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THE TECHNIQUE OF THYROIDECTOMY

Recent Advances in the Management of Cases

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The post operative mortality of partial thyroidectomy, in the hands of surgeons accustomed to this type of operation, varies between one and two per cent. This includes every type of goitre other than carcinoma—no case however toxic, or however emaciated or whatever the severity of cardiac damage, being considered inoperable. This one to two per cent mortality in over 1,000 operations dates from 1932; in recent years, the mortality being only a fraction of one per cent. I feel quite certain that the reason for this latter low mortality results directly from the acceptance by doctors generally of the constant teachings of thyroid physicians and surgeons in the past ten years. It has been pointed out so often and so clearly how many patients slip, while under medical observation, from a slight degree of thyrotoxicosis to a well-established stage, followed by complications of severe and disabling character, endangering life and greatly lessening the chance of ever gaining full recovery. The acceptance of the fact, that in thyrotoxicosis, operation is desirable in as early a stage of the disease as possible, thereby ensuring a return to normal health, has resulted not only in lowering the mortality, but has greatly lessened the necessity for stage operations. It is interesting to note, that in the past three years in just over two hundred cases, no two or three stage operations have been found necessary, and three only in 1941 and 1942; whereas, prior to that time, at least six or seven a year underwent partial thyroidectomy in several stages. Perhaps too, it is significant that we have had no pre-operative deaths in the past three years, whereas there were seven in the preceding six years.

It is also now more appreciated that the nodular-secondary type of thyrotoxicosis, leading insidiously over many years to cardiac damage and culminating in established auricular fibrillation, must be dealt with during the earlier stages of the disease. The knowledge that even a non-incapacitating and apparently non-toxic nodular gland with, in most cases, a normal basal metabolic rate and few symptoms other than tiredness and occasional palpitation, will in the course of time show signs of myocardial damage and auricular fibrillation, has, we believe become more common. One must clearly realise the danger when one finds that 27.9 per cent of close on 600 nodular goitres had developed well-established auricular fibrillation by the time they were sent for operation. Of these, 40 per cent were between the ages of 50 and 60, while 30 per cent were between the ages of 40 and 50. Of these cases 78 per cent were discharged with regular rhythm, following operation, either occurring spontaneously or after a short course of quinidine. In over 205 cases of the primary type there were only 5 per cent with fibrillation. How often have we in the past assessed a minimal degree of thyrotoxicosis, recommending outpatient observation, only to find operation had been unnecessarily delayed and ground lost.

It appears from the above, that we are coming to the conclusion that all adult goitres are to a lesser or greater degree thyrotoxic or potentially thyrotoxic by nature. Note Linnell's (1) recent statement, "It is, however, our conviction that not only do nearly all goitres eventually become toxic but that by the time early middle life is reached cases of goitre without some evidence of toxicity are rare." Further weight is added to this suggestion by the fact that on very many occasions transient post-operative auricular fibrillation has been noted, lasting from 12 to 24 hours in patients who had a perfectly regular rhythm before operation. Many of these cases were apparently only slightly toxic, and some of the glands harboured only single adenomata. This is surely an indication that the patients were on the point of developing paroxysmal or established auricular fibrillation.

Comparatively rarely now do we see the typical severe Graves' disease or primary thyrotoxic goitre with the protruding eyes, wasted body, flushed skin, rapid pulse, anxious face and restless demeanour, that only a few years ago would be seen at any time in a thyroid ward. Compare the cases now coming to operation with three cases appearing on the same operating list at this hospital one afternoon in 1934.

The first, aged 43—a long-standing goitre with a deep retrosternal prolongation, auricular fibrillation, laboured breathing from cardiac failure and tracheal pressure, oedema extending to the waist and with fluid in the pleural cavity for which the patient had previously undergone several aspirations. Operation was performed in stages.

The second case was one of a severe primary toxic goitre with all classical signs and symptoms to a marked degree. The resting pulse was 130-140. After avertin the pulse
rose to 216, so that operation postponed and the bowel washed out. The pulse remained at 200 for several days and then slowly fell to 130. Two weeks later with morphia, scopolamine and local infiltration, the superior vessels were tied and later, one lobe at a time was removed.

The third case had been confined to bed for eight months, during which time the pulse had rarely fallen below 130. She, too, was a primary type of severe degree, wasted, restless, flushed and anxious. As we would often then say, "The margin of safety is a very small one."

In our goitre ward to-day are ten cases, quite a fair cross-section of the types at present dealt with, of which only one is likely to give rise to any anxiety: viz., a man of 60 with a long history of goitre, partially retrosternal, wasted and dyspnoeic with an enlarged heart, auricular fibrillation, oedema and gross congestive failure on admission. The other nine are women, ages varying between 21 and 68; seven with long-standing nodular goitres, of which three are partially retrosternal, and all but one being thyrotoxic, the two oldest having auricular fibrillation. The one apparently non-toxic case has a large retro-clavicular adenoma causing tracheal pressure. The two remaining cases have primary thyrotoxic glands, are nervous and irritable, showing all the classical signs and symptoms of primary thyrotoxicosis. None of these cases, other than the first, can be considered gravely ill or give rise to any anxiety, but the pre-operative and operative procedure of each must be given individual consideration.

Pre-operative Considerations

Collaboration between physician, experienced in cardiology and thyrotoxicosis, and surgeon is of paramount importance. I find myself willingly guided by him, not only in regard to the length of pre-operative rest required, but also in regard to many other details of pre- and post-operative care. On one occasion in a definite thyrotoxic goitre an advanced pulmonary tuberculosis was pointed out by him. The physician decides the amount of digitalis necessary in cases with pre-operative auricular fibrillation and the amount of quinidine in those post-operative cases slow to return to a normal sinus rhythm.

X-ray examination of chest is mainly a routine procedure, not only for cases of suspected retrosternal prolongation to show their depth, but also in the majority of apparently uncomplicated cases, as not uncommonly, unexpected conditions are disclosed. Only a few weeks ago in a man with a toxic adenoma, pressure symptoms and irritating cough, X-ray disclosed the lungs pitted with secondary malignant deposits, the primary being a Grawitz tumour of the kidney. The above case emphasises the care that must be taken in the general examination of the patient even though thyrotoxic symptoms are definite and predominant.

Type of Patient

Every type of patient will be met from the highly strung, flushed, restless and often uncooperative primary type, to the rather slow thinking, stout, sub-thyroid suffering from Hashimoto's disease; while between them are patients with every degree of thyrotoxicosis and its various manifestations; some where the emphasis is on the cardio-vascular system, some on the nervous system and some on the metabolic system. As regards age, there will be children of 10 up to the elderly myocardial patient of 80. There will be those dyspnoeic, with stridulous breathing from tracheal obstruction, due to pressure from a large non-malignant goitre and others where there is a malignant gland causing its well-known distressing symptoms. Perhaps the case demanding the most careful thought in deciding for or against operation, is the thyrotoxic patient with associated mental instability. I do not mean the highly nervous type, so often seen in thyrotoxicosis, but the one, strange in manner, suspicious and often confused, and on rare occasions maniacal. One such case had attempted suicide by strangulation with bed sheets the morning prior to operation and on previous occasions. She was completely cured of these mental aberrations by successful operation.

The pre- and post-operative procedure must depend solely on the individual merits of each case; there can be no uniformity, either in regard to the pre-operative period of rest and iodine, or in the type of operation performed, or amount of tissue left. The majority of cases, particularly of the primary type, are nervous, irritable, highly strung, anxious and frightened. In no other disease does the need for such tact and consideration arise as is necessary in the handling of these patients. "The patient is never wrong," must be the staff slogan. Nurses must be chosen chiefly for their tact and sympathy, for in a severe case, any irritability on the nurse's part, no matter how justifiable, may result in the postponement of operation. Complete confidence must be, and with care can be, soon gained.

Much thought has been given to the question of single room versus general ward for these severely toxic patients. Experience has taught us that the general goitre ward serves, by placing the patients in close proximity with each other, to allay anxiety and increase confidence, with much resulting improvement. They see other cases, before and after operation, with increasing self-confidence, and the fact that the majority are up on the sixth day has a marvellous effect in improving the morale of those awaiting operation. There almost always appears to be a friendly atmosphere present, and one, moreover, of mutual help;
there is even a friendly rivalry in comparing scars, etc., all of which helps to dispel the fears of even the most anxious. One may say, the goitre ward is a happy ward, so directly opposed to the fact that the thyrotoxic patient is often an unhappy person. In assessing the thyrotoxic patient, the fact that there has been little or no loss of weight or that there has actually been a gain in weight, does not influence the decision for operation. This type can have all other signs and symptoms of thyrotoxicosis but a comparatively normal metabolism. In these cases rather less gland is removed than usual, and one often leaves a superior pole intact, as this portion generally appears to conform more to the normal, but the inferior arteries are ligated, as we consider that this procedure lessens any chance of recurrence. The Hashimoto goitre patient with the reverse of toxic symptoms, e.g., a low B.M.R. and a myxoedematous outlook and appearance, but with an ever enlarging gland and increasing sense of cervical constriction, must have the greater part of the gland removed and all four arteries ligated to prevent regrowth and alleviate progressive compression. Thyroid extract is given afterwards in perpetuam. A recent case with such a goitre, a doctor now fully engaged in active work, is now, after operation, free from symptoms on one grain of thyroid daily, his B.M.R. being—7. The single adenoma may be toxic or otherwise. Either type, however, may grow rapidly and force the trachea to the opposite side; in some cases it completely replaces one lobe and yet leaves its fellow of the opposite side apparently normal. Haemorrhage into its substance, with pain and sudden increase in its size, is not an infrequent occurrence.

Puberty goitre, due apparently to temporary physiological disturbance, is fairly common, disappearing in time with or without treatment; very occasionally toxic symptoms appear with a change in the consistency of the gland. In children, also, the non-toxic goitre is often found and is left alone. Toxic goitre, in childhood, however, can be severe and rapidly progressive, and in a grave state indeed were several of the 23 children, whose ages ranged between 10 and 16, all of whom underwent operation. A few of these had had previous X-ray treatment to the gland, with, according to the history given, some temporary improvement but who, on admission, were again rapidly losing ground. At operation it is our custom to leave rather more gland than in an adult case of approximately the same degree of toxicity. Latterly, we have felt that in these cases also, the inferior thyroid arteries should be ligated to lessen the chance of recurrence, there being two recurrences in the above cases in which this was not done. Our experience does not coincide with those who state that operative difficulties are increased by previous deep X-ray therapy, either in children or adults. Pigmentation of the skin may be present and perhaps the platysma may be a little more adherent than normal; below this level no change has been noted. In carcinoma of the thyroid there is often, contrary to general belief, some evidence of thyrotoxicosis and always a long history of goitre. As complete a removal as possible is performed, followed, in every case, by deep X-ray therapy. The outlook is far better than is commonly taught in text-books on medicine.

Septic tonsils and carious teeth in thyrotoxic patients are always dealt with after and not before operation; this perhaps no longer needs emphasis. The same applies to other operations, for example, uterine fibroids with menorrhagia. Two such cases are now warded awaiting operation; their toxic symptoms have been removed by partial thyroectomy and they are now considered safe to undergo sub-total hysterectomy. As regards the influence of thyrotoxicosis on menstruation, Russell and Dean (2), in their analysis of 139 of our cases, seem to have disproved the generally accepted text-book view that thyrotoxicosis tends to produce menorrhagia, having found this symptom present in two cases only. It apparently has the opposite effect, for in over half the severe cases, it had produced scanty periods or amenorrhoea, 50 per cent of these returned to normal after operation.

Estimation of the B.M.R. is of great value in doubtful cases, e.g., those with loss of weight and tachycardia and yet no apparent enlargement of the gland. But clinical experience, with careful examination and history, goes far in replacing it. In these doubtful cases with tachycardia, a sleeping pulse rate is helpful; as it is also in the average toxic type, where the pulse rapidly increases in rate, from apprehension or any other stimulation whilst they are awake. Finally, pre-operative laryngoscopy of goitre patients with stridor or husky voices, occasionally may show weakness of a vocal cord, but in the majority these symptoms are due only to tracheal pressure or a simple laryngitis.

Preparative Treatment

Although, as previously pointed out, each case must be assessed and treated on its individual merits, there are general principles of treatment common to all.

1. The general goitre ward and the association with other goitre patients. As few restrictions as possible, for though physical and mental rest is essential, these cannot be obtained unless the patient remains happy. If the patient finds complete rest in bed irksome, this may defeat its own
object, for a rapid pulse rate often gradually settles to a lower basic level, on allowing the patient up within reason. Complete rest is reserved for those patients with severe myocardial damage and symptoms of cardiac failure. Operation is postponed until the physician is satisfied that such signs of failure have reached their minimum.

2. Lugol's iodine m.v.t.d.s. is commenced on the day of admission, except in cases in which a B.M.R. estimation is desirable. If the patient has already been on iodine for weeks or months before admission, as is so often the case, its good effect is probably already past, and the patient's pre-operative state cannot be brought to its optimum by its exhibition. Iodine is only of real benefit, when given in the above dosage for from 7 to 14 days. In the majority of cases seen at the present time, the temporary amelioration of signs and symptoms, often with palpable hardening of the gland, occurs in the shorter period. The pulse rate is again the main guide in settling the date of operation. Within 4 or 5 days after admission it is usually possible to come to a decision on this point. The patient is almost always informed of this, for we think the day of "stealing the goitre" is over, except, perhaps, in the grave mentally unstable type of case previously mentioned. In the more severely toxic cases, the basic pulse level is generally reached within 10 to 14 days; rarely is anything to be gained by waiting longer and much can be lost, the patient becoming restless and apprehensive, with again a rising pulse rate.

3. Digitalis is always given in cases of auricular fibrillation to control the ventricular rate; and in addition, in cases where congestive failure is present, salyrgan or a like preparation is injected if necessary. Digitalis is never ordered in cases without fibrillation, and again, we never give quinidine before operation. Auricular fibrillation is never a contra-indication for operation.

4. A generous diet is ordered with extra milk, and the patient is encouraged to drink as much fluid as possible containing glucose. A severely thyrotoxic patient, for whom the above is especially necessary, needs little encouragement, what with loss of fluid through sweating and the avid appetite which comes from increased metabolism.

5. Occasionally a nervous patient who fails to respond favourably to her surroundings is given small doses of luminal, t.d.s. and sleep is assured by medinal at night.

6. Purgatives are liable to set up diarrhoea in the severely thyrotoxic patient and are therefore generally contra-indicated, enemata or glycerine suppositories being used instead.

7. Last, but not least, thiouracil can be of great value in the pre-operative treatment of the severe primary thyrotoxic goitres, now so rarely seen. I have had the opportunity of operating on five cases, two of which had undergone full courses of thiourea at other hospitals and under expert supervision; but who, though they had temporarily improved, had relapsed while still under treatment. The operation time in each was prolonged on account of increased vascularity and fixation of the gland. The other three cases had proven intolerant to the drug, since it had caused nausea and vomiting.

Pre-operative preparation.

When the period of preparative treatment is finished, with the pulse at its basic level and the patient assured and confident, preparations for operation are commenced.

Two Days before operation.

The patient's weight is taken to estimate the amount of pre-operative avertin necessary.

Day before operation.

Fluid diet only.
Small enema or glycerine suppository if necessary.
Skin preparation.
Medinal gr. x at night.

Morning of operation.

Further skin preparation.

(a) In cases of moderate toxicity—Atropine injection gr. 1/75 and rectal avertin, 1/3 of an hour prior to operation.

(b) In cases more severely toxic with a less settled pulse—Omnopon gr. 1/3, scopolamine gr. 1/150, 1 1/2 hours, and avertin 1/3 of an hour prior to operation.

(c) In very severely toxic cases with auricular fibrillation, a rapid ventricular rate, in spite of digitalis, and evidence of cardiac failure, omnopon and scopolamine are given 1/3 and 1/3 of an hour before operation, and avertin omitted.

The average dose of avertin given to a toxic patient is 0.1 c.c. per kilogram body weight, but in those less toxic or apparently non-toxic with little or no loss of weight, a rather smaller dose is given. On several occasions in severely toxic primary cases we have found the pulse rising rapidly soon after the administration of the avertin, it being then necessary to wash out the bowel and postpone operation, which was performed later under omnopon and scopolamine. With the pre-operative use of thiouracil this will probably seldom be necessary. On one thing we are agreed; the
ILLUSTRATIONS ON TECHNIQUE OF THYROIDECTOMY

By

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Fig. 1.—Low collar incision.

Fig. 2.—Exposing surface of lobes by infra-hyoid retraction.

Fig. 3.—Ligation of middle thyroid vein to facilitate dislocation of lobe.

Fig. 4.—Ligation in continuity of inferior thyroid artery.
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Fig. 5.—Ligation of superior thyroid artery.

Fig. 6.—Remaining portions over-sewn and anchored.

Fig. 7.—Continuous suture of platysma.

Fig. 8.—Clips and sutures removed in 48 hours.
1.—Primary thyrotoxic goitre

**Fig. A.**—Clinical picture.

**Fig. B.**—Hystopathology: showing diffuse epithelial hyperplasia.

The thyroid removed.

**Fig. C.**—Anterior view.  
**Fig. D.**—Posterior view.
2.—Secondary nodular toxic goitre

Fig. A.—A clinical picture of a secondary toxic goitre with established auricular fibrillation. Normal rythm 24 hrs. after operation.

Fig. B.—Histopathology: showing encapsulated foci of epithelial hyperplasia.

The thyroid removed

Fig. C.—Anterior view.

Fig. D.—Posterior view.

Secondary nodular toxic goitre.
3.—Toxic adenoma

Fig. A.—Clinical picture.

Fig. B.—Histopathology: showing hyperplastic epitheliums with absorption of colloid and an area of haemorrhage.

Fig. C.—Anterior view.

Fig. D.—Posterior view.

Toxic adenoma.
THYROIDECTOMY

J. E. PIERCEY, F.R.C.S.

4.—Hashimoto’s disease

Fig. A.—Clinical picture.

Fig. B.—Histopathology: showing lymphadenoid goitre (Hashimoto’s disease) showing lymph follicle.

Fig. C.—Anterior view.

Fig. D.—Posterior view.

Hashimoto or lymphadenoid goitre showing ivory-like cut section and ‘new potato’ external appearance.
THYROIDECTOMY

absolute necessity of a basal narcotic in all toxic cases, and of these we personally consider avertin the best.

It is administered in a quiet side ward away from anything suggesting operation, and there the patient falls asleep, remembering nothing, and on awakening with nothing in the way of horror to relate to those patients in her ward awaiting operation. Fifteen minutes before operation the neck is injected with approximately 100 c.c. of normal saline and adrenalin 1/200,000 solution. This injection, which is both superficial and deep to the platysma, lessens capillary oozing and facilitates the flap dissections, by clearly outlining the layers.

Anaesthetic

There is small need to mention the dangers of chloroform and ether in the thyrotoxic patient, but one can vividly remember, among other things, the post-operative distress caused by the collection of mucus on the rare occasions when the latter had been used. Following the removal of a particularly vascular gland a whiff of ether, causing the patient to strain momentarily, may help to assure the surgeon that absolute haemostasis has been gained. Gas and oxygen is a routine procedure with us, and we feel that the intra-tracheal method of administration is rarely necessary, and then only in cases with evidence of tracheal obstruction. It is our impression that the tube gives rise to tracheal irritation and collection of mucus.

Considerations in Partial Thyroidectomy

For the best results of operation, it is necessary for the surgeon to be experienced in thyroid surgery, and to have an assistant well versed in his methods, together with an anaesthetist, theatre sister and staff, working as a trained team. Though as little time as possible should be lost, speed is not essential if gentleness and control of all main vessels, before bleeding occurs, is practised. There is no set operation for goitre; the procedure in each case must depend on its own merits and the surgeon be guided by factors recognised before and during the operation. These factors include the degree of toxicity, the type of gland, the age of the patient, whether a previous increase in weight, and presence or absence of cardiac failure.

The severe primary type, now rarely seen by us, whose pre-operative basic pulse level remained above 120, till latterly, was operated on in stages, a lobe at a time, after preliminary ligation of the superior thyroid arteries. Life was saved on many occasions by this procedure, improvement following each stage. This type can probably now be brought to a safe level by a pre-operative course of thiouracil.

The patient with a comparatively normal metabolism, who is perhaps gaining weight, is left with rather more gland than usual, though, as stressed by the late Cecil A. Joll, the inferior thyroid arteries are ligated to lessen any chance of recurrence, and in addition, one superior artery is left intact. It is interesting to note, that in many glands with generalised degenerative changes, nodular or otherwise, the tissue in the region of the superior poles conforms more to the normal, and in many cases is apparently uninvolved. Advantage is taken of this fact by leaving the poles intact on occasions. It is to be remembered, too, that adenomatous masses tend to be situated at the root of the neck and are often partially retroclavicular or have retrosternal prolongations.

That an adenoma is single is never to be taken for granted; the other lobe should always be explored. We have often seen a second operation, necessary some years later, due to disregard of this practice, not from re-growth, but from the continued growth of the unexplored lobe.

Elderly patients with secondary thyrotoxic goitres undergo almost complete removal. A small strip or button of tissue is left on either side, and surprisingly, the patient suffers none of the symptoms of myxoedema as a result. Almost complete thyroidectomy is performed in cases of cardiac failure.

Points in Operative Technique

(1) The low collar incision and final careful approximation of the skin edges with clips, which are removed in 48 hours, give a scar difficult to discern at conversational distance (see Figs. 1 and 8).

(2) The recognition and isolation of the middle and inferior thyroid veins, and their ligation by means of a threaded aneurysm needle, before severence, enable the lobe to be dislocated forward with ease and without blood loss (see Fig. 3). Very rarely is it necessary after this procedure, however large the gland, to cut the muscles transversely, for it is usually the middle thyroid vein which drains into the internal jugular that binds the gland down.

(3) The recognition and ligation of the inferior thyroid arteries well away from the gland, and therefore well away from the recurrent laryngeal nerve, is an important step for (a) it allows free section of the gland with a minimal amount of blood loss; (b) in this way a larger stump of gland may be left, whereby the safety of the parathyroid bodies and the recurrent laryngeal nerve is ensured;
and (c) the possibility of recurrence is diminished (see Fig. 4). It is interesting to note that there has been, to our knowledge, no recurrence in 250 ligated cases in the past four years, whereas 51 or 6.8 per cent of 750 operations in the previous eight years, were for recurrence in unligated cases, 15 of which had recurred within four years.

(4) Double ligation of the superior thyroid artery at the apex of the upper pole, including its two main divisions (see Fig. 5).

(5) Complete removal of the mid-line upper prolongation, or pyramidal lobe, with its separate arterial supply, which, if left, it may well enlarge later.

(6) Complete removal of the isthmus, laying bare the trachea, otherwise an unsightly regrowth may occur (see Fig. 6).

(7) Over sewing the stumps to ensure haemostasis (see Fig. 6).

(8) A retrosternal prolongation is always more easily dealt with than X-ray examination would lead one to expect, as it is usually devoid of tethering vessels and can be brought upward and forward without blood loss.

(9) The wound, in the majority of cases need not be drained, but on occasions, a slip of corrugated rubber is passed from the cavity through the muscles in front of the sterno-mastoïd to the lateral margin of the wound. The platysma is approximated by a fine continuous suture (see Fig. 7).

(10) In conclusion the importance of gentle handling as well as the isolation and control of tethering vessels cannot be over estimated.

Post-Operative Procedure

On return to the ward the patient is placed immediately in Fowler's position, morphia gr. 1/6th or heroin gr. 1/12th, given when restless and repeated when necessary; a rectal saline containing Lugol's iodine minims 20 is administered, and the intake of fluids encouraged. The discomfort at the back of the neck, so often complained of, responds as a rule to aspirin and phenacetin. Lugol's iodine is continued for some four or five days. The drainage strip is removed on the first day, the clips on the second, and the bandage is replaced on the third day by a gauze collar tied with tapes.

A sharp reaction often follows operation, with a rise of temperature and pulse rate. In moderately severe cases, the pulse may rise to 130 and temperature to 101°F, with the patient flushed and restless. Within twenty-four hours the acute reaction generally subsides, and the pulse gradually settles to normal within seven days or so.

It is remarkable how quickly the patient appreciates the improvement brought about by operation; within four days, and often sooner, being cooler, dryer and less nervous and reactive. The majority of patients can be up on the sixth or seventh day and discharged on the tenth or twelfth, if home conditions are favourable. A six weeks' period of freedom from responsibilities, domestic and occupational, is advised, as a minimum.

Complications

Immediate complications are rare. No case of toxic crisis has been seen for some years. Should it occur, the treatment consists of an oxygen tent, morphia and fluids, but often fails. Post-operative pneumonia occasionally occurs, but in our experience, is extremely rare.

Symptoms due to injury of the recurrent laryngeal nerve are seldom seen, for there have been only 18 cases in 1,000 operations, and these have been in every case of a transient nature only. Parathyroid tetany is also an infrequent complication, and in the 15 seen, most were so slight and transient, that they responded to a few days of intensive calcium therapy; in only three cases was parathyroid extract necessary in addition. These became ultimately free from symptoms without any necessity for continued treatment.

Thirty cases of myxoedema of varying degrees have been recorded. All, as is to be expected, responded to thyroid extract and, in the majority of these, it was soon found to be unnecessary, owing to the metabolic balance being restored by the regeneration of the remaining tissue.

RESULTS

In the average case, I think a return to normal or near normal can be looked for, whilst a large measure of health can be restored even to the severely toxic patient, and those with complications; this is proved by the fact that 78 per cent of patients with auricular fibrillation left hospital with a normal rhythm. It is borne out by Keynes (3) in "that nearly all the patients are enabled to live an approximately normal instead of a semi-invalid life, and the majority are able to assume full activity both physical and mental."

One must always bear in mind that thyrotoxicosis commonly occurs in the highly-strung, sensitive type of person, and although complete thyroid balance may be regained by operation, the constitutional make-up is not altered.

It is generally recognised that the nursing profession is an exceptionally arduous and exacting one, and the fact that of forty nurses who underwent partial thyroidectomy, all returned to full duty, is an indication of the effectiveness of the operation.
I am grateful for the opportunities I have had of associating myself in thyroid work with the late Cecil Joll, Sir Thomas Dunhill and Geoffrey Kaynes, and for the benefit derived by me from their vast experience.

I wish to thank Miss E. M. Dean, Laboratory Technician to New End Hospital, for her careful compiling of statistics and records; Mr. J. E. Andrews, L.C.C. Medical Photogapher and finally Dr. J. W. Linnell for his kindness in criticising this paper.

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PRACTICALITIES

CLINICAL OBSERVATIONS ON MALARIA

By P. G. SHUTE, F.R.E.S.
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The disease malaria in man is caused by a specific, pathogenic organism known as the human malaria parasite, of a very primitive type belonging to the lowly animal kingdom, the Protozoa.

There are at least four separate species of human malaria parasites, each having morphological characters. By appropriate staining the microscopist is enabled to identify accurately the species involved.

The four species are:—

1. Plasmodium vivax (Benign tertian).
2. Plasmodium falciparum (Malignant or sub-tertian).
3. Plasmodium malariae (Quartan).
4. Plasmodium ovale (Ovale tertian).

A definite diagnosis of malaria can be made only by microscopical examination of the blood and recognition of the parasites. In certain cases, however, especially in relapses, the occurrence of fever every third day is indicative of Benign tertian malaria, while the occurrence of fever every fourth day is suggestive of Quartan malaria. Yet even when the fever presents this classical picture, diagnosis can be clenched only by finding the parasite in blood films.

It is probably no exaggeration to say that, until a few years ago, very few practitioners in this country were called upon to diagnose a primary attack of malaria. The reason, of course, was that it was almost impossible for people who were infected in tropical countries to arrive in England before the end of the normal incubation period of the disease. Now, however, with speedy air travel on an ever-increasing scale, it is possible for a person to be infected with malaria in the tropics one day, arrive in England on the following day, and develop malarial fever a week or two later.

In the knowledge of the writer there is the case of a man who spent only one night at a West African Station, returned to England by air a couple of days later, and developed Malignant tertian malaria nearly two weeks after his arrival. The diagnosis of malaria was not made for several days after fever had begun, because this disease had not been suspected and the fever chart was atypical.

It is generally agreed that, at least in non-immune Europeans infected with M.T., it is the primary attack and the first two or three relapses which, if not recognised and promptly and adequately treated, may lead to a fatal result. Unfortunately, in primary infections, and this applies to all four species of malaria parasites, the illness seldom begins with characteristic symptoms and signs. It may be worth while, therefore, to describe in detail the history of the fever as it occurs in each of the four species of human malaria parasites.

PLASMODIum vivax = Simple or Benign tertian malaria.

The asexual parasite completes its cycle of multiplication in 48 hours.

Common features of this species of parasite
1. The normal incubation period is between nine and fourteen days but may be as long as one year.
2. The whole of the life cycle of the parasite takes place in the peripheral blood.
3. Parasites, if present, are about equal in numbers both during the fever and in the fever free period.
4. The host cell of the parasite is swollen and if correctly stained is seen to be heavily studded with fine granules (Schuffner's dots).
5. Temperature frequently rises to 105° F. or over.
6. Rigors, which nearly always precede the onset of an attack, usually last about an hour. This is followed by the hot stage, the skin is hot and dry, the face flushed and headache and vomiting are often severe. This stage lasts about four hours.

Lastly, there is the sweating stage which is one of profuse perspiration. The temperature falls
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