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DELIVERED BEFORE THE MEDICAL SOCIETY OF LONDON.

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BY

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COMPARATIVELY recently, I had occasion to remove the pylorus, since which the operation has largely occupied my thoughts. It is one which, from some cause or causes as yet not satisfactorily explained, has, with one exception, hitherto successfully baffled the best directed efforts of surgeons in these islands, and, as we learn from Dr. Winslow, in many other countries, notably France, the United States of America, Brazil, and Norway, the experience of surgeons is equally discouraging. In Austria and Germany, on the other hand, the results are distinctly better, although the mortality is still alarmingly high.

In dealing with this subject, it is not my good fortune to be able to give a record of a successful surgical achievement in that direction, and what I have to say, therefore, will doubtless lack the interest and encouraging stimulus to renewed effort that my remarks might have were I in a position to recount a conspicuous success in connexion with an operation, the mortality in which has up to this been so great and so disheartening. However, it must be remembered that on the path of surgical progress are always found difficulties and obstacles which must be recognised, and if possible removed, before any distinct and signal advance can be made.

It is as a rule of equal, perhaps even of greater, importance to consider and analyse the probable causes of our surgical defeats than to dwell, as we would naturally desire to do, on our surgical triumphs. Had the truth of this not been acknowledged in modern times, many of those brilliant operative achievements which must ever signalise the era in which we live and work would never have been brought to a successful issue, and be now regarded as legitimate exercises of our art. In illustration of this, I might indicate several operations now well recognised and frequently performed, among which ovariotomy naturally occupies the foremost place—an operation the mortality in which, during its infancy, was almost uniform. Professor Buchanan, of Glasgow, has stated that he remembers the time when one of the most accomplished surgeons of his day publicly asserted that if a surgeon performed ovariotomy, and it was followed by a fatal result, he might with justice be tried as a criminal charged with culpable homicide,[1] and I can recall the fact of another eminent surgeon, and one of my most respected teachers, who on the completion of one of my ovariotomies, which he witnessed, and the result of which was successful, thanked his God that he had never been called on to perform this operation.

By those who have commenced the study and practice of surgery within the past fifteen or twenty years such statements will in truth probably be heard with amazement if not incredulity.

Having regard to the fact that pylorectomy must still be considered in its infancy—eleven years only have elapsed since the initial operation was undertaken in Paris by M. Pèan—and also to the occasional successes which have been obtained by our Continental brethren, notably Billroth, Wölfler, Czerny, and others, we should not, as some are inclined to do, regard the fortress as impregnable, but rather consider what are the probable causes that have militated so strongly against our getting successful results.

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[1] *Brit. Med. Journal*, March, 1888.

The importance of dealing with this subject appears all the greater, in face of the acknowledged and undoubted steady increase of late years in the number of cases of cancer among the community at large, a circumstance strongly emphasised by Sir Spencer Wells in his Morton Lecture (1888), and also the fact that the pylorus is so favourite a *habitat*—to borrow a botanical term—for abdominal cancer. In proof of this, I would refer to the well-known researches of Gussenbauer and Von Winiwarter,[1] which show that 60 per cent. of the cases of cancer of the stomach are situated at its pyloric end. Another important point, and one alluded to by Mr. Butlin in his work on the *Operative Surgery of Malignant Disease* (p. 212), is that cancer in so many instances remains even to the end limited to the pylorus, and without either any glandular participation or contraction of adhesions to any of the neighbouring organs.

With these few preliminary remarks I may now very briefly detail the main facts connected with the case to which I have already alluded, and which were kindly furnished to me by Dr. Lennon, assistant-physician to the Meath Hospital :—

A. O., aged thirty-four, presented herself at the extern department of the Meath Hospital on June 4th, 1889. She complained of persistent vomiting of sour water and "slime," accompanied by a gnawing pain in the belly, the vomiting occurring chiefly after food, but at times a large quantity came up amounting to several pints, which she could not account for. The sour water was occasionally brown and frothy, but usually clear. Some mornings when lying in bed, or when walking in the streets, her mouth would fill with water without any taste. Her appetite had failed of late; her bowels were confined and could never be moved without aperient medicine. The urine was of a high colour and very scanty. She had suffered from a "windy" and sour stomach for the past three years, but was never prevented by her illness from going about and discharging her usual duties.

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[1] *Langenbeck's Archiv*, xiv. 372, 1876.

On March 3rd she became much worse, the vomiting being constant and pain at times severe. She had to lie in bed nearly all day owing to weakness and giddiness, and she noticed, as she expressed it, the flesh beginning to "melt off her bones." She was at times greatly troubled with hiccough. At no time had she ever vomited any blood. She could not account for her present illness in any way; she was always of temperate habits; there was no unfavourable family history; had always been comfortable at home, and free from all domestic or other anxieties. Formerly she had been somewhat addicted to drinking strong tea, but of late had quite abandoned the habit. The patient was greatly emaciated, of dark complexion, transverse wrinkles on the forehead very well marked, tongue abnormally clean, papillæ prominent and red, and glands in the neighbourhood of groins, axillæ, and clavicles apparently not enlarged.

On examination of the abdomen the anterior wall was thin and retracted, and a little to the left of the epigastic region there was an extensive, well marked, looped, fusiform bulging, which extended downwards into the left lumbar region, across the lower part of the umbilical and then into the right lumbar region, the cavity of the protrusion being upwards and to the right side. The bulging diminished in size when flatus was got rid of, or when local relaxation took place. On tilting this enlargement, which was clearly due to gastric dilatation, splashing could be distinctly felt and heard. On the right side another smaller and somewhat elongated tumour was discovered, which was firm, lobulated, slightly movable, and distinctly tender, about $2\frac{1}{2}$ inches in length and $\frac{3}{4}$ inch in width, extending obliquely from a point commencing two inches vertically downwards from the ninth rib at its juncture with its cartilage to the lower and right part of the umbilical region. There was dulness on grave percussion over the smaller tumour, while over the larger a variable note was heard according to the position of the patient, dulness being most marked below the umbilicus when in the supine position. Heart sounds were normal, very clear in character.

The diagnosis made was a dilated stomach resulting from probably a cancerous pyloric obstruction. In this view Sir G. Porter, Dr. Arthur W. Foot, and my other colleagues who saw the case concurred.

Having explained fully to the patient my views as to the serious nature of her case, and also the gravity of the operation, which I believed gave her a prospect, though a slender one, of relief, and possibly of recovery, she at once not only consented to have the operation performed, but urged on me to undertake it as speedily as possible.

On the day previous to the operation (June 25th) I washed out the stomach thoroughly with a 5 per cent. solution of boracic acid, which procedure was carried out without difficulty or unpleasantness to the patient. She had a good night subsequently. Next morning, at 9.30 a.m., I again washed out the stomach, and continued injecting the boric solution until the fluid returned was almost transparent. This washing of the stomach did not appear at all to exhaust the patient. Shortly after she was anæsthetised with chloroform, which was skilfully administered by the resident surgeon, Dr. Newell. No sickness or other untoward accident attended the administration of the anæsthetic, the employment of which had to be kept up for the very protracted period necessary for the operation, in which I was ably assisted by my colleagues, Sir George Porter, Bart., Mr. P. C. Smyly, and Mr. Hepburn. I commenced by making a curved oblique incision, about 4 inches in length, on the right side, a little above the level of a horizontal line drawn across the abdomen, corresponding to the umbilicus. On reaching the peritoneum, I divided it with a blunt-pointed scissors to the same extent as the external wound, the edges of which were drawn asunder with retractors, and a good view was now obtained of the stomach, omentum, pylorus, and duodenum. The disease was found to be confined to the pylorus, which was much enlarged, hard but smooth, and devoid of ulceration. The omenta were apparently free from disease. The next step of the operation consisted in the separation of the omenta from the

pylorus and pyloric end of the stomach. This was done by taking up one small portion of the structure after another with a blunt aneurysm needle, armed with a double carbolised silk suture; these were then fastened, and the tissue divided between them. This procedure, which was of necessity a very protracted one, was applied first to the great, and subsequently to the lesser, omentum, and a considerable time elapsed before the pylorus and adjacent portion of the stomach were detached from these structures. The pylorus could then be easily lifted out of the abdominal cavity, and an accurate estimate made of the extent of the disease. The next step consisted in reducing the pyloric end of the stomach, to enable me to subsequently attach it to the duodenum. This I did by applying to the stomach an enterotome (Dupuytren's) from the upper or lesser curvature obliquely downwards and forwards, each end of the enterotome being guarded by soft rubber tubing, which had previously been carefully asepticised.

I then made an oblique section of the stomach to the outer side of the enterotome, and then carefully applied along the course of the incision a series of ten Czerny-Lembert sutures, the material employed being very fine twisted carbolised silk, and the needles used small, round, and straight. The enterotome, which was kindly lent to me by Dr. Thornley Stoker, was then removed, and temporarily applied to the lower portion of the stomach, on the cardiac side of that portion of it which was eventually to be attached to the duodenum. To this an enterotome was then applied, the entire lumen of the duodenum being closed by the instrument. This portion of the intestine was then divided on the distal side of the instrument. The most difficult and tedious part of the operation now commenced, which consisted in attaching the divided duodenum to the open portion of the stomach, now temporarily closed by the enterotome. I first applied to the posterior walls of the duodenum and stomach a Lembert suture, which involved primarily the muscular and serous coats of the stomach and duodenum, that is,

I passed small, round, straight needles, armed with fine twisted carbolised silk through the muscular and serous coats, first inserting fifteen of them at this stage, and over them I then applied a second series of sutures, involving the mucous lining only. In this way the serous was applied to the serous, and the mucous to the mucous coat. Having done this carefully, I then removed the enterotomes, and proceeded to attach the anterior portion of the walls. To do this I had to reverse the order which I had adopted in the first instance, suturing now the mucous lining first, and subsequently the muscular and serous. This was, as in the first stage of the suturing, necessarily a very protracted part of the operation. Having firmly secured the sutures before closing the wound, I carried out the toilet of the peritoneum with much care, and took every precaution that the parts involved should be left as dry and free from clots as possible. The edges of the wound in the abdominal wall were then brought together in the usual manner, and fixed by strong carbolised silk sutures and dressings of sal alembroth and iodoform wool applied, all being kept in place by a fine and broad flannel roller.

During the operation the patient on three occasions became so weak as to give rise to very serious apprehension on my part. From these semi-syncopal attacks, however, she rallied on small quantities of brandy being given by the rectum, and hypodermic injections of ether administered. On being placed in a previously well warmed bed, the patient's condition in a short time improved in a marked degree.

I saw her at frequent intervals during the afternoon, and each time improvement was noted. The patient complained of no pain, nor was there any gastric irritability. At 10.30 p.m., however, there was a sudden failure in the heart's action. The pulse became very rapid (140), weak and compressible, and all our efforts to improve it by diffusible stimulants given hypodermically as well as by the rectum proved unavailing. The patient continued to get weaker, and finally succumbed eleven and a half hours after the operation.

This makes, as far as I have been able to ascertain, the fifth pylorectomy performed in these countries. I have been informed by Dr. Bristowe that there was another in St. Thomas's Hospital, but I have not learned any details connected with it, but the result was, I believe, as unsatisfactory as those which preceded it. However, it is satisfactory to know that a break in the cloud has at last come in the brilliant result obtained comparatively recently by Mr. Rawdon.

It may possibly help us to determine the causes of our high mortality in this operation if we take a rapid survey of some of the principal features of these cases. Mr. Southam first performed the operation in England in April, 1882. His patient was a male, aged forty-three, and was greatly emaciated at the time of the operation, unable to take any solid food, and suffered from constant sickness after taking nourishment of any kind. This condition of things had gone on for four months previously. In this case the patient survived the operation fourteen hours.

The second case was Mr. Meyland's, and was operated on in March, 1886. The patient was a male, aged forty-six, and at the time of the operation was apparently even in a more debilitated condition than the former case. There was great weakness, emaciation, pain, and frequent vomiting, and he was rapidly losing weight. In this case, too, there was much glandular contamination, chiefly in the gastro-hepatic omentum. The patient had been suffering from symptoms referable to the stomach and pylorus for two years. The operation lasted in this case three and a half hours. The patient survived four days.

The third case was Mr. McArdle's, operated on in May, 1886. I have not ascertained the length of time the patient was suffering previously to the operation, but she was in a condition of great prostration and emaciation when it was performed. The operation lasted three hours. This patient survived four hours.

The fourth case was Professor Buchanan's, operated on in 1888. His patient was a female, aged forty-eight,

pallid, weak, and much emaciated. There was great distension of the stomach, and a nodulated, freely movable pyloric tumour about the size of a hen's egg. In this case seventeen hours was the time the patient survived after the operation, which lasted two hours and a half.

The fifth case was the one under my care, the principal details of which I have already given, and the symptoms in which, like the preceding ones, were complained of long previous to the operation. In my case the operation lasted two hours and three quarters.

The last case (Mr. Rawdon's)—"the break in the cloud," as I have termed it—has quite recently been published; but in connection with it the following circumstances are important to bear in mind: First, that the pyloric portion of the tumour was small in size; that there were no adhesions; that there was no extreme emaciation; that the serious symptoms were only "of some weeks' duration;" and that the operation, mainly owing to the sutures that were employed, was not by any means as protracted as any of the preceding ones.

The outcome of this brief survey is important, for we observe in five of the six cases that—

1. The symptoms of pyloric stenosis had existed for a lengthened period previously to the operation.

2. That great weakness and emaciation existed at the time of the operation.

3. That there was constant vomiting.

4. That the operation was much protracted in consequence of a difficult and complicated system of sutures having been employed, and which rendered also an unduly prolonged narcosis necessary.

5. That in the sixth case these unfavourable conditions were for the most part absent.

As regards the causes that have brought about such a high mortality, we may, I think, accept those given by Winslow, namely, shock, collapse, inanition, peritonitis, and gangrene of colon. The most generally accepted view, and one probably containing many elements of probability in it, is that the shock is due to the great

length of time the operation necessitates. But the collapse cannot altogether be due to this, for, as Mr. Butlin has pointed out, many successful cases of ovariotomy—and, I may add, hysterectomy—as well as other operations, have taken as long, but rather, as he says, to the emaciation and debilitated condition of the patient at the time of the operation.

Mr. Southam has propounded a theory as to the cause of the collapse, which, however, I cannot but regard as untenable. He suggests that it may be due to septic intoxication from the ferments in the alimentary canal getting into the peritoneal cavity by the law of osmosis, and setting up an acute and rapidly progressive peritonitis, sufficient to destroy life in the course of a few hours; and he also thinks that the division of the stomach and intestines renders it impossible to keep the parts perfectly aseptic. In this view I cannot coincide either. If any of the methods of suture, such as that of Czerny-Lembert or any of the others here illustrated, are carefully carried out, and during the section of the stomach, previously asepticised by diligent irrigation, the contents are prevented from getting access to the cavity of the peritoneum by the devices of either Rydygier, Gussenbauer, Schede, Billroth, Treves, and others, one need not be very apprehensive as to sepsis supervening from that cause.

It seems to me that, from the hitherto published records of pyloric resection, two main causes have militated against success; one is the late period in the development of the disease in which the operation has been, as a rule, undertaken, and the other is one connected altogether with the *technique* of the operation, namely, the introduction of so many and such complicated sutures, which necessarily protract the performance of the operation, and in this way, from the long exposure of the parts involved, induces—especially in weak, debilitated individuals—shock and collapse. As regards the first of these causes, it seems to me that, having regard to the comparatively little risk that, with due antiseptic precautions, attends exploratory abdominal operations, especially in females, we should, in cases

where we reasonably suspect the existence of any organic pyloric disease, expose the part, with the twofold object of determining the existence or not of any adhesions, the size and exact situation of the growth, and also if infiltration to any extent of the adjacent tissues exist. When accurate information on these points is obtained, we could, strengthened by the knowledge thus obtained, either decline any further operative interference or proceed to perform the operation with a confidence we could not otherwise hope to have in the performance of what Professor Buchanan has rightly stated is "truly a formidable operation."

The other point is the question of sutures. That a thoroughly accurate and firm fixation by sutures of the edges of the duodenum and pyloric end of the stomach is essential to success goes without saying. But it is a question whether a simpler and speedier method than those—and many of which are illustrated here, and which are extremely complicated—may not satisfactorily fulfil the required conditions. The suturing of the mucosa, for example, is one of the steps of the procedure, as in the Czerny-Lembert method, which undoubtedly greatly protracts the operation. In my case thirty-one were inserted, and after making many experiments on the cavader I feel confident that an efficient closure can be made by confining ourselves to the serous and muscular structures, and letting the mucosa take care of itself. I cannot but think, too, that the use of the continuous suture, involving only the serous and muscular coats of the stomach, should be employed at all events in the curtailment of the pyloric end of the stomach. Time would certainly be saved by the adoption of this method of suture. Another plan, undoubtedly affording facilities for expediting the operation, would be the use of Senn's decalcified bone plates, employed with such success by Mr. Rawdon, and also by Mr. Clark in his recently published interesting case of gastro-enterostomy.* For the benefit of those not quite familiar with the application of Senn's plates, I am able through the kindness

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* *Brit. Med. Journal*, February 8th, 1890.

of Mr. Rawdon to exhibit this simple but ingeniously devised model, which clearly explains their mode of application.

The question has been boldly raised as to whether, having regard to the unfavourable statistics of the operation and the frequency of, and in some instances very speedy, recurrence of the disease, pylorectomy can ever be regarded as a legitimate procedure. But it should be remembered that in some of the cases, a year, fifteen months, and in one instance four years, elapsed before the patient succumbed. To base a proposition on the ground of frequency of recurrence seems to me to be unphilosophical, for the logical outcome of the adoption of such a principle would be the practical abandonment of operations for cancer on other organs frequently affected—notably the tongue and breast—and I cannot but think that increasing surgical experience tends rather to strengthen than to paralyse the efforts of surgeons in the operative treatment of cancerous maladies of these organs. Certainly my own clinical experience, extending now over a large number of years, during which I have operated on all recognised forms of cancer in every accessible situation, tends in that direction, and not only emphasises the desirability of early recognition and early removal if a cure or a tardy re-appearance of the disease is to be reasonably anticipated, but also compels the adoption of views in favour of the primarily local origin of the disease, views which, as time has progressed and experience widened, have deepened and crystallised into firm belief.

Nor should we abandon as hopeless the possibility of a discovery being made in the future of a constitutional therapeusis which may exercise a modifying and possibly destructive influence on the growth and extension of cancer. Many claims have been made to such an alleged discovery, but although nothing yet has been found to bear the crucial test of scientific investigation or experience, we should not—as so many have done, and still do—scornfully reject all suggestions made in that direction, even though they may not come to us strengthened by scientific

credentials. It seems to me that in our existing scepticism we should exercise caution, and especially if, as seems not improbable, the parasitic origin of cancer may yet be established, rather look forward hopefully to the long-wished-for discovery emerging from the hazy mists of mere probability into the clear and bracing atmosphere of scientific truth, a recognised and established fact; but until that day arrives we must be content to render as perfect as possible a local therapeusis, and in doing so we can derive no small encouragement from what has been said by the greatest living pathologist, Virchow, who, speaking more from a purely pathological than a clinical standpoint, admits the possibility not only of cancer being a local affection at its beginning, but often very long afterwards when "it must," he says, "be possible during this period locally to cure it."

From the preceding observations the following propositions may, I think, be stated:

1. That the recognition of the disease should, if possible be made before any marked emaciation and weakness supervene.

2. That in all doubtful cases exploratory measures should be adopted with the view of (*a*) forming a just estimate of the nature of the disease, (*b*) the existence or non-existence of adhesions, (*c*) the presence or absence of such glandular infiltration.

3. That washing-out or irrigation of the stomach is a desirable antiseptic precaution, and can be easily carried out without exhausting the patient.

4. That the protracted nature of the operation, as usually performed, unquestionably tends to promote shock and ultimate collapse.

5. That with the view of shortening the operation it is desirable to determine what is an effectual and, at the same time, speedy method of inserting sutures.

I cannot conclude these remarks without observing what a peculiar source of pleasure it is to me that on this occasion the meeting is presided over by one who has played so distinguished and conspicuous a *rôle* in the wide field of

abdominal surgery, and acquired for himself thereby so deserved, extended, and lasting a fame.

For the following note on the pathology of the pyloric tumour in the case I have detailed above, I am indebted to Dr. McKee, Curator of the Museum of the Royal College of Surgeons of Ireland :—

"The portion excised measures 2½ inches along the lesser curvature, and 3½ inches along the greater. The tumour is annular in form, the ring being wider at the stomach end, where it admits the little finger, and narrowing to about three-eighths of an inch towards the duodenum. At this end the growth terminates abruptly, and is cleared for one-eighth of an inch by the incision. At the other end, a large fringe of apparently healthy mucous membrane has been removed, but here the tumour passes more gradually into the tissues of the part. Externally the tumour shimmers through the serous coat, in which near the great curvature are a few small transparent nodules about the size of a pin's head. On making an incision along the smaller curvature, the tumour was found to be extremely ulcerated, and to have invaded the muscular coats of the pylorus, which were greatly hypertrophied.

"The stomach, removed *post mortem*, measured from the sutures to the cardiac end 9½ inches, and transversely five inches. The serous coat is reddened in the neighbourhood of the sutures, and covered with a few flakes of fibrin. There is a similar reddening and swelling of the mucous membrane fading away towards the stomach. No trace of tumour near the line of incision, or in any other part of the stomach."

"*Microscopic Examination.*—The growth is a carcinoma which appears to have originated in the alveoli of the pyloric glands. The transition from the normal to the abnormal epithelium is sudden, the cells being at once reduced to half their size. While their granular protoplasm is retained, the nuclei are spherical and centrally placed. Still, in all parts of the tumour isolated cells are observable, with flattened periphally situated nuclei and clear contents. The tumour penetrates the muscularis mucosæ, and extends

horizontally beneath it, so as to undermine the healthy mucosa; it insinuates itself between the bundles of the muscular coat, and even penetrates them. The alveolar structure is most marked in the upper portion of the growth, the cells being here contained in long narrow spaces, some of which are provided with a lumen. In the submucosa and muscularis the alveoli are much smaller, irregular in shape, and with very little interstitial substance. The ulceration is extensive, and in places extends as far as the muscularis mucosæ."