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CANCER OF THE OESOPHAGUS

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Cancer of the oesophagus still presents one of the unsolved problems of surgery. The deep situation of these growths, their close proximity to the great vessels—the pleura and the bronchi—and the vital importance of the oesophagus itself make surgical attack exceedingly difficult. Secondary growths are, it is true, not a very marked feature, but the explanation of this is to be found rather in the fact that the patients die before any can occur than in any want of malignancy in the growths themselves. The primary growth is often considerable in volume, but in general it is impossible during life to form any true estimate of its extent. This in itself adds greatly to the difficulty of scientific treatment, since if radium is employed it is impossible to say with any certainty where it ought to be placed, or how much should be inserted. In addition, the patient is usually an elderly individual, often in the last stages of exhaustion from starvation, and quite unable to support any attempt at radical surgery.

The first problem in all these cases is to enable the patient to swallow, and this we shall show it is usually possible to accomplish by comparatively simple means. On the other hand, the growths themselves are almost invariably squamous carcinomata, often of a baso-cellular type, such as is known to be highly sensitive to radium, and is constantly treated with success in the buccal cavity. If by some means it were possible to expose the growth to the action of gamma rays in a uniform manner, there is very little doubt that in a certain proportion of cases the growth would disappear, and in a few cases this has actually happened. The difficulties are undoubtedly immense, but they are purely anatomical in nature and should not be insuperable. Their conquest would constitute a really important advance in surgery.

The dimensions of the problem may be gauged from the fact that carcinoma of the oesophagus accounts for a proportion of all cases of malignant disease variously estimated at from 4 to 6 per cent. In this country the annual mortality from the disease is about 1,600, of whom 1,200 are males and 400 are females. But these figures, important though they must be admitted to be, in no way represent the amount of suffering involved to these unfortunate people, condemned, apart from surgical relief, to a lingering and miserable death from starvation.

Pathology

As we have seen, the disease occurs more commonly in men than in women in the proportion of about 3 to 1, but there is a curious distinction between the two sexes, both as regards the age and the site at which it occurs. In men it is a disease of later life, 90 per cent. of the cases occurring after 50, whilst it is far more common in the lower two-thirds of the oesophagus. In women it may occur at a much earlier age, and the incidence after 40 is almost constant, whilst 60 per cent. of the cases

occur at the upper end of the oesophagus. Many of the cases in women, in fact, are of an entirely distinct pathology, and are more correctly described as post-cricoid carcinoma, often arising in the pharynx. Generally speaking, however, carcinoma of the oesophagus may be regarded as essentially a disease of elderly men, in which 80 per cent. of the cases occur at or below the bifurcation of the trachea.

Histologically carcinoma of the oesophagus is almost invariably a squamous epithelioma, sometimes of the basal type, but often showing a number of cell nests and a high degree of keratinization. More rarely a medullary form is seen arising from the glandular structures and consisting of rounded polygonal cells. Spreading by the lymphatics these growths naturally tend to follow these structures round the circumference of the oesophagus and to produce stenosis. Sometimes, however, they remain localized to one portion of the wall, giving rise to a fungating mass, a local induration, or a deep ulcer according to the reaction of the stroma. Thus we may find anything between a soft, sprouting mass of tissue with a profuse discharge, bleeding readily on contact, and a dense fibrous scirrhous producing a tight stricture, which can only be dilated with difficulty.

No one can have studied these tumours post mortem without being struck by their wide extent and their involvement of surrounding structures. Several inches of the oesophageal wall may be entirely destroyed and replaced by growth, and we have had cases where over a long period the patient has swallowed through an intubated mass of carcinoma. The mass of growth may, indeed, protect the surrounding tissues, but ultimately these are opened up so that direct perforation may occur into the mediastinum, the pleura, a bronchus, or even the aorta. The usual termination arises from perforation of the respiratory tract and the rapid development of an acute septic pneumonia, although in a few instances the opening of a large blood vessel closes the scene.

The lymph glands along the oesophagus are usually involved, but distant metastases are unusual, simply because the patient dies before they can occur. There is a curious tradition that carcinoma of the oesophagus is a disease of low malignancy: we regard it as one of the most highly malignant tumours appearing in elderly people, only failing to give rise to secondary deposits because it destroys the individual by its local extension.

Clinical Course

In the great majority of cases the first symptom in carcinoma of the oesophagus is a steadily increasing dysphagia. Occasionally the onset is so abrupt that the patient thinks that some foreign body, such as a fish bone, has stuck in his throat, but usually it is gradual in onset and without remission. Solids are, of course, first affected, but in most cases the slowness with which

liquids can be swallowed will attract attention at an early stage, and this difficulty is often accompanied by regurgitation of unaltered food. The inconvenience is increased by the secretion of quantities of viscid mucus, which fills the oesophagus and impedes swallowing. Sometimes when this has been ejected as a quantity of white froth swallowing becomes comparatively easy. We have come to regard this white froth as a diagnostic feature of the first importance. In the later stages it is blood-stained and foul, indicating a fungating growth with extensive ulceration, and producing a marked fetor of the breath.

In a few cases where the growth is at the lower end of the oesophagus the symptoms are rather those of flatulent dyspepsia, a feeling of fullness after meals, and the eructation of gas. These symptoms may suggest gastric carcinoma, and, indeed, in some of these cases the growth has arisen in the stomach itself and invaded the cardiac orifice. The same symptoms may, however, appear with true carcinoma of the oesophagus. Pain is not usually an early symptom, but a reflex spasm which results from attempts at swallowing may lead to acute discomfort. In the late stages, where the dorsal roots, or even the vertebral bodies, may be involved, pain may be a very severe feature. Hoarseness and aphonia may occur from involvement of the recurrent laryngeal nerves, and in a few instances these have actually been the first symptoms of the disease.

Involvement of the respiratory passages gives rise to by far the most important group of secondary symptoms. Irritation of the upper passages produces a profuse secretion of a tenacious stringy mucus, which causes great annoyance, and often a constant irritable cough. In late stages involvement of the tracheal wall may give rise to respiratory embarrassment, and we have actually seen a nodule of growth perforating the trachea and producing obstruction. More common, however, is the formation of a fistula into the trachea or bronchus, or into the lung itself, followed by the development of a septic pneumonia as a terminal event.

Wasting occurs from pure starvation, and, in contrast with carcinoma of the stomach, the patient, far from having a loss of appetite, suffers severely from hunger and thirst. That starvation is the cause of the wasting is shown by the rapid improvement which occurs when the patient is enabled to swallow or is fed by a gastrostomy. In the later stages, on the other hand, if the patient is unable to swallow, the general discomfort, the constant pain, and the persistent cough have a very serious effect upon his condition.

Examination of a Case

Of the methods of examination available we shall only describe radioscopy and oesophagoscopy, for the passage of bougies is both useless and dangerous.

X-ray examination, in our opinion, entirely eclipses any other method. It is extremely simple and it is absolutely safe. In every case it will indicate the level of an organic obstruction, whilst in the great majority it will, if properly conducted, give indisputable evidence of the nature of the lesion. The picture furnished by a carcinoma is usually so characteristic that a mistake is scarcely possible. The patient should stand with his left arm above his head facing the screen obliquely, so that the rays pass through the thorax from left posterior to right anterior. In this way the spine, heart, and great vessels are avoided and the clearest picture is obtained.

He now swallows a thick emulsion of barium sulphate of the consistency of a viscous syrup. The emulsion is seen to reach the obstruction and to fill up the lumen of the oesophagus above it. Except in the rare cases when the obstruction is absolute, it will now be seen to trickle slowly through it and to fill up beyond it the longitudinal

folds in which the mucous membrane of the empty oesophagus normally lies. In the case of a malignant stricture a moderate degree of dilatation may be observed above, the shadow will terminate in a cone pointing downwards, and from the apex of the cone a fine twisted stream of barium will be seen making its way through the tortuous vagaries of the growth. A film will show these details even more clearly than the screen, and will supply permanent objective evidence of the nature of the obstruction.

The ordinary barium examination, carried out in an upright position, only gives information as to the condition of the oesophagus above the stricture. We owe to Ledaux of Brussels the ingenious suggestion that the patient should be made to swallow a certain quantity of barium into the stomach and then be examined on a couch in a high Trendelenburg position—in other words, standing on his head. If the patient now attempts to swallow, the cardiac orifice opens synchronously as a part of the normal mechanism, and the barium flows back into the lower portion of the oesophagus. In this way the extent of the stricture can be accurately defined.

Finally comes direct examination with the oesophagoscope, undertaken with a view to discovering the character of the growth and its possibilities of treatment, rather than for the mere diagnosis of malignant stricture. The information obtained may be of very great value, but it is not a manipulation to be undertaken lightly, for except in expert hands the instrument is by no means free from danger. With the patient lying flat, and the head slightly extended and deflected to one side, the oesophagoscope is inserted at the angle of the mouth and passed into the oesophagus under the control of vision. The passage through the upper sphincter is sometimes difficult, but once it is overcome the whole oesophagus can be explored with ease. In its whole thoracic course the lumen will be seen as a narrow transverse slit which opens and closes with each respiration. On reaching the aperture in the diaphragm the slit becomes antero-posterior and ceases to expand, whilst immediately beyond this the cardiac orifice of the stomach appears as a rosette of fine mucous folds. On entering the stomach itself the large folds of gastric mucosa are seen, and there is usually a gush of fluid into the instrument. Manipulations must be carried out with the greatest care, since the oesophagus itself is always fragile, and it may be deeply ulcerated in the presence of a malignant growth.

The lumen of the normal oesophagus appears on direct examination as a transverse slit which opens and closes with each respiratory act. If the wall is infiltrated these movements cease, whilst dilatation of the lumen above the stricture will be immediately obvious. A puckered stricture, a fungating mass of growth, or an ulcerated area can readily be observed, and occasionally it may be practicable to remove a fragment of growth for section, though we do not advise this as a routine procedure. But the chief use of direct examination is for dilatation of the stricture, to which we shall later refer.

Treatment of Oesophageal Carcinoma

It is only rarely that the question of radical removal of a carcinoma of the oesophagus can even be raised, and in spite of a few brilliant results it seems to us most unlikely from the pathological considerations which we have already described that it can ever become a practical method. The depth at which the oesophagus lies, the fragile nature of its wall, which possesses neither a sub-mucous nor a peritoneal coat, the complexity of the structures by which it is surrounded, and the age at which the disease occurs are all opposed to a direct attack, and one may be sufficiently grateful if one can relieve the dysphagia. For this we have three methods

at our disposal: dilatation, intubation, and gastrostomy. The last is, of course, a confession of surgical failure, but it by no means follows that in some cases it may not be the soundest practice. We would only say that if it is to be performed this should be done at an early stage, and not left until exhaustion has increased its danger and diminished its utility. Our own practice is to attempt to relieve the dysphagia directly, and, if this fails, to perform gastrostomy, although in certain cases where the patient's condition has been desperate we have first performed gastrostomy in order to save his life.

Dilatation should only be attempted under the direct control of the oesophagoscope. We first pass a fine flexible bougie on the end of a long steel wire, which does not interfere with vision. Over this are passed tubular dilators of increasing size, formed of short cylindrical rods of aluminium, with an axial hole which slides easily over the wire guide. The dilators rise by millimetres from 4 to 11 mm. in diameter, and by passing them in turn it is usually quite easy to dilate the stricture up to the full size. As the dilator is passed through and clears the stricture, or as it meets it on its return, a fair estimate of its length may be obtained. Even with these dilators it is, of course, necessary to proceed with great caution and gentleness, and to remember the extreme fragility of the oesophageal wall.

Dilatation is usually followed by immediate relief of the dysphagia, but this is likely to recur in a few weeks' time. To avoid this we devised, some years ago, a flexible tube formed of a spiral of German silver wire, with an expanded upper end and a twisted oval section which prevents its upwards displacement. These tubes are now in general use, and from their extreme flexibility they are readily tolerated, the patient being usually quite unconscious of their presence, whilst the large lumen allows ordinary food to pass. With reasonable care in mastication or in the preparation of food the tube should not become blocked, and we have had a large series of cases in which the patient was able to eat a dinner without difficulty. There was a slight difficulty in the introduction of these tubes, which we have now overcome by a very simple device. It was found that even after full dilatation the lower edge of the tube tended to catch on the end of the growth, and refused to pass through the lumen. This can be entirely avoided if before introduction a small cone of gelatin is inserted into the end of the tube: a glycerin suppository of suitable size answers perfectly. The facility of introduction produced by this simple device is very remarkable, and the gelatin dissolves in a few minutes and passes on down the oesophagus.

Treatment by Radium

These methods aim solely at the relief of dysphagia and not at the cure of the disease. So far as can at present be seen it is only with some form of radiation that we can hope to effect this, and we have at our disposal radium and α rays.

Of the methods of radium treatment which have been adopted the most direct is by the insertion into the lumen of the tumour of a sound containing radium. After exact measurements have been made of the position and extent of the stricture, a rubber sound is prepared containing within its cavity a series of radium tubes each 2 cm. in length, filtered by at least 1 mm. of platinum, and each containing 10 mg. of radium element. Three or four such tubes may be used according to the length of the stricture. The sound should be made of rubber, containing no metal, and should have a wall of at least 2 mm. in thickness, and it is convenient to block the lower end of the sound with a wooden or vulcanite rod 2 cm. in length. The sound is passed until a mark made upon it registers with the teeth and indicates that the

radium is in position, and it is then brought round the cheek and secured either by plaster or by a string passed round the ear. The tube should be retained in place for forty-eight hours, and this treatment should be repeated on three occasions in all, so that the total dose of 30 to 40 mc.d. is received.

More comfortable for the patient when it can be adopted is the method suggested by Madame Simone Laborde. A rubber sound is prepared, as already described, but only of slightly greater length than the region to be treated. The sound is attached to a stout thread and is simply swallowed by the patient. Its progress is noted on an x -ray screen and the thread is secured to a tooth or to the cheek when the sound is correctly placed. The weight of the sound and the platinum it contains assists its progress and prevents its regurgitation. The sound can be left in place for six or eight days provided a gastrostomy has been performed, but the dose received ought not to exceed 30 to 40 mc.d. In view of the fragility of the oesophagus, and our ignorance of the extent of the growth, a larger dose involves too great a risk of perforation. If no gastrostomy has been performed it is scarcely possible to retain the tube in position for more than eighteen hours, but it may be replaced after a day's rest and the treatment continued until a full dose has been received. The procedure, of course, assumes a permeable stricture into which the sound can pass, but given this condition very satisfactory results have been obtained, although so far only of a temporary nature.

Where intubation with my own spiral tube can be effected, this may very conveniently be used as a support for radium. A narrow gold tube, about six inches in length, is filled with radon gas. The ends are sealed, and one end of the tube is wound into a circle half an inch in diameter to form a ring to which a thread can be attached. This is lowered into the spiral tube, the ring resting on its upper aperture. The emanation tube does not interfere with the passage of liquids through the intubation spiral, and is easily withdrawn at the end of forty-eight hours.

A method which we have used extensively is the introduction of seeds by means of the oesophagoscope into the substance of the growth itself. With a large oesophagoscope a full view of the upper surface of the growth is easily obtained, and it is then quite easy, by means of a special introducer, to insert seeds into the substance of the growth to any depth that may be desired. We have made a practice of introducing two rings of seeds at different levels, and in this way it can be shown on radiographic examination that a fairly even distribution of the seeds has been obtained. It might seem that the proceeding was essentially dangerous, since it is impossible to guarantee that the seeds will not enter the mediastinum or the surrounding structures, but in well over a hundred cases we have never had any trouble attributable to this cause. Perforation of the oesophagus under normal conditions would produce certain death from infection of the mediastinum, but it must be remembered that the seeds are necessarily sterile and that no organism can grow in their neighbourhood. In a few cases a fairly satisfactory result has been obtained, the patient recovering his power of swallowing and being restored to a condition of health. In no case, however, have we succeeded in effecting a cure, all the patients having died within a year. If some means could be discovered of defining the limits of the growth it is possible that much better results could be obtained.

So far as we are aware, no attempts have been made, at least on any scale, to treat carcinoma of the oesophagus by accurately directed radium beam radiation. From the depth at which the oesophagus lies it is obvious that a very large source would be required, but, apart

from this, there would not appear to be any considerable difficulty, for with reasonable care the heart and lungs are not likely to suffer from ill effects. On general grounds one would expect that such a method ought to produce more satisfactory results than any of those hitherto employed, since the growth with which we are dealing is certainly radio-sensitive, and the only real danger is that by too energetic a dose we may produce sloughing of the tissues and perforation. Combination with internal radiation from a tube or from seeds would seem to be a rational method, but so far it has not been developed.

Deep X Rays

Results of great interest have recently been obtained by Levett using deep x rays, the radiation consisting of very hard rays and being limited to a narrow field, including seven inches of the oesophageal wall. It is still too early to speak with any certainty of the results secured, but in a few cases at least it would seem that complete healing had been obtained without secondary stenosis. Hitherto the disadvantage of x -ray treatment in these cases has been the intensely depressing effect upon the patient, due apparently to the effects of the x rays upon the surrounding structures, and perhaps to the absorption of products so formed. So severe have been these effects that radiologists of the brilliant achievement of Coutard have entirely abandoned the method. If, however, these secondary effects could be avoided by skilful adjustment of the apparatus, the method would appear to have definite possibilities, and it is certainly one which should be explored to the full.

Another method which we are at present ourselves investigating is the application of radon to the outer surface of the oesophagus after exposure by transthoracic exploration. It is a very remarkable fact that even in elderly subjects the lower half of the oesophagus can be fully exposed by the transthoracic route apparently without risk and with only trivial inconvenience to the patient, far less in fact than is associated with an ordinary laparotomy. Theoretically, if a growth of the oesophagus could be surrounded by a group of radon seeds there is little doubt that the growth would entirely disappear and that healing of the mucosa would occur. The mechanical problems involved are, however, difficult to solve, and in spite of a few encouraging examples we can still only regard the method as in the experimental stage.

Conclusions

It will be seen, then, that for the present we regard the relief of dysphagia as the one object to aim at in the treatment of carcinoma of the oesophagus, and we consider the introduction of a spiral tube as the method most likely to achieve this in practice. Our personal experience of the method now extends over some fifteen years, and includes upwards of 300 cases, whilst the method is in general use by many other surgeons. We consider, however, that every attempt should be made to develop the method of radiation both by radium and by x rays, since although both of these are still in the experimental stage they are probably the only methods to which we can look for any real prospect of curing the disease.

ADOLESCENT AND SENILE KYPHOSIS*

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(With Special Plate)

It is about time that opportunity was given for the ventilation of ideas upon the difficult and puzzling subject of adolescent kyphosis. Though the literature is now abundant, most of the work seems to have been done by American, French, German, and Italian authors, and very little by Englishmen. It was not until Beadle¹ and Ross-Smith² published their papers in 1931 on the intervertebral disk that much thought was given to this structure in Great Britain, or to the possible association of its pathological conditions with adolescent kyphosis. It seems strange that this should be so, for it cannot be doubted that the condition has long been recognized here by orthopaedic surgeons and those working in institutions for surgical tuberculosis. In fact, one of its chief claims to recognition is that adolescent kyphosis, on account of its occasional combination of pain, deformity, and peculiar x -ray appearances, constitutes one of the most important differential diagnoses from spinal caries. Sorrell³ says that 25 to 30 per cent. of cases sent to his hospital with a diagnosis of spinal caries turn out to be cases of adolescent kyphosis.

Clinical Picture

Obviously, unless one has worked on this comparatively rare condition for a long time, it is difficult to collect a sufficient number of cases to give any valuable statistics on the relative frequency of any particular type of onset. I shall therefore content myself by merely enumerating the varieties.

Adolescent kyphosis starts between the ages of 12 and 17, normally a period of active growth, and is said to be more common in boys than in girls. The deformity may become exceedingly unsightly (Fig. A), but the active process tends to cure itself spontaneously in the course of eighteen months. If treatment is carried out early the deformity may even be lessened, but it is doubtful if it can ever be entirely corrected. In my small group of cases, and from a perusal of the literature, I think I can detect five different classes.

1

The onset is insidious. Kyphosis gradually develops, but the patient himself is unaware of it. He is usually brought up for advice by his parents, who are alarmed at the deformity. There is, however, no pain—at most a sense of fatigue at the end of the day or after exercise, but often not even that. There may be no history of trauma, and he appears to be in perfectly good health and of normal development. The posture is poor on account of the round back, but the musculature is good and there is no spasm. The kyphosis, however, cannot be corrected either actively or passively, and there is often a certain amount of rotation of the vertebrae. The hamstring muscles may be short.

2

In this group the onset is also insidious, but the patient belongs structurally to an altogether different type. The child is tall and lanky, and there may be a history of debilitating illnesses in childhood following rapidly one upon another. The musculature is inadequate, and the posture is very bad. He complains of backache, which appears, however, to be due to fatigue. In him, too, the movements of the spine are not restricted by spasm, but the hamstring muscles are markedly contracted. He belongs, in fact, to the type of child who acquires postural deformities, but in whom the kyphosis becomes fixed earlier than usual.

3

In this class are included those cases in which the onset is fairly sudden. There may be a history of a fall a month or so previously, or a period of exceptional activity at work or at play. Scheuerman,⁴ who first drew attention to the condition in 1920, was so impressed by this that he called it

* Read in opening a discussion in the Section of Orthopaedics at the Annual Meeting of the British Medical Association, Bournemouth, 1934. The author's section on Senile Kyphosis has been omitted for reasons of space.