the gonadotropic substance present in the urine of pregnant women and inject them into sterile women. Thyroidal insufficiency (in both parties) may account for sterility, since Lawrence and Rowe (1928) have shown that 39 per cent. of a series of patients with some degree of thyroid insufficiency were sterile. The results of this series show that investigation and treatment of as many as possible of the existing causes of sterility, at the same time, raise the fertility level and render pregnancy more likely to occur.

Summary

1. Sixty-two women complaining of sterility have been examined, the patency or non-patency of the Fallopian tubes being confirmed by uterosalpingography, and hormone therapy has been administered in many cases.

2. Of the husbands examined 13 per cent. were absolutely sterile, and in 8 per cent. few and distorted spermatozoa only were observed.

3. In 17.7 per cent. of women examined no lipiodol entered the peritoneum, showing non-patency of the tubes, and in 19 per cent. of the remaining cases one tube only was patent.

4. Of the women who had been sterile from two to eleven years (with the exception of two cases of nine months and one year respectively) 47.8 per cent. have to date (September, 1938) become pregnant within a period varying from one to seven months after treatment was begun. (In all these cases the tubes were patent and the husbands fertile.) Of the whole series 35.5 per cent. became pregnant.

5. The average age of the patients in this series is 30 years.

6. The average number of years of sterility is 5.7.

I am greatly indebted to Miss Dearnley, who has allowed me to carry on these investigations in her out-patient department at the Royal Free Hospital. I am also indebted to Dr. Ulysses Williams for the interesting series of radiographs, to Dr. Pillman Williams for so kindly carrying out basal metabolism and sugar tolerance investigations, and to Dr. Rawlinson, director of the Institute of Public Health and Hygiene, for his careful examination and report on the semen specimens.

REFERENCES

- Béclère, C., and François, E. (1937). *Bull. Soc. Obstét. Gynec. Paris*, **26**, 568.
 Bonnet, L. (1936). *Bull. Mém. Soc. Chirurgiens Paris*, **28**, 275.
 Clauberg, C. (1935). *Dtsch. med. Wschr.*, **61**, 1189.
 Coventry, W. A. (1934). *Amer. J. Obstet. Gynec.*, **27**, 912.
 Davis, M. E., and Koff, A. K. (1938). *Ibid.*, **36**, 183.
 Kilroe, J. C., and Hellman, A. M. (1933). *Ibid.*, **25**, 152.
 Lawrence, C. H., and Rowe, A. W. (1928). *Endocrinology*, July-August, 410.
 Pujol y Brull, A., Vanrell, J., and Riera, V. C. (1929). *J. Radiol. Electrol.*, **13**, 38.
 Rubin, I. C. (1932). *Amer. J. Obstet. Gynec.*, **24**, 561.
 Volk, W. (1936). *Z. Geburtsh. Gynäk.*, **113**, 339.
 Williams, L. C. Pillman (1933). *Lancet*, **2**, 858.

I. Snapper and P. Formigne (*Nederl. Tijdschr. Geneesk.*, 1938, **82**, 1937) review the literature and record three cases in adults of the coexistence of aneurysm of the cerebral arteries and congenital cystic kidney. The first case was one of a polycystic kidney associated with a calcified renal cyst, the second showed a solitary renal cyst, and the third a polycystic kidney with multiple small cysts in the liver. The first patient recovered and the other two died. In the patient who recovered neurological examination suggested the presence of a subarachnoid haemorrhage, and radiographs showed the polycystic kidney with a calcified cyst. In the second case necropsy showed a ruptured aneurysm of the right internal carotid at its junction with the middle cerebral artery, and in the third case a ruptured aneurysm of the middle cerebral artery with subarachnoid haemorrhage was found.

AURICULAR FIBRILLATION AND THE THYROID

BY

E. G. SLESINGER, O.B.E., M.S., F.R.C.S.

Surgeon, Guy's Hospital

Thyrotoxicosis is the fourth commonest cause of auricular fibrillation, rheumatic heart disease occupying first place and myocardial degeneration and hyperpiesia the second and third. In the thyrotoxic cases, however, it is almost invariably possible to restore the patient to normal rhythm and to prevent relapse, whereas in the other types the prognosis is less favourable. The correct diagnosis and treatment of thyrotoxic fibrillation are therefore of great importance. Without adequate treatment invalidism, gross cardiac failure, and death will follow, all of which are preventable by prompt and proper treatment. In this connexion it is important to remember that thyrotoxicosis is not always as easy to diagnose as might at first sight appear. Clinically the cases can be conveniently divided into two types, which are termed primary and secondary.

In the primary type the goitre and the toxic symptoms appear at or about the same time. The whole epithelium of a previously normal thyroid is able to respond to the stimulus producing the thyrotoxicosis, and the resultant symptom-complex, usually termed exophthalmic goitre, is typical and usually readily recognized. The patients are in the main young adults and their hearts can stand the strain of continued tachycardia for a long time without developing arrhythmia, so that auricular fibrillation, while it occurs, only does so late in the disease. In secondary thyrotoxicosis, on the other hand, a goitre, usually of the nodular colloid type, has been present for a number of years before the onset of toxic symptoms. Only part of the epithelium of the gland can respond to the exciting stimulus, and the resultant symptoms are less marked and in part different. The patient, however, is older than in the primary case, and the heart is less able to withstand a prolonged tachycardia. It is in this secondary group that the greater number of cases of auricular fibrillation are met with whose thyrotoxic origin has not been diagnosed.

Diagnosis

If the patient is recognized as suffering from thyrotoxicosis and is noted to have arrhythmia it is nearly certain to be auricular fibrillation. In a rapidly beating heart extrasystoles are sometimes indistinguishable without an electrocardiogram, and such occasional extrasystoles are commonly found in thyrotoxicosis. On the other hand it is the case with very frequent extrasystoles that is most liable to be mistaken for fibrillation, and, as Campbell (1935) has pointed out, this is not a common condition in thyrotoxicosis. If, therefore, there is an established arrhythmia in a patient known to be thyrotoxic it can safely be assumed to be fibrillation, although this should, of course, be confirmed by an electrocardiogram. Paroxysmal auricular fibrillation, again, is not uncommon in hyperthyroid cases, and, although it may exist for some time, generally progresses to a state of established fibrillation if untreated.

Careful inquiry must be made into the history of attacks of arrhythmia. These are generally recognized by the patient. Both the frequency and the duration of attacks vary in different patients, but are usually fairly constant in the individual, especially as to duration; the patient being aware of when the attack starts and of

when normal rhythm is re-established. It is, however, in the patient in whom the presenting symptom is the cardiac arrhythmia that mistakes in diagnosis most often occur. Three possible sets of circumstances may be present in such a case. First, both the patient and her medical adviser may be aware that she has suffered from thyrotoxicosis. This may, however, have appeared to settle down, and she may have had a period in which her thyrotoxic symptoms have caused very little disability. The onset of arrhythmia in such a case is often thought to be an independent condition, and is treated as such, without material benefit and without the realization of the urgent need for thyroidectomy. It cannot therefore be too clearly stated that the severity of the general symptoms of thyrotoxicosis bears no relation to the onset or continuance of auricular fibrillation, and the assumption that a hyperthyroid state is too mild or has recovered too well to be responsible for the arrhythmia is a false one, and one which has deprived many patients of relief.

The second type of fallacy which may occur is where both the patient and her doctor are aware that she has had a nodular goitre, without symptoms, for many years. It is a familiar thing to which neither of them any longer pays attention. Tachycardia, followed by paroxysmal and later by established fibrillation, may be the first and almost the only evidence of the onset of secondary thyrotoxicosis. In such a case, again, it not infrequently happens that the aetiological importance of the goitre is not appreciated and the patient is treated along purely cardiac lines, and naturally without permanent benefit.

The third situation is one in which the patient is quite unaware of anything the matter with the thyroid at all, and in which her adviser either omits to examine the thyroid or, if he does, fails to detect any enlargement. Enlargement of the thyroid up to three or four times its normal size can exist in the neck without detection, and a small nodular goitre is easily missed, particularly if it is substernal in position. In such a patient the symptoms of thyrotoxicosis, other than the cardiac, may be but slight, and unfortunately many such cases pass on, unrecognized, to gross cardiac failure and death. It should be stressed, therefore, that no case of auricular fibrillation, especially in a patient over 40, should be considered as non-thyroid in origin until it has been proved to be so.

It occasionally happens that a patient is operated on for thyrotoxicosis who has never shown auricular fibrillation but develops it during the actual operation, immediately afterwards, or after an interval of two to three days. In my experience such cases invariably resume normal rhythm when the post-operative reaction has subsided, without further treatment, and I do not consider it a danger to the safe completion of the operation.

Treatment

The coexistence of auricular fibrillation with thyrotoxicosis is an urgent indication for operation. Without it normal rhythm can but seldom be restored, and, if restored, cannot be maintained. X-ray treatment, whatever view one may hold about its place in the treatment of uncomplicated thyrotoxicosis, is inadequate in the presence of fibrillation, and medical treatment is solely of value as a preparation for operation. The risk attaching to thyroidectomy in the hands of an experienced thyroid surgeon when fibrillation is present, while greater than in the uncomplicated cases, is remarkably little increased, remaining in most clinics in the region of 2 to 3 per cent. This has to be contrasted with the grave outlook which confronts the patient who is allowed to

continue with fibrillation unoperated on. It is unfortunate that many patients, aware that they are suffering from cardiac arrhythmia, are filled with alarm that their heart will not stand the strain of an operation—a fear often shared by their medical practitioner. With proper pre-operative care that fear is largely groundless, and must not be allowed to induce the patient to take the far more dangerous, though naturally more attractive, path of delay.

PRE-OPERATIVE

In preparing these patients for operation it is wise to take an electrocardiogram and to have the basal metabolic rate estimated. This is generally far higher in the primary than in the secondary cases, but I have had three patients in whom repeated readings were within normal limits, although clinically thyrotoxicosis was definite, and in all three normal rhythm was restored after operation. Two to three weeks in bed is generally necessary before the operation. During that time the patient is kept on a high-calorie diet and is given half a grain of luminal daily as a sedative. Lugol's solution, in doses depending on the type and degree of thyroid change, is given; but while it is very helpful in the primary type, I have not found the same benefit in the secondary. Though unable to agree with those who find it equally efficient in either type, I have never seen the bad effects which some observers report in secondary cases. Digitalis should be given in sufficient dosage to slow the rate of fibrillation. It seldom, in my experience, restores normal rhythm, but is of great value in slowing the rate. Quinidine is reserved for use after operation if necessary, as even if it restores normal rhythm, which is exceptional, fibrillation is generally restarted at or after the operation.

OPERATIVE

The usual operative procedure adopted is a one-stage subtotal thyroidectomy. It is never enough to remove one lobe in the primary cases or to resect the nodular goitre in the secondary, and many cases of relapse are due to inadequate thyroid ablation. Stage operations are occasionally necessary in bad cases, particularly in primary thyrotoxicosis, and although far less frequently called for than before the introduction of pre-operative iodine, still at times offer the safe solution of an otherwise dangerous problem. The choice of anaesthetic will depend on the predilection of the surgeon. Since the introduction of avertin I have abandoned local anaesthesia and use avertin and gas-and-oxygen. In the skilled hands of Dr. Marston and Dr. Harris I have never had cause to regret the change. When gross cardiac failure with enlargement of the liver is present it has been our custom to omit the avertin and to use premedication with morphine, followed by gas-and-oxygen. It is important to remember that the higher the rate of metabolism the greater the percentage of oxygen required, and the amount of oxygen necessary in a bad case to maintain the pink colour which spells safety is often remarkable.

POST-OPERATIVE CARE

The post-operative care of these cases is the same as that of an uncomplicated thyroidectomy except as regards the heart. The pre-operative digitalis should be continued after operation, and a proportion of cases will resume normal rhythm on the fifth or sixth post-operative day. If they do not do so by the seventh day it is our practice to stop the digitalis and begin the administration of quinidine. This is given in the form of a definite course. Five grains are administered early in the morning of the first day of the course. On the second day this

dose is repeated and is followed by another 5 grains two hours later. On the third day three doses of 5 grains are given two-hourly, and so on until on the sixth day 30 grains in all are taken. Many patients resume normal rhythm towards the end of this course. If they do not, after a rest of five days the course is repeated. I have so far had but one patient who failed to resume normal rhythm before the end of the second course, and at his own request he was tried with a third, with a resumption of normal rhythm on the last day. Once normal rhythm has returned a maintenance dose of 5 grains twice a day is kept up for some time, and when that is stopped the patient is instructed to resume it if the pulse becomes irregular.

Summary

Auricular fibrillation in thyrotoxicosis and its relative frequency to other types of fibrillation are discussed.

Difficulties in diagnosis are mentioned, and the lack of relation between the severity of the thyrotoxicosis and the liability to fibrillation is pointed out.

Auricular fibrillation is stressed as an urgent indication for operation and the dangers of delay are indicated.

The pre-operative, operative, and post-operative care of patients with thyrotoxic fibrillation is considered.

REFERENCE

Campbell, M. (1935). *Guy's Hosp. Rep.*, **85**, 471.

Clinical Memoranda

Surgical Treatment of Chronic Ulcers

Chronic ulcers of the extremities play a very prominent part in the production of ill-health, especially in the Tropics, and in many cases constitute quite a major problem to local health centres, as these cases tend eventually to congregate in the almshouses. Among predisposing factors might be mentioned hypovitaminosis (vitamin B in particular), a diet low in protein, and iron and calcium deficiency, while spirochaetal and fusiform bacillary infection also plays a part. Most important, too, is the often present background of yaws, arteriosclerosis, varicosity, or syphilis. These ulcers in the absence of energetic appropriate treatment tend to persist indefinitely, produce appalling deformities, and render the patient unfit for his work. Ultimately chronic fibrosis and obliterative endarteritis place the lesions outside the realms of ordinary medical treatment, and the help of surgery then offers the only hope of speedy successful recovery.

In the treatment of these chronic ulcers surgical procedures should be carefully combined with medical treatment. Calcium might be given, also iron, vitamins, and high-protein diets. Varicosity, yaws, syphilis, and all other involved factors, too, must receive appropriate attention. Combined with the above the first and simplest surgical measure is to excise the edges of the ulcer, scrape the base, and apply some such preparation as 40 per cent. formalin followed by saline irrigation, or pure carbolic followed by rectified spirit. This together with suitable local treatment often effects a cure.

LOCAL MEASURES

Among the local procedures likely to prove useful the following might be mentioned as being of special merit:

1. Exposure to air without dressing. This is one of the most effective forms of treatment where infection is no longer present and the ulcer bed is level with the skin or nearly so: antiseptics here merely delay healing.
2. Normal saline dressing applied on gauze.
3. Hypertonic saline dressing where slight stimulation is needed.
4. Lotio rubra for vigorous stimulation.
5. Warm baths; these evoke vasodilatation.
6. Bier's hyperaemic treatment.
7. Insulin dressings.

The next helpful surgical procedure is skin-grafting. This, however, is especially liable to failure unless stringent precautions are taken to render these ulcers aseptic by prolonged pre-operative preparation. Thiersch grafting usually suffices, but pedicle grafting ensures a more lasting skin surface and one less liable to break down again in later years, as some of these healed ulcers sometimes do.

OPERATIONS ON NERVES

Periarterial sympathectomy may next be mentioned. This operation has of late been pushed into the background, but in the treatment of very resistant and chronic ulcers it has a definite sphere of usefulness. The operation should not be performed in young subjects, or before other simpler surgical procedures have been tried. In carefully selected cases the ensuing increase of blood supply turns the scale in favour of the patient and results in dramatic healing of the ulcer. In a series of cases treated recently this operation proved to be one of the most powerful stimulants to healing in our possession.

Intraspinal injection of alcohol might be tried in cases where a more prolonged abolition of sympathetic vascular influence is desired. It finds its sphere of usefulness in feeble patients, where more drastic operative procedures are contraindicated. The operation requires considerable care in its performance.

Where still more complete sympathetic abolition is required, and where the ulcers are of so serious a nature that the leg is practically useless and amputation is being seriously considered, lumbar ganglionectomy might finally be tried. The increase in temperature of the limb from temporary vasodilatation artificially induced by warm baths or spinal anaesthesia must first be found to be satisfactory, and even a small rise favours operation. Ganglionectomy in selected cases yields dramatic results, and I have seen a number of cases in which a leg has been saved by this operation. Under spinal anaesthesia a lumbar incision as for exposure of the upper part of the ureter is used, and the operation performed extraperitoneally.

AMPUTATION

Finally must be mentioned amputation. This, needless to say, is rarely necessary, especially where ample use has been made of other more conservative surgical procedures. Occasionally, however, it is called for as a life-saving measure, and it is surprising how dramatically a toxic, emaciated, bed-ridden patient will take a renewed grip on life when rid of a hopelessly chronic septic leg. Amputation in these cases should therefore not be delayed until it is too late and the patient perhaps loses his last chance.

To sum up: it might be stated that surgery, and especially sympathetic surgery, has a definite and very important place in the treatment of chronic ulcers, and combined with appropriate medical treatment will in most cases effect a speedy cure.

Jamaica, B.W.I.

K. WILSON JAMES, F.R.C.S.Ed.,
Colonial Medical Officer and Surgeon
to the Falmouth Hospital.