The Position of a Tumour.

Its position has a very similar influence to the size and density of a tumour upon its susceptibility to radiations. If, for instance, it lies beneath or in tissues such as muscle and bone, it may become almost impossible to give it adequate radiations from the surface. If such factors as these are not present it may be possible that radiations from one side where the tumour is nearer may, at least in part, make up for deficiencies in radiation from the other side from which the tumour is farther away; but to get a proper quantity of rays traversing the growth many ports of entry may have to be used, and it becomes very difficult to get absolute accuracy of dosage. When cancers invade or are adherent to certain structures and organs such as bone, the stomach, bowel, liver, or lungs, treatment is rendered much more difficult, and often at the present time fails to produce a good result. It seems that not only is the nature of the tumour an important factor in ray treatment, but also the nature of the tissue and organs that it invades. The more accessible a growth is, as a rule, the better are the results, but growths of certain organs, such as the oesophagus, rectum, and tongue, seem to resist radium treatment more than elsewhere.

The consideration of the preservation of the skin is an ever-present problem to the radiologist. It has been already mentioned that under certain conditions it is possible that a stretched or ill-nourished skin may be more rapidly destroyed than a tumour, and, moreover, if the blood supply or ability of the skin to repair is bad, unless proper care is used the last condition may be worse than the first, from the formation of an intractable ulcer—not an x-ray or radium ulcer but a malignant one. That is to say, it may not be possible to give a suitable destructive dose to the ill-nourished tissues without risk. If one could be sure of destroying such a malignant growth beneath the skin there would be less difficulty in dealing with the factor of the skin, for it is almost certain that scar tissue would eventually form and fill up the gap; but the uncertainty of destroying the growth under these conditions makes the radiologist take more care in endeavouring to preserve the skin, and hence has arisen the so-called "erythema dose." The burying of radium tubes will often, but not always, obviate this difficulty. In the case of rodent ulcers and epitheliomata of the skin not invading bone or cartilage, the skin, as a rule, has been modified or destroyed by the growth. In such cases the preservation of the epithelium need not be considered and marked local destruction produced if necessary, with knowledge that good repair will take place afterwards and a soft, supple scar be formed.

It will be seen from the foregoing remarks that the whole system of ray treatment is exceedingly complicated. The difficulties of dosage are modified by nearly all the usual things which may take place in a tumour from its nature or position. The possibility of actually stimulating an outlying portion of a growth which has been only partially radiated must always be borne in mind, although it is not as a rule a difficult problem in practice, because fortunately the range of dosage producing stimulation is an exceedingly small one.

What is needed is a large number of physical measurements of the different parts of the human body and of pathological growths, and a full and complete investigation of the nature of the lethal dose for cancer cells; when these have been made an approximate idea may be obtained of the method of treating tumours in different situations, although even then it seems that a number of imponderable biological problems, such as the resistance of the organism as a whole and the resistance of tissues locally to cancer growth, remain to be solved.

But in spite of all these difficulties, and the disadvantageous position in which radiologists are placed in this country of treating practically only inoperable cases, many good results are obtained from radium treatment: 7½ per cent. of all the cancer cases (mostly inoperable) which come to Manchester for radium treatment are alive and well to-day after periods varying from two to seven years, and many cases of carcinoma of the cervix of the uterus, breast, skin, lip, and other regions are in perfect health who would but for radium be dead; while endothelioma of the parotid gland and spindle-celled sarcomata show still more gratifying results. Moreover, short of cure much valuable palliative work is done, while in non-malignant conditions, such as exophthalmic goitre, Hodgkin's disease (when young), keloid, cavernous and capillary naevi, the percentage of cures is high; finally, radium is specific for excessive uterine haemorrhage and spring catarrh.

THE SURGICAL TREATMENT OF CHRONIC ULCER OF THE BODY OF THE STOMACH.

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THE surgical treatment of duodenal ulcer and pyloric ulcer can now be regarded as standardized and relied upon to give almost uniformly and permanently satisfactory results. Such a statement cannot yet be made in respect of ulcers situated in the body of the stomach. Their treatment has been difficult and disappointing, and the many and varied operative procedures advocated and practised have been gradually discarded as failing to give the results hoped for. Partial gastrectomy, involving excision of the segment in which the ulcer is situated, together with the portion of the stomach on the distal side of it, is strongly recommended by such eminent authorities as Sir Berkeley Moynihan and Mr. James Sherren as being the only method that can be relied upon to cure. On general grounds such a drastic remedy is only justifiable if we admit inability to succeed by simpler measures. The routine excision of an organ for a non-malignant lesion is at variance with the principles governing conservative surgical practice and is rather a confession of failure. That gastrectomy is advisable in certain cases of gastric ulcer may be admitted, but unless we are prepared to regard such ulcers as precursory of cancer its necessity in every case can only be accepted with great reserve. Further, even though partial gastrectomy is held to be the procedure of election the problem is not solved, for it is inapplicable in many of the worst cases of gastric ulcer and proves useless when most required.

For many years I was impressed by the uncertainty of the results that followed operations for gastric ulcer. Immediate and permanent relief of symptoms was obtained in some cases, while in others the results were only partially good or wholly unsatisfactory. Good or indifferent results bore no definite relationship to the size and character of the ulcer, nor to the particular operation performed. I tried posterior gastro-enterostomy with and without excision of the ulcer, excision of the ulcer without gastro-enterostomy, excision of the segment of the stomach in which the ulcer was situated by the "sleeve" method, and various other procedures that have been advocated from time to time. None of these methods gave uniformly good results, and it is of interest that my worst results occurred in a series of twenty-five cases in which small ulcers were excised freely and the opening carefully closed without the production of any appreciable deformity of the stomach. A very small proportion of these cases derived any benefit from the operation, and I have subsequently had to operate a second time upon nearly half of them.

Careful consideration of my cases gradually brought out the fact that the chief determining factor as regards result was the situation of the ulcer. My experience, which I believe to be in accord with that of surgeons generally, was that the relief of symptoms due to gastric ulcer becomes increasingly difficult the farther from the pylorus the ulcer is situated. The farther the ulcer from the pylorus the less satisfactory were the results obtained by the same operative procedure. There is no evidence that this is due to any essential difference in the morbid anatomy or the pathology of the ulcer. An ulcer in any part of the stomach is more or less subjected to the same physical conditions as regards chemical and mechanical irritation of gastric contents. If, then, there is a difference in the response of such ulcers to surgical treatment it can only be accounted for by variations of site and not of pathology, and treatment must be varied in accordance with that principle.

Following up the clue provided by clinical and operative experience, with the valuable assistance of Dr. Harold Black, radiographer to the Queen's Hospital, Birmingham, an endeavour was made to ascertain in what way an ulcer modifies the physiology of the stomach. That from a surgical standpoint any essential modification was in respect of its motility and not its chemistry I was convinced, and that the chemical part of gastric digestion could be modified by a surgical operation to the advantage of the patient appeared highly improbable on general grounds, and my operative experience confirmed this opinion.

Radiography brought out clearly the fact that an ulcer of the stomach causes spasm of the segment in which it is

situated. This spasmodic contraction may last for a long time and be associated with considerable delay in the passage of the meal past the site of the ulcer. It was also observed that spasm of the segment in which the ulcer was situated was accompanied by feebleness or absence of peristalsis in the rest of the stomach. The *x*-ray observations went to prove that the effect of an ulcer, whether at the pylorus or in the body of the stomach, was the same. In both cases there is spasm of the ulcer segment and damping down of general peristalsis.

The immediate and lasting relief that follows posterior gastro-enterostomy for pyloric ulcer, and its failure in many instances to give the same result when the ulcer is situated in the body of the stomach, seems to depend upon the relationship between the site of the ulcer and that of the new stoma. In cases of pyloric ulcer the artificial stoma is always situated well to the proximal side of the ulcer, while in proportion as the distance of the ulcer from the pylorus increases the less likely is this to be the case if the ordinary rule is observed that the new opening should be made at the most dependent part of the stomach where the cardiac and pyloric portions join. When the ulcer is situated far over to the left it may well be that the new stoma lies wholly distal to it. This failure to modify the site of the stoma as the situation of the ulcer varies is, I am convinced, largely responsible for the varying results of gastro-enterostomy for ulcers of the body of the stomach. For relief of spasm it is essential that the new stoma should be placed well on the proximal side of the ulcer, and ulcer and stoma should bear a definite relationship to one another. Radiography demonstrates that when this is the case practically all the meal passes rapidly and smoothly through the new opening, little or none passing into the portion of stomach on the far side of the ulcer segment.

Clinical experience proves, however, that drainage of the stomach on the cardiac side of the ulcer only is not altogether satisfactory. The distal pouch is a factor that has to be reckoned with. It appears to become a "dead" cavity and a kind of cesspool in which stagnant stomach contents which have passed beyond the ulcer segment in small quantity collect. Peristalsis is feeble and ineffective to empty this pouch either by forcing back its contents into the proximal pouch or on through the pylorus. The result is that the patient experiences a sense of discomfort and epigastric fullness. To remedy this it is necessary to establish a second anastomosis between the distal pouch and the jejunum, or to extirpate the pouch altogether. That the latter is effective is certain, but that it is essential is open to criticism.

Briefly stated, in my opinion chronic ulcer of the body of the stomach should be treated as though an hour-glass contraction existed at the site of the ulcer. The alternative operations are: (1) Partial gastrectomy, the distal pouch, together with the ulcer, being removed and the proximal pouch anastomosed to the jejunum; or (2) double gastro-enterostomy, openings being established between the stomach and jejunum on either side of the ulcer. The choice between these two procedures is to a large extent determined by the conditions found at the time of operation and by clinical evidence upon the question of malignancy.

For several years I have treated every case of chronic ulcer of the stomach on the above lines and have made no distinction between those cases in which definite hour-glass contraction existed and those in which it did not. At first I adopted partial gastrectomy as the procedure of choice, but in many cases, and those often the worst, it was impracticable. Where an extensive ulcer was adherent to the pancreas over a wide area or had penetrated through all the coats of the stomach into structures outside, gastrectomy would have been extremely difficult and dangerous. The same objection applied to cases in which the ulcer was situated far over to the left in the cardiac end of the stomach where closure of the proximal pouch could only be effected with considerable difficulty. Further, the general condition of some of the patients was such that it was undesirable to do more than was absolutely essential.

For these reasons it was often necessary to adopt the second alternative—that of drainage of the stomach on either side of the segment containing the ulcer. This is done by means of a single long opening or by two entirely separate anastomoses. The site of the ulcer is the sole determining factor, and so long as the openings are placed well to either side of it the most easily accessible portion of the stomach

wall is selected. Often it is impossible to utilize the posterior surface of the stomach for the anastomoses owing to dense adhesions, and the anterior wall is then selected. Owing to the necessity for placing the anastomoses in definite relationship to the site of the ulcer the usual technique for securing the smooth flow of bile and pancreatic secretion along the jejunum and the avoidance of regurgitant vomiting is rarely practicable. To obviate this risk entero-enterostomy is performed between the ascending and descending limbs of the coil of bowel taking part in the anastomoses. A loop of jejunum is taken, sufficiently long to allow of this lateral anastomosis being comfortably carried out. The whole operation involves a minimum of disturbance, causes a negligible amount of shock, and is easily completed in fifty minutes.

The results of the operation were surprisingly good, immediate relief being experienced. Indeed, so free from digestive disturbance were the patients that it was with the greatest difficulty that they could be persuaded to exercise the care with their diet that was obviously advisable for some months at least, in view of the fact that the unhealed ulcer still existed. That such care is necessary was shown by temporary relapse in several cases after gross indiscretions of diet. So good were the results that I began to extend the range of the operation, and to carry it out in preference to partial gastrectomy in cases in which the latter was practicable. I have now treated between fifty and sixty cases of ulcer of the body of the stomach in this way, and although many have been operated upon too recently to draw positive conclusions as to the permanency of the benefit obtained the general result has been very encouraging.

In discussing the choice between partial gastrectomy and double gastro-enterostomy with entero-enterostomy, the question of malignancy must be considered. If cancer often becomes engrafted upon chronic gastric ulcer obviously the more drastic operation is preferable as more likely to remove this grave risk. The experience of English surgeons has been that ulcers which have existed for a considerable time rarely become malignant: that some ulcers are malignant from the onset is certain. Clinically it may be difficult to make a distinction, and I am accustomed to rely upon the duration and persistency of the symptoms. A short history with persistent and progressively severe symptoms is highly suspicious, while a long history with intermittency of the early symptoms makes primary malignant ulcer unlikely. The former history calls for gastrectomy, if at all possible, whatever the character of the ulcer at the time of operation. There is no reason, if the risk of secondary malignancy is feared and local conditions allow of it, why the ulcer should not be excised, or destroyed by the actual cautery as Balfour suggests, provided that the stomach on either side of its site is drained. Such local treatment is impracticable in the worst cases, and in the simpler ones I believe it to be unnecessary, the ulcer tending to heal rapidly when efficiently short-circuited. It is remarkable how rarely at a second operation carried out some time afterwards there is any evidence of the original ulcer beyond some scarring of the stomach wall.

That double gastro-enterostomy with entero-enterostomy has a real value I am convinced. It can be relied upon to give prolonged relief in the worst forms of gastric ulceration where partial gastrectomy is contraindicated on account of the difficulty and danger involved. My experience of it has been too short to claim a permanent cure, but the maintenance of satisfactory digestion at the end of two years encourages the hope that it may prove to be so in many cases.

As to whether it should be regarded as an alternative to partial gastrectomy where the latter is practicable is more controversial. If equally good results are obtainable by the less severe operation, it must be the one chosen. Partial gastrectomy is, however, so strongly advocated by some very experienced surgeons that one is diffident about criticizing their statement that it should be the procedure of election. Before, however, accepting this view as applicable to all cases of simple ulcer of the body of the stomach in which partial gastrectomy is possible, further evidence of its necessity must be forthcoming. Although in very experienced hands partial gastrectomy is not dangerous, it is a formidable operation for the ordinary surgeon and only justifiable if a cure is unobtainable by simpler, safer measures. For this reason I suggest a more extended trial of double gastro-enterostomy combined with entero-enterostomy.