# ROENTGEN THERAPY IN CONJUNCTION WITH THYROIDECTOMY IN THE TREATMENT OF SEVERE HYPERTHYROIDISM

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In spite of recent improvements in the preoperative management of patients with hyperthyroidism, there still is a small group of elderly patients in whom thyroidectomy cannot be made safe by medical treatment alone. These cases occur almost exclusively in the older age groups and are characterized by failure of the patient to improve in response to rest and iodine. Loss of weight and appetite occur and persistent mental confusion or delirium with or without elevation of temperature may be present. The liver function, as measured by the bromsulfalein test, is often impaired and the icterus index may rise to 15 or 20. In the past it has been necessary to reject these cases as inoperable.

Pole ligations have long been used as preliminary measures to reduce the severity of the hyperthyroidism and to render the patient operable. The results from pole ligations, however, are by no means uniformly satisfactory. Clinical improvement is noted in about only 50 per cent of all patients in whom ligations alone are performed. In addition, pole ligations performed in bad risk cases always entail a definite hazard, for even this minimal surgical procedure may initiate a fatal thyroid crisis.

Roentgen therapy has long been used in the treatment of hyperthyroidism but in the uncomplicated case, surgery is the treatment of choice. In response to roentgen therapy, the basal metabolic rate frequently will approach normal, the nervousness may subside, and the patient may gain weight. Too frequently, though, the tachycardia will persist and the eye signs may progress. In short, the remissions induced by roentgen therapy, except in early cases of residual or recurrent hyperthyroidism in which there is little or no palpable enlargement of the thyroid, tend to be both incomplete and transitory, as compared with the results obtained by thyroidectomy.

In some cases of diffuse goiter with hyperthyroidism, if the bulk of thyroid tissue is not too large, a definite, although often incomplete and transitory, remission of symptoms takes place in response to roentgen therapy. This remission occurs within a month after the onset of treatment and is most marked in from six to ten weeks after treatment is started. In patients with small diffuse goiters, the results obtained by the use of roentgen therapy are far superior to those obtained in patients with large adenomas.

I do not employ roentgen therapy in the treatment of uncomplicated hyperthyroidism. Too often valuable time is lost and the failure of roentgen therapy to induce a satisfactory remission results in progress of the disease to the point where the operative risk is increased. In the

desperate case, however, where surgery cannot be undertaken because of delirium or other contraindications, roentgen therapy may be of value in diminishing the severity of the disease to such an extent that thyroidectomy can be performed with safety. Roentgen therapy is less hazardous than pole ligation, usually affords greater clinical improvement, and therefore, has supplanted pole ligation as treatment preliminary to thyroidectomy in the occasional bad risk case.

## Case Report

The patient was a man sixty years of age whose chief complaint was weakness which had been present for eighteen months. He had lost twenty-five pounds in weight. The pulse rate when at rest in bed was 100 beats per minute and the blood pressure was 150 mm. systolic, 80 mm. diastolic. At entry the basal metabolic rate was plus 57 per cent. He was given 15 minims of Lugol's solution three times a day, a high vitamin, high carbohydrate, high caloric diet, and he was kept at rest in bed. The pulse rate, blood pressure, and basal metabolic rate did not respond to this therapy. At the end of ten days the basal metabolic rate was plus 42 per cent, the pulse rate 100, and the blood pressure 140 mm. systolic, 70 mm. diastolic. Clinically, the patient was much worse. He had lost ten pounds in weight in ten days. He was mentally confused and delirious at night in spite of the fact that all sedation had been withdrawn. The temperature rose to 100.2° F. in the evening. The liver function was impaired, as evidenced by an icterus index of 10, and by 100 per cent retention of dye five minutes after the injection of 2 mg. of bromsulfalein, and five per cent retention at the end of one-half hour. He had lost all appetite and felt nauseated at times. A thyroid crisis was impending; therefore, thyroidectomy was contraindicated.

Roentgen therapy was started on the tenth day after admission and thirteen treatments were given in the next fifteen days. The pulse rate rose to 130 between the third and fifth treatment and the basal metabolic rate rose to plus 56 per cent. A total irradiation of 2300 r units was given to the thyroid area. At the completion of the therapy the appetite had improved, and he had gained three pounds in weight. The basal metabolic rate had fallen again to plus 43 per cent. During this time the dosage of Lugol's solution had been reduced to five minims three times daily. The patient was discharged from the hospital and instructed to continue this same dosage of iodine and to rest in bed at home. He still was mentally confused in the evenings.

The patient returned seven weeks after the first roentgen treatment. His appetite was good and he had gained fifteen pounds in weight. His mind was clear. Although the tachycardia was unchanged and the basal metabolic rate was still plus 34 per cent, he had made a striking clinical improvement. After a few days of preparation with increased dosages of iodine, a left hemithyroidectomy was performed. The patient was placed in an oxygen tent, he was given a blood transfusion, and glucose was administered intravenously by the continuous drip method. In spite of these measures, the operation was followed by considerable reaction, the temperature rising to 104° F. Five weeks later the remaining lobe was removed. There was minimal postoperative reaction and the patient was discharged from the hospital on the seventh postoperative day. He has since regained his lost weight and his pulse rate is normal.

This case illustrates the results that have been obtained in a small group of bad risk cases which have been subjected to roentgen therapy prior to operation.

## ROENTGEN THERAPY

It has frequently been stated that roentgen therapy makes the thyroid adherent to surrounding tissues and therefore is contraindicated in patients who are to be subjected to surgical intervention. Adherent glands may be present in some patients who have had roentgen therapy, but this may be equally true of longstanding hyperthyroidism in any patient who has been subjected to prolonged iodine therapy. If roentgen therapy is properly administrated, the thyroid will often be no more adherent than the ordinary exophthalmic goiter. Even if the technical difficulties were increased by the administration of roentgen therapy, this still would be no contraindication to its use. The dangers of thyroid surgery today lie not in the technical hazards of operation, but rather in the physiological problems that arise with the combination of old age and severe hyperthyroidism. Anything that will decrease the severity of the hyperthyroidism will render operation less hazardous and will lower the mortality rate.

The routine use of roentgen therapy as a preliminary preoperative measure would be both economically unsound and physiologically unnecessary. However, in the type of bad risk case that represents 2 or 3 per cent of all cases of hyperthyroidism, and in which pole ligations were formerly performed, the treatment may result in either a lowering of the operative mortality, or a widening of the scale of operability, or both. Since adopting this method of treatment for bad risk cases, we no longer have found it necessary to perform pole ligations.

## SUMMARY

1. Roentgen therapy is of value in the preoperative treatment of bad risk patients with severe hyperthyroidism.

2. I do not recommend roentgen therapy for the treatment of uncomplicated hyperthyroidism.

3. Roentgen therapy has taken the place of pole ligation as a preliminary measure in preparing bad risk cases for thyroidectomy.

4. By combining roentgen therapy with stage operations, the mortality rate of thyroid surgery may be reduced and the operability rate increased.