ENDOCRINES IN THEORY AND PRACTICE

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CLINICAL ASPECTS OF HYPERTHYROIDISM

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Hyperthyroidism or toxic goitre may arise in a patient who has shown no signs of thyroid disease previously or in one who for many years has had a simple goitre. It is more common in females than in males and may occur at any age, but the incidence is greatest in women in the third decade and at the time of the menopause.

Course of Disease

The disease is usually chronic, partial remissions and periods of increased activity alternating irregularly; rarely the course is short, the condition lasting for a few months and ending in spontaneous recovery. The initial attack or any relapse may be so severe as to cause death, and, if the condition is chronic, auricular fibrillation and congestive heart failure or mental disturbances are likely to develop eventually.

Aetiology

The cause is unknown, but infections such as influenza or acute tonsillitis, psychic stresses such as emotional shocks and financial or family worries, and events of the sex life such as adolescence and the menopause, are so frequently associated with the onset or a relapse that they are regarded as exciting causes. In many cases no exciting cause can be found. A constitutional factor also is probable.

Clinical Picture and Diagnosis

The clinical picture is extremely variable. The symptoms and signs include enlargement of the thyroid gland, muscular weakness, mental irritability, physical and mental restlessness, tremor, palpitation and tachycardia, excessive flushing and sweating, loss of weight, and eye signs of which the most striking are exophthalmos and widening of the palpebral fissures. All or only a few of these disturbances may be present, and any one of them may be absent. The most constant departure from the normal is the increased rate of basal metabolism, but in mild cases the figures are difficult to assess, and when the increase is definite the clinical features are usually well marked. The estimation of the basal metabolic rate is therefore unnecessary for diagnosis.

The typical clinical picture of exophthalmic goitre in which all the symptoms and signs are present is most frequently seen in women during the child-bearing age; in older patients, and when the condition arises in the course of a long-standing simple goitre, the signs may be few and the picture may be predominantly that of a functional failure of some organ such as the heart or of the mental faculties. When auricular fibrillation results in an elderly patient the signs and symptoms of congestive heart failure may be so pronounced that the underlying cause is missed, a slight enlargement of the

thyroid gland and an absence of any other cause for the cardiac irregularity being the only clues to the diagnosis. If a thyroid origin is considered, however, other evidence is usually forthcoming in a slight widening of the palpebral fissures, tremor, or a history of goitre, simple or toxic, earlier in life.

A mild degree of hyperthyroidism is sometimes seen in patients who have suffered for years from neurasthenia and indefinite symptoms of ill-health. A slight enlargement of the gland and the nervous manifestations of hyperthyroidism are present, with or without tachycardia, and as a rule no loss of weight. This is an important group, for the thyroid disturbance is but a part of a more general departure from health which has existed for some time. It is of great importance to assess accurately the part that the thyroid gland is contributing to the disability, for treatment directed to the thyroid alone will give disappointing results, and thyroidectomy may make the condition worse and give rise to mental depression, rendering the life of the patient more unhappy than before.

Condition of the Gland

In the absence of previous disease of the thyroid gland the enlargement is characteristically moderate or slight and affects the gland diffusely. Sometimes it affects the isthmus or one lobe or a portion of a lobe more than the rest of the gland, but the whole is involved. It is firm but not hard, and the surface may not be quite smooth, slight palpable irregularities being due to exaggeration of the normal lobulation. In severe and early cases excessive vascularity is recognized by a palpable thrill and loud systolic murmur. In cases of some duration, or after the administration of iodine, the excessive vascularity disappears and the gland becomes harder and more irregular. If the disease arises in a case of long-standing colloid or simple nodular goitre the gland may be large and irregular. The gross irregularities are due to involution nodules; rarely a "foetal adenoma," usually single, is associated with hyperthyroidism. In older patients it may occasionally prove difficult to determine any enlargement of the gland, which is small and fibrous, but on surgical exposure it is always found to be larger than clinical examination disclosed.

Muscular Weakness and Tremor

Muscular weakness and excessive fatigue on exertion are probably the most constant symptoms. Mental restlessness is usually the symptom first noted by relatives, and is characterized by excessive mental energy and irritability, with periods of depression. The tremor is best seen in the outstretched fingers, and is typically fine and irregular. It may be present also in the lips and tongue, and, in severe cases, affects all the muscles of the body. It may be coarser and more obviously irregular. In many patients there is a physical restlessness so that they cannot sit still and are continually altering the position of their limbs.

State of the Heart

The cardiovascular system is characteristically affected, and the dangers to efficiency and to life are mainly due to this. Palpitation may be the earliest symptom, and in

severe cases is present even at rest, but in milder cases is noticed on slight exertion or emotional disturbances. Sensations of heat that may be accompanied by a visible flush are complained of by the younger patients especially, and though most marked in the face, neck, and upper thorax may be accompanied by an uncomfortable feeling of heat throughout the body. The cardiac impulse is forcible, and suggests a vigorous and rapid action of the heart. It may be palpable all over the praecordium. The apical impulse is diffuse, and can be felt outside the normal position even in the absence of cardiac enlargement. In severe or long-standing cases slight cardiac enlargement occurs, but if marked is indicative of some complicating factor such as hypertension or a valvular lesion. The heart sounds are loud and sharp, and systolic murmurs at the apex and base are usual. The rate of the heart is rapid and varies with the severity of the disease, rising to 180 per minute or over; but more commonly rates of 100 to 120 per minute are found.

The heart's action is usually regular, but if the disease is very severe in younger patients, or even if only mild in the older, auricular fibrillation is likely to arise. With the onset of auricular fibrillation congestive heart failure results and life is endangered. Previous to the onset of established fibrillation, paroxysms of auricular fibrillation or of auricular flutter, and extrasystoles, may occur. The systolic blood pressure is usually raised and the diastolic normal, so that the pulse pressure is increased.

Loss of Weight and Other Signs

The body weight and the rate of change in weight are valuable guides to the severity of the disease and to its activity. So long as loss of weight continues the disease is active; cessation of loss and commencement of gain are indications of a remission. In severe cases the loss of weight is rapid and striking, several stones being lost in a few months. In milder cases there may be no loss of weight at any time, but those patients who show some of the signs of the disease but are persistently overweight must be carefully considered, for in them the thyroid disturbance is not, as a rule, the only cause of their ill-health.

Exophthalmos may be absent in the younger as well as in the older patients, but in the latter is more often slight in degree. It is usually bilateral, but is frequently more marked on one side. It may be so extreme as to dislocate the eyeball. It may vary in degree from day to day, but when established is the most persistent sign of the disease, often remaining when recovery is otherwise complete. Even when no proptosis can be demonstrated the eyes appear to stare abnormally. This is due to retraction of the upper lid, which is the most common of the eye signs. Excessive lachrymation contributes to the shining appearance of the eyes; other eye signs that may be present are infrequency of blinking, lack of wrinkling of the forehead on looking upward, lagging of the upper eyelids when the eyes are turned downwards, and difficulty of convergence on looking at a near object.

Glycosuria is common at some time in the course of the disease, but there is no elevation in the value of the fasting blood sugar; it is not indicative of diabetes mellitus, disappearing with recovery from the thyroid disease. Diabetes mellitus may be present in addition to hyperthyroidism, but not more frequently than in any other group of patients.

Medical Treatment

The disease may subside and recovery be complete on medical treatment alone. Even if surgical treatment is

required the safest time in which to operate is when the activity of the disease has subsided and a remission is established. The object of medical treatment is therefore to bring about a remission, and such treatment should be carried out even if the need for surgical treatment in addition is clear.

Rest.—Rest is the most efficient method of treatment, and it must be physiological as well as physical rest, and rest for the mind as well as for the body. This should, as a rule, be carried out in a hospital or nursing home, not only because of possible exciting causes due to incompatibilities and worries in relation to the home or relatives, but also because the mental unrest and irritability that result from the disease have usually been productive of friction and irritations even if these were absent before the onset. Complete rest in bed is desirable at first in all cases. It may have to be continued for weeks or months in the severe cases and in those with congestive heart failure, but in the milder cases should be relaxed after a few days or weeks, since its continuance unduly may be productive of "unrest," both physical and mental. The surroundings must be cheerful and the nurses and attendants agreeable.

Diet.—In view of the increased metabolism the diet should be a generous one, well balanced, and containing ample fresh food and vitamins. The appetite is usually good, and no difficulty is experienced in getting the patient to take sufficient nourishment, but in a few instances it is poor, and such patients require much skill and experience on the part of the nurses to get them to take enough food to enable the loss of weight to be checked. Sleep is usually good, but for the mental restlessness in the day-time it is advisable to give a sedative, and luminal in doses of half a grain (32 mg.) or 1 grain (64 mg.) two or three times a day is satisfactory. If hypnotics are necessary, chloral or paraldehyde is suitable.

Infections, especially of the teeth, tonsils, and sinuses, should be sought for, and the patient's business and domestic affairs explored for sources of worry.

Iodine.—Considerable improvement usually results from the rest and other measures. The tachycardia subsides, the nervousness and restlessness diminish, and an estimate of the severity of the condition is obtained. In some cases such measures alone suffice after one or two weeks to check the activity of the disease, and a remission sets in, with steady improvement and gain in weight. In many, however, the improvement is slight and temporary, and iodine should then be prescribed. This will produce a further improvement, and should be given in doses of 10 minims of Lugol's solution or of liquor iodi simplex (*B.P.*) three times a day, or in the form of potassium iodide $1\frac{1}{2}$ grains (0.1 gramme) three times a day. The full effect will be seen at the end of about ten days, and the dose can then be reduced; for prolonged administration small doses (5 to 6 minims daily) should be given. In most cases either rest alone or rest and iodine will cause a remission, and steady improvement will continue. This may go on to recovery, or more usually a stage of partial recovery only is reached and a mild but chronic condition sets in.

Indications for Surgical Treatment

If after six months of efficient treatment it appears unlikely that complete recovery will ensue, some method of reducing the amount of functioning thyroid tissue should be employed—either thyroidectomy or irradiation. Irradiation takes several months to produce its effects, and is therefore unsuitable for the more severe cases or

for those in which an early return to working efficiency is essential; but in the mildest cases and in those in which the thyroid disturbance is but an incident in a long history of neurasthenia and ill-health it should be tried. In older patients and in those with nodular goitre the likelihood of recovery without operation is less, and operative treatment should not be delayed.

The tonsils commonly are moderately enlarged and congested, but this disappears following recovery and requires no special treatment; but if residual sepsis is present in the tonsils, teeth, or sinuses this should be dealt with if possible before surgical treatment by thyroidectomy. In the more severe cases it is advisable to postpone tonsillectomy till after the condition of the patient has been improved by thyroidectomy.

If medical treatment is not effective in checking the activity of the disease and the patient continues to lose weight thyroidectomy may have to be carried out before a remission can be established. Such a step is to be avoided if the activity of the disease can possibly be checked by any other method, for in such a case the operative risk is considerable; but it should not be delayed until the patient's condition becomes too serious. If necessary, a preliminary ligation of thyroid arteries should be carried out, the subtotal thyroidectomy being subsequently performed in one or two stages, according to the patient's condition.

Auricular Fibrillation

In the presence of auricular fibrillation and congestive heart failure prolonged medical treatment may be required before thyroidectomy can be safely performed, but once the fibrillation is established this is the only treatment that can restore health. Digitalis should be used to control the ventricular rate, and care must be taken to avoid digitalis poisoning, for the ventricular rate is more difficult to control than in auricular fibrillation due to other conditions, especially when the disease is actively progressing. Salyrgan and other diuretics are of great value when ascites and oedema are present. Previous to thyroidectomy quinidine is not advisable, for even if normal rhythm can be established it is not stable. Following subtotal thyroidectomy the rhythm frequently reverts to normal spontaneously, but if the irregularity persists at the end of one or two weeks quinidine should be given.

Surgical treatment should be regarded as an incident in the management of the case; following it a long convalescence of three to six months is advisable, and the patient must be guided and guarded through infections and the worries and troubles of life. Small doses of iodine (Lugol's solution, 5 or 10 minims daily) are advisable for three months following operation, and aid in the necessary readjustment of the endocrine system before health can be regained.

Surgical Treatment

Surgical treatment should not be considered when the early manifestations of the disease appear. When the disease becomes established through failure to respond adequately to the measures already indicated it becomes advisable to diminish the amount of secretion by resection of gland tissue. The patient will naturally want to know the degree of improvement to be expected.

This disease is not analogous to a condition such as appendicitis, in which the affected organ can be completely removed. The patient has still to rely on the gland tissue left after resection for the physiological needs of the body. The surgeon must therefore know by experience

how much should be resected to obtain the greatest improvement possible while still leaving sufficient behind. If this is judged wisely the benefit is so great as to approach a cure. The pulse rate falls; the mind and body become tranquil; the feeling of heat disappears; the appetite—which in many patients has been excessive—and the basal metabolic rate both approach normal. The improvement in the eyes varies with the degree of exophthalmos; when this has been moderate it often disappears. There is nearly always some improvement, but when exophthalmos has been very pronounced the improvement in the eye signs may occasionally be disappointing.

When the disease has lasted a long time, or when complications have been severe, the improvement is no less striking and the relief is great; but if the heart has been gravely exhausted it cannot recover its original efficiency. The patient may feel well, but strength should not be tested beyond the limits of safety, and these limits are soon learned by experience. Auricular fibrillation disappears and normal rhythm is regained in about 80 per cent. of cases. Congestive heart failure due to thyroid toxæmia can be easily avoided after thyroidectomy. Glycosuria often disappears; if not, it is sometimes controlled by dietetic measures. If diabetes mellitus is a complication and has become difficult to control by insulin it is more easily controlled after thyroidectomy. If mental disturbances have been a direct result of the disease great improvement follows operation, but if the mental condition has preceded the symptoms of thyroid disease, or if it is of the depressive type, great care should be taken and the help of a psychiatrist sought.

In few diseases is the relief to the patient following operation so great as it is in toxic goitre. This must not tempt the surgeon to perform thyroidectomy in unsuitable cases, and hesitancy must be exercised, especially when the thyroid disturbance is subordinate to other factors contributing to the ill-health of the patient.

The death rate remains about 3 per cent. when an average proportion of very severe cases have to be dealt with. Injury to parathyroid glands is now rare; injury to a recurrent laryngeal nerve is not so rare; hæmorrhage—primary or later—is avoided by the most careful hæmostasis. Thyroid operations should not be performed when it is difficult for the surgeon to reach the case quickly in case of necessity during the first twenty-four hours after the operation.

Anaesthesia

Good anaesthesia contributes greatly to the safety of all operative procedures on the thyroid gland. Chloroform is unsafe; ether is to be deprecated. Satisfactory anaesthesia is obtained by nitrous oxide and oxygen helped by a hypnotic dose of avertin, together with infiltration of the neck with local anaesthetic solution.

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