percentage, but in 7 of these the operation consisted of the removal of one lobe; in 1 only the arteries were tied, while in the other 5 cases the operation was a subtotal thyroidectomy, and the persistence of toxic symptoms is surprising. In 2 of the lobectomies (Cases 3 and 35) the operation consisted of the removal of an adenoma from one lobe, but the persistence of toxic symptoms suggests that smaller adenomas are still present in the remaining lobe. The patient in Case 6 (the ligation) had auricular fibrillation with marked oedema and ascites. As she did not show sufficient improvement after ligation to warrant a thyroidectomy she was sent home. She had signs of cardiac failure for twelve months, after which she gradually improved, and at the time of writing (five years after operation) she has no oedema, and is carrying on a fair share of her household duties. The patient in Case 34 stated that her operation effected a complete cure, but the excitement of escaping out of her burning house caused an immediate recurrence; there is no enlargement of the thyroid. The other 4 patients with toxic symptoms who had subtotal thyroidectomies were considerably improved by the operation; the present toxicity is a persistence of symptoms and not a recurrence. In the remaining 29 cases the basal metabolic rate is within normal limits in 25, while in 4 it is below minus 10 per cent. Clarke and Black⁷ found that 7 of their 64 patients had basal metabolic rates between minus 10 per cent. and minus 30 per cent. Smith, Clute, and Strieder⁸ mention that in 19 of their 100 cases there was a basal metabolic rate below minus 10 per cent., while in 15 of these there was definite evidence of myxoedema; they attribute this to the pre-operative use of iodine. Of my 4 patients with a basal metabolic rate below minus 10 per cent., 2 showed definite evidence of myxoedema—namely, Nos. 11 and 40. The patient in Case 40 had a rate of minus 16 per cent., this in spite of 6 grains of dry thyroid daily. Immediately after operation her rate was minus 18 per cent.

There were 4 patients who still had auricular fibrillation. In 2 of these the pulse rate was over 100; in the third it was 68, and in the fourth it was 72. One of them, patient No. 34, has developed fibrillation since her operation, which was a subtotal thyroidectomy, but as the basal metabolic rate is at present plus 59 per cent. it is to be expected.

CONCLUSIONS

The disappearance of exophthalmos does not of necessity follow the complete relief of hyperthyroidism, yet a diminution of toxicity is usually followed by an improvement in this sign, which may disappear completely in cases which we regard as cured. Exophthalmos is likely to persist in those cases in which the metabolism has not dropped to within normal limits. Nervousness is invariably improved by a successful operation, but the patient may continue to be nervous in spite of a normal metabolic rate.

The majority of patients gain weight after operation, yet there are occasional cases in which an otherwise successful result is not accompanied by any increase, and this is seen even in a patient in whom there was a considerable loss of weight before operation. Failure to gain weight is occasionally associated with glycosuria, which is sometimes seen in Graves's disease, and may become more severe after operation.

Relief of hyperthyroidism and a lowering of the metabolic rate to normal limits usually follow a subtotal thyroidectomy; there are cases in which the metabolic rate remains above normal limits in which no increase of thyroid tissue can be made out, and in which no focus of sepsis can be discovered in any part of the body; worry and too little leisure are probably the factors which prevent a good result in these cases. Crile⁹ attri-

butes these failures to the presence of septic foci in other parts of the body, or to worry and overwork.

The removal of one lobe is followed by improvement, and patients Nos. 31, 36, and 42 were types with exophthalmic goitre in whom relief of hyperthyroidism has followed this operation. A satisfactory result has also followed ligation in two cases, and it will be readily understood that the improvement which ultimately followed was the cause of the complete operation not being undertaken at a later date. Ligation alone is not regarded as a curative measure, and while it is of interest to note that a normal metabolic rate can follow this simple procedure, it is probable that the operation had little effect on the ultimate outcome.

If the clinical condition of the 42 patients, their ability to do work, and the rhythm and rate of the pulse are considered in conjunction with the basal metabolic rate findings, the result of operative treatment has been good in 28 cases, improvement in 9, while in 5 the operation has been of little value.

I am indebted to Mr. G. Jefferson and to Mr. Garnett Wright for allowing me to examine these patients, and to Dr. G. Murray for some very useful criticisms.

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TREATMENT OF CARCINOMA OF THE OESOPHAGUS*

BY

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In this day of scientific progress we are faced with a disease, insidious in onset, slow in its development, relentless and remorseless in its course, and finally fatal in its issue. Against this disease we must admit that progress has been slow and almost unperceivable, and yet a great deal of work has been done, and many hopes have been raised only to be quickly dashed to the ground. With this admission we will first review briefly the principal difficulties, then proceed to a critical survey of the existing methods of treatment, and finally suggest certain points on which discussion would seem to be particularly valuable and indicate certain directions in which further research is urgently called for.

The principal difficulty lies in the anatomical formation of the oesophagus. Suspended at the entrance, where it is attached to the back of the cricoid cartilage, and fixed at the lower end, where it traverses the diaphragm, it remains completely mobile in the centre. This can be demonstrated by passing a tube into the oesophagus and viewing it on the x-ray screen, when the end of the tube can be freely moved from side to side.

In the cervical region the gullet lies in intimate contact with the trachea, into which perforation readily takes place. In the central zone the left bronchus is easily

* Read in opening a discussion in the Section of Oto-Rhino-Laryngology at the Annual Meeting of the British Medical Association, Eastbourne, 1931.

invaded. In the lower mediastinum the pleura is wrapped round the tube in an all too close embrace, and damage or infiltration very readily takes place; while in the diaphragmatic region the vascular and lymphatic anastomosis is so free that the condition is hopeless from the outset. Except in the neck, the gullet lies deep among sensitive and vital structures, and external operations have not achieved success. The absence of a peritoneal coat is of vital importance. Such a coat, if present, would delay extension and give rise to adhesions which would be of invaluable assistance in treatment by diathermy.

Little is written in the textbooks of anatomy on the lymphatics of the oesophagus. Three years ago I had some injection experiments carried out for me. The submucosae of numerous gullets were injected with methylene blue and silver nitrate. Great difficulty was met with in inducing injection, and finally a specimen was produced which showed the finely developed reticulum of the oesophageal lymphatics.

Experiments were carried out by injection into the wall of the oesophagus of monkeys, to show the distribution of the normal lymphatics.¹ The animals were killed twelve days later, and the lymphatic areas draining from the oesophagus were found to be injected with methylene blue. The most widespread diffusion was found, including the glands at the base of the neck, and the mediastinal and intercostal glands. A remarkable extension took place on to the parietal surface of the pleura and the pleural surface of the diaphragm. The inference from these experiments is that lymphatic spread in the early stages is slow and takes place with difficulty, but when once this fine reticulum has been broken through the invasion is widespread and comparatively rapid.

TREATMENT BY DIATHERMY

Diathermy was ushered in with considerable promise, but has been largely abandoned. We have here an instrument capable of complete destruction of the localized growth, but it has to be used with great care, or fatal operative results take place. To eradicate an oesophageal growth with safety by diathermy it is necessary to raise up a protective connective tissue reaction, analogous to callus formation, outside the growth. There was hope that by repeated small applications of diathermy success would be attained in the human subject. The expectation has not been realized.

In 1926 I carried out some experiments on rabbits and monkeys with a view to stimulating connective tissue reaction around a localized area of the oesophagus. Various irritants, such as silica and iodine, were injected through the walls of the gullet in the living monkey—without effect. A large quantity of solid paraffin was introduced into the mediastinum through the oesophageal wall by a specially constructed syringe, and on the death of the monkey ten days later not a trace of paraffin or any resulting reaction was discovered. Lastly, the trans-mural passage of electric currents was tried, but no irritation of the surrounding tissue took place.

Treatment by diathermy is a painless operation, which has as its result dilatation of the lumen of the gullet and increased ease of feeding. It is not without danger, and several patients died within a day or two of the operation from fatal leakage into the pleural cavity. As a curative means it has proved a complete failure for the reasons given above. As an operation of palliation it is of distinct value.

RADIUM TREATMENT

Radium treatment has now almost entirely replaced diathermy in the treatment of carcinoma of the oesophagus.

External Application.—It is remarkable how few cases of carcinoma of the oesophagus within the region of the

neck present themselves for examination and treatment. Of those limited number of cases a large proportion consist of that peculiarly difficult growth which takes place within the sphincter at the entrance to the oesophagus and behind the cricoid. In general it may be said that if the growth can be reached from the neck my experience is altogether in favour of excising it if in any way possible. The external application of radium has not proved of much value in my hands in this area. The external approach by a trans-pleural thoracotomy is a severe operation, and in the majority of patients their general condition and lowered vitality render them unsuitable for this procedure, and during the last year we have not had a single case. During the previous two years three patients were treated jointly with Mr. Seymour Barling; all three died within a month for various reasons. The great drawback of the external approach to the oesophagus with a view to implanting radium is that any such treatment would of necessity have to be repeated.

Interstitial Application of Radon.—This method the author introduced in 1928.² By this means radium emanation is carried into the substance of the growth. The technique is fairly simple. The growth is treated by adrenaline before operation; the position of the lumen is ascertained, and if necessary it is dilated. The radon seeds are inserted by a special trocar and cannula, fitted on to a handle and made by Messrs. Mayer and Phelps. The seeds are buried deeply into the upper part of the growth; their number and position are checked by x-ray examination on the following day, at the end of a week, and at the end of a month. The disadvantage is that only the upper part of the growth can be dealt with at the first operation, leaving the lower part to be dealt with at a subsequent insertion. Experience is that the effect of the radon is to cause shrinkage and devascularization of the growth, and in two cases the growth has apparently disappeared entirely.

Central Application of Radium.—In this method the growth is dealt with from the centre of the lumen, which is dilated and a more or less rigid tube inserted, to the outer surface of which radium needles are fixed. It has the advantage of definitely dilating the lumen. It has the disadvantage of dealing with the growth from the centre and most degenerated part, and one which is farthest from the active and growing edge. In addition, sepsis on the ulcerated surface is encouraged by the advent of radium. For treatment by this method I should like to introduce two new tubes. The first is a rigid metal tube with grooves in a direction parallel to its length, and the second of hard rubber of similar shape. The rubber tube is the one now in use, and it has two advantages over the rigid metal tube: (1) When the patient is moved back to bed or sits up there is no danger of rupture of the oesophageal wall; (2) there is no secondary radiation from the surface of a metal tube. After insertion the patient should be x-rayed to ascertain the position of the radium. The value of an x-ray examination is well shown by the following case:

Male, aged 56. The growth was 1.4 in. from the teeth. A rubber tube containing six 5 milligram tubes of radium screened by 0.5 mm. platinum, was inserted, and the string was suitably fixed by plaster behind the ear. On the fourth day he gave a violent gulp and swallowed everything, including the strings and strapping. He was x-rayed and the tube was seen on the right-hand side of the abdomen about half-way down, and it remained in this position despite the use of purgatives. On the fifth day it was removed by laparotomy, and the radium was found in the duodenum and the strings were trapped in the stomach.

A review of the treatment of cancer of the oesophagus would not be complete without a mention of the operation of gastrostomy. From the endoscopic point of view I

regard the necessity for this operation as an expression of complete failure. Such a failure will from time to time occur in every surgeon's hands, but I have never known a patient who was grateful for having had the operation carried out, nor can I recall a case in which subsequent endo-oesophageal treatment by radium, etc., was rendered easier or more satisfactory.

The proper use of diathermy, notwithstanding that it fails to cure, will in the great majority of cases maintain the patency of the lumen sufficiently for the patient to maintain fluid nourishment. However carried out, the shock produced by gastrostomy absorbs a large amount of the patient's available strength and vitality, a deep cloud of depression settles on him, and he ceases to care enough to live.

POINTS FOR DISCUSSION AND INQUIRY

I now propose to indicate some points which seem to call for discussion and to require further research. I will enumerate them as follows:

1. *Diathermy*.—Is it possible to increase the safety and efficiency of the use of diathermy in the oesophagus by stimulation of a protective peri-cancerous infiltration or by any other means?

2. *Radium*.—Should mural or central methods of implantation be adopted—or a combination of both? What variation in the technique can be adopted, such as

(a) dosage in total milligram hours, either by reducing the radium content per needle or increasing the length of exposure, or the reverse process; (b) screenage—increase of thickness of platinum or other metal?

3. *Fluorescein*.—What is the influence of fluorescein, if any? Are there any substances of a similar nature more effective?

4. *Radio-sensitiveness*.—What types of tumour are more radio-sensitive, and why? Can radio-sensitivity be increased? There can be no question that some tumours of the oesophagus appear to be very radio-sensitive and others to be entirely unaffected. Why is this?

Consideration of the methods of treatment of carcinoma of the oesophagus available at the present time inspires no great hope for the immediate future, but despondency is to be deprecated. Consider the triumphs of radium over cancer of the mouth, and how little we know yet of the variations in the technique required for different areas. When we glance back along the long corridor of time and review the successive triumphs of surgery we can but feel that this, the most difficult of all growths to eradicate, will yet yield to patience, hard work, and clear thinking. May it be so.

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POST-MORTEM: THEIR OBJECT AND PERFORMANCE*

BY

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In this matter there is a natural bias on the general practitioner's part to resent the snatching from him of another portion of what has been pessimistically described as "all that is left to him" in an age of specialization. As a G.P. for over 20 years I sympathize with this attitude, and I feel somewhat of a "Judas" should I appear to be on the other side; and yet, perhaps just because of this instinctive general-practitioner prejudice which only reluctantly yielded to knowledge and experience, I hope my remarks may be regarded as adverse rather than hostile. Judging from the correspondence which appeared in the *British Medical Journal* in August, 1930, by "Rusticus" and others in later numbers, and from my own experience, the wish to do post-mortem examinations is often more a theoretical protest than a practical desire. I have been begged by practitioners not to give them this work. Others do them as "a messy job," not so much for the fee but as a protest at being deprived of the work and its fee. A few are eager for the work. But all three groups invariably preface their examination with a very pregnant remark, namely, "It's several years since I last did a p.m."

VESTED INTERESTS

Pathologists naturally feel that the examination of the cadaver is their work, and, in so far as a pathologist's scope of work usually involves not competing with others in practice and the frequent examination of morbid tissues in the living and dead, this seems a logical and just contention. The fact that a pathologist is *ipso facto* not a potential competitive practitioner must, financially at least, more than compensate the general practitioner for the occasional fee he loses by the pathologist taking this work.

* Read in opening a discussion in the Section of Pathology and Biochemistry at the Annual Meeting of the British Medical Association, Eastbourne, 1931.

But two even more vital points are involved. One is the loss of experience in pathological conditions to the general practitioner if post-mortems become a pathologist's perquisite, and the other is the similar educational loss to the pathologist, after specially training himself and simultaneously limiting his financial field, if post-mortems are scattered among various individuals.

The "acid test" of interest in knowledge is the gaining of experience without fee. The individual loss to each practitioner is a small price to pay for the removal of a potential rival, and he can better retain and improve his pathological knowledge by watching a trained man deal with morbid organs than by handling them himself—and here "Rusticus" agrees with me. Some practitioners are eager lookers-on at their patients' post-mortems. Others have received suggestions to be present with an acidity which left no doubt as to the chemical reaction of the test, nor of the "psychological content" of their interest. Personally I realize that there is a monetary loss of time involved in merely attending a post-mortem, and I could wish a further fee were payable for such attendance, or possibly (though not probably) the pathologist might agree to apportion part of his fee to the attender who might really prove a valuable attendant.

COMPLEXES—LAY AND MEDICAL

As to the "complexes" of this subject. They are varied and numerous. First—and, let it not be forgotten, our master in the long run—is "the man in the street." He is composed of several groups. The "home is my castle" group, who object most strongly to the whole business; think it "a lot of darned doctors' nonsense and a fee-making dodge"; "won't have any of mine cut up"; and, to do them justice, won't give in till a Coroner's Order, a police-sergeant, and three men actually remove the body from the house. Then there is a large group, and one has nothing but respect and sympathy for them, who are genuinely horrified, and if it must be done beg "Can't our own doctor do it, in the scullery?" regardless of the fact that ten or fifteen summers may have passed away since their own doctor did a post-mortem, and that the average scullery is hardly a desirable place—as Dr. Webber agrees,