, after an interval of nineteen days. Abortive ulcers started again on October 19th, with the full ulcer on the 21st—that is, after a seventeen-day interval. There was a further abortive ulcer on November 6th, followed by an ulcer on November 10th—an interval of twenty days. The most recent ulcer was on November 29th—an interval of nineteen days.

The ulcers are preceded by a burning, pricking sensation, but this may be felt without the actual formation of an ulcer. The sensation has also occurred at intervals between 1926 and the present attacks, occasionally a full ulcer having appeared. The ulcers are situated on the lips and cheek, never on the gums or throat. They may be from a pin's head in size to a half-inch in length. About the third day a slough develops, which separates, leaving a raw area. The ulcer is not tender unless touched until the slough has separated, when it becomes exceedingly tender. It clears up in about a week. Sometimes there is slight glandular enlargement associated with the ulcers, but not always. On examination no evidence of Vincent's organisms, moulds, yeasts, or haemolytic streptococci have been found.

At the period of maximum depression in the leucocyte count the red cells show marked vacuolation, numerous microcytes, some extremely small, and poikilocytosis, and the platelets become exceedingly numerous. At the height of the leucocyte counts there is little disturbance in the red cell picture beyond some vacuolation; the platelets are normal. The urine, blood urea, and blood sugar are normal; blood pressure is 142/84, and the teeth are satisfactory.

Before I saw the patient on October 6th no drugs at all had been taken for at least one month, nor any substance, as far as could be ascertained, likely to contain drugs. Ultra-violet rays had been used on the ulcers, and short-ray therapy. After the blood count on October 6th Blaud's pills (80 grains), three adexolin tablets, and one teaspoonful of marmite were given daily. On November 27th, as the bleeding time was found to be considerably prolonged, calcium and vitamin D were also given. The bleeding time was normal on December 2nd. Seven doses of 2 c.cm. anahaemin were given as shown on the chart.

Pentose nucleotide has not been used up to the present, as three of my previous cases developed exceedingly severe reactions, and as this patient lives in the country and refuses to go into a nursing home it was not felt safe to employ this drug.

As can be seen from the chart, the menstrual periods apparently bear no relationship to the rise and fall in the