Cryosurgery of the Pituitary Gland*

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I have been asked to discuss neurosurgical methods of altering pituitary function as a means of controlling diabetic retinopathy. Partial or total destruction of the pituitary gland can only be affectively utilized in the therapy of the complications of diabetes if it can be accomplished with low morbidity and mortality. My experience with hypophyseal stalk section and hypophysectomy by frontal craniotomy for palliation of carcinoma of the breast led me to believe that these methods would have low morbidity and mortality in the diabetic patient. However, in contrast to the older, apparently frail woman with metastatic carcinoma of the breast who had little difficulty undergoing craniotomy, the diabetic not only had difficulty with the craniotomy but also had significant morbidity with prolonged general anesthesia. Any complications of either anesthesia or craniotomy often led to a fatal outcome or severe morbidity. Because of this morbidity and mortality, I first attempted, as Dr. Pearson has mentioned, stereotaxic hypophysectomy with Yttrium^{90}, a radioactive isotope. The ease with which the isotope could be placed in the gland with uniformly high incidence of total or near total destruction of the gland led to the series of patients which Dr. Pearson has discussed. A problem in the long-term followup with these patients, namely a 10% to 12% incidence of rhinorrhea and a smaller percentage of late radiation changes in surrounding neural structures, induced our division of neurological surgery at the Medical College of Virginia to attempt another method for producing destructive lesions in the pituitary gland. The method had to be simple in application, preferably able to be done under local anesthesia, and should be relatively innocuous to the ocular motor nerve, the optic nerves, and the hypothalamus, which lie close to the pituitary gland. Our reason for picking stereotaxic cryosurgery was the unique position of the pituitary gland and the reversibility of a controlled cold lesion. The gland is surrounded by bone on its inferior surface, the cavernous sinus on its lateral surfaces, and cerebrospinal fluid on its superior and posterior surfaces. The areas containing the neural structures we wished to protect were, therefore, isolated from the gland by either cerebrospinal fluid or blood, substances capable of rapid heat exchange. The ocular motor and optic nerves are known to cease functioning at approximately 10 C, but do not sustain irreversible damage until cooled 10 to 15 C below this. These factors seemed ideal for cryosurgical techniques.

TECHNIQUE

Cryohypophysectomy at the Medical College of Virginia is done under local lidocaine (Xylocaine) anesthesia with a modification of the Rand-Wells stereotaxic head holder. The coiling instrument is the Cooper-Linde cryosurgical probe which utilizes liquid nitrogen as the cooling agent. For total hypophysectomy we use the 4.4 mm probe and for partial lesions the 2.2 mm probe. The probe consists of three unicentric tubes with an exposed silver tip. The inner tube delivers the nitrogen, the middle tube exhausts it, and the outer tube is a vacuum insulator. After positioning the head with x-ray control, the nasal mucosa is anesthetized and the probe guide is positioned at the floor of the sphenoid sinus. An opening is then drilled through the floor of the sinus and the probe guide advanced to the floor of the sella. After checking the position by x-ray, the floor of the sella is opened with a drill, the capsule of the pituitary gland incised, and the the probe placed in the gland. The usual probe position is just below the equator of the gland and about 2 to 3 mm lateral to the midline. The low position in the gland is to minimize cooling of the pituitary stalk in order to avert significant diabetes insipidus, and the medial position is to protect the ocular motor and optic nerves. Liquid nitrogen is circulated through the probe with thermistor control of the probe temperature, and frequent checks of optic and ocular motor function are made while the temperature is lowered to −180 C. Since there is considerable difference between non-functioning of a nerve and damage, any evidence of malfunction signals the operator to rewarm and reposition the probe. A second lesion is placed in the gland 2 to 3 mm on the opposite

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side of the midline by either slanting the probe across the midline or using the opposite nostril. Each lesion takes approximately 10 min of cooling.

RESULTS

We have performed cryohypophysectomies in 35 patients with no mortality. In six of the patients with carcinoma of the breast who subsequently died of their disease, histological section of the sella has failed to reveal any evidence of remaining pituitary gland. Complete endocrine evaluation has been done pre- and postoperatively on all the patients, and except for a few patients in whom partial destruction was planned, these tests indicate no functioning pituitary. The morbidity has consisted of two cases of rhinorrhea, both of which occurred in the immediate postoperative period and have healed spontaneously. This is in contrast to the delayed onset of rhinorrhea in the radiation pituitary abalation cases. It is difficult at this time to state that stereocryohypophysectomy is superior to stereo-Yttrium hypophysectomy, since both have low rate of immediate complications. As time has passed, the lack of delayed complications in the cryosurgical cases appears to favor that technique.

In closing I would like to state that I believe that with stereocryohypophysectomy we have a simple, effective technique which can be utilized to alter pituitary function. It can be performed under local anesthesia and, is a safe and effective method for aid in the control of diabetic retinopathy.

GOOD TEACHING*

The growing emphasis on research, the availability to academic personnel of external grants which support a wide variety of activities other than teaching, the lure of "freedom from routine duties" (although teaching should never deteriorate into a routine duty), and the use by some institutions of criteria for advancement that seem to overemphasize research or even that superficial evidence, publication—all of these factors have of late tended to underemphasize the role of good teaching.

But what is a good teacher? Is he the popular teacher? Is he the one who gives flashy and spectacular lectures? Is he the one whose students average highest on departmental exams? Is he the one whose presentations are so tidy that note-taking is easy? Is he the good fellow with the best jokes? Is he a disciplinarian, or is he lax about standards and performance? Does he trouble the stupid but inspire the really able?

The answers all depend on the orientation of the one who replies. By all odds the most popular physics teacher I have ever known was a sweet gentleman who just could not bring himself to fail the letters and arts students who flocked to his sections to work off their science requirements. One of the most popular lecturers in a social science subject I have met with was a man whose smoothly presented lectures were almost as well organized as the textbook. He was famous for finishing every lecture with a polished phrase exactly as the bell rang.

On the other hand, one of my own great teachers in high school was an exceedingly strict Latin teacher. Perhaps he was not loved, but he certainly was respected—and 55 years later I can still scan Vergil.

My very greatest university teacher stopped one day, in the middle of a long and complex proof of a fundamental theorem in potential theory, looked at the confused and badly written mess he had put on the blackboard, said "Well, boys, something is wrong" —and walked out, leaving us to save ourselves.

So before you decide whether a teacher is good, ask, good for what? The purposes should vary greatly, from the broad intent of survey courses and the exploratory excitement of introductory courses to the stimulating depth of graduate courses. Is the criterion of goodness the mechanical success with which information is transmitted, the sympathy and warmth with which a young mind is led to unfold—or the influence a great character can have on the whole life of a student?

I do not think a teacher can be judged by weighing publications, but I also think no teacher can be successful unless he is alert to the new knowledge in his field. In many instances it is absurd to expect a teacher to be a scholarly producer of original research; but it is fatal not to require him to be alive to his subject.

I am sure that some evaluations of teachers by students have been made with serious purpose, but I profoundly disbelieve the results. It will not even work to ask alumni —presumably wiser, surely older, and hopefully more eclectic— which teachers they remember with greatest admiration.

I think the only useful judgment concerning university teachers comes from their immediate working colleagues. The administrators should be aware of student opinion, of course, and in some cases it may be useful. But fellow teachers, through their skillful and intimately informed judgments, will come nearest to recognizing good teaching. The immediate colleagues of a teacher will know what the students really think, for they will have obtained this information in effective informal ways, will have available the evidence of student records, will be aware of the general community opinion, and will have put all this information through the sieve of their own competence.

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