The Radiation Treatment of Pituitary Adenomas

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Over the years external radiation treatment has developed as a primary method of treatment of pituitary adenomas. With increasing experience and refinements in techniques, progressive improvement in results has been reported,1−3,5 and is also found in the experiences at The University of Michigan Medical Center.

During the years 1940 to 1959 inclusive, 180 patients with pituitary adenomas were treated with external radiation, either as the primary method of treatment (94 cases), or in addition to surgery (86 cases). In 99 patients the diagnosis was chromophobe adenoma and in 31 eosinophilic adenoma. Five of the patients with tumors classified as chromophobe adenomas had signs of basophilic activity which became evident following subtotal adrenalectomy for Cushing’s syndrome.

The diagnosis was established histologically in 51 patients. In the others the diagnosis was made clinically; in those with acromegalic features the tumors were classified as eosinophilic adenomas and in the remainder they were designated as chromophobe tumors (Table 1).

Sex and Age

The sex distribution of the entire group was essentially equal between males and females, although there was a predominance of females in the group with eosinophilic adenomas, and a smaller predominance of males in the group with chromophobe adenomas. The average age of patients with eosinophilic adenomas was 46 years, and of the patients with chromophobe tumors 43 years. The age range was from 17 to 78 years. Details of sex and age distribution are included in Table 1.

Symptoms

The symptoms exhibited were variable but the most common were visual disturbances, visual-field defects, headache, symptoms of hypopituitarism, and manifestations of acromegaly such as enlargement of hands and feet, and coarsening of facial features. The duration of symptoms prior to treatment ranged from 1 month to 20 years; the average was about 3 years.

Treatment

All patients were treated by a single course of consecutive daily sessions. The majority of the patients (81) were treated with roentgen ray (200–250 Kv. range). Of these, 31 patients were treated to a dose of 2000 r (estimated tumor dose) in about 2½ to 3 weeks. Five patients received an estimated tumor dose of about 2500 r in about 3 to 3½ weeks and 40 patients received an estimated tumor dose of about 3000 r in about 3½ to 4 weeks. Since 1955, 49 patients were treated with Cobalt-60 or Cesium-137 radiation to calculated tumor doses of about 4000 r in 4 to 4½ weeks except for 1 patient, treated postoperatively, in whom the dose exceeded 5000 r. In an additional 9 patients treatment could not be completed (5 with roentgen ray and 4 with Cobalt-60 radiation).

Thirty-six patients were treated postoperatively; 33 of these following subtotal resection of the tumor, and 3 following biopsy. One patient had an eosinophilic adenoma and the remainder had chromophobe tumors.

Eleven patients were irradiated for recurrences at 1 to 28 years following previous
treatment consisting of surgery and/or irradiation.

RESULTS

Those patients who had improvement of clinical status, or arrest of activity or of growth of tumor for a period greater than 5 years, or continued improvement at the time of last follow-up if less than 5 years (but not less than 1 year) were considered to have had satisfactory results with irradiation. Those who showed no improvement and those who were dead before 5 years or had evidence of recurrence prior to 5 years, were considered to be poor results.

The 36 patients treated postoperatively are excluded from the following analysis of results; those patients treated for recurrences (11 cases) are included. Thus a total of 94 patients are available for evaluation of results of radiotherapy, of which 64 had chromophobe tumors and 30 had eosinophilic adenomas.

Of the 64 patients with chromophobe adenomas, 36 (56.3 per cent) were considered to have satisfactory results (Table 2). Ten patients survived 10 to over 15 years, 13 five to ten years, 6 three to five years, and 7 one to three years at the time of last follow-up. Twenty-eight patients were considered to have poor results, including 3 in whom treatment was incomplete, and 1 patient who was lost to follow-up.

Of the 30 patients with eosinophilic tumors 19 (63.3 per cent) were considered to have satisfactory results. Seven patients survived 10 to over 15 years, 5 five to ten years, 3 three to five years, and 4 one to three years at latest follow-up. Eleven patients were counted as poor results, of which 3 could not complete their treatment. No statistically significant difference could be demonstrated between the results in the chromophobe and the eosinophilic adenoma patients.

If the criterion of arrest or improvement of acromegalic features is considered, 10 patients had no improvement or had progression of acromegaly following treatment (Table 3). Seventeen patients had arrest of previously progressing acromegaly, and partial regression of acromegalic features was observed in 2 other patients.

A very dramatic improvement was observed in another patient who obtained complete regression of acromegalic features to a normal status and is presented below:

Case Report. E.J. was 25 years old when he was discharged from the U. S. Air Corps in July 1945 because of finding of decreased vision in his left eye on routine examination. In December 1945 he noted onset of headaches and on Jan. 1, 1946 he had sudden onset of blindness of the left eye, for which he was seen at The University of

TABLE 1

Sex and age of patients receiving radiation

<table>
<thead>
<tr>
<th>Type of Adenoma</th>
<th>No. of Cases</th>
<th>Path. Diag.</th>
<th>Sex</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromophobe</td>
<td>99</td>
<td>49</td>
<td>M</td>
<td>0-19</td>
</tr>
<tr>
<td>Eosinophilic</td>
<td>31</td>
<td>2</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2

Results of radiation treatment and duration of improved status

<table>
<thead>
<tr>
<th>Type of Adenoma</th>
<th>Total No. Cases</th>
<th>Improved</th>
<th>Years of Improved Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromophobe</td>
<td>64</td>
<td>36 (56.3%)</td>
<td>10 13 6 7</td>
</tr>
<tr>
<td>Eosinophilic</td>
<td>30</td>
<td>19 (63.3%)</td>
<td>7 5 3 4</td>
</tr>
</tbody>
</table>