A Clinical Lecture ON LINITIS PLASTICA, OR LEATHER-BOTTLE STOMACH.

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By SIR JOHN BLAND-SUTTON, F.R.C.S.,
SURGEON TO THE HOSPITAL.

PHYSICIANS and surgeons of great experience, after examining patients with tumours connected with the abdominal viscera, are often unable to decide whether the tumours are innocent or malignant. In a doubtful case they sometimes advise the patient to have the tumour exposed by an operation in order that its nature may be determined; indeed, it is not uncommon when the tumour has been thus exposed for the doubt to persist. In suitable cases the offending lump is excised and submitted to microscopic examination. This method, as a rule, settles the question, but not always, for pathologists of equal eminence and experience occasionally differ not only in regard to the species or even the genus of the tumour, but, what is more important from the patient's point of view, whether the morbid growth is an inflammatory mass or a malignant tumour. To-day I propose to illustrate this matter by reference to an extremely interesting morbid condition known as the leather-bottle stomach.

In 1854 Dr. William Brinton, Physician to St. Thomas's Hospital, described under the term "linitis plastica" a remarkable disease of the stomach. The precise nature of the change puzzled him as it had other pathologists who studied this disease before him. There is evidence that the condition had been recognized at least two centuries before. Brinton invented the fantastic name, "linitis plastica," but credit is due to him for attempting to separate it as a distinct disease.

The introduction of operative methods in the treatment of gastric diseases has led to a thorough study of the histology of morbid growths of the stomach, but even with the aid of all the refinements of histological methods this disease defies exact classification in precisely those features on which the practical surgeon most requires information. Are the extraordinary changes which produce a leather-bottle stomach infective (inflammatory) or cancerous? I propose to emphasize the im-

portance of this question by giving the particulars of a case.

A woman, aged 42, was admitted into the hospital under the care of Dr. Lakin. Her belly was enormously distended with fluid and everywhere dull on percussion. We could not satisfy ourselves whether the distension was due to fluid from a burst ovarian cyst or hydroperitoneum associated with a papillomatous cyst of the ovary. We were also suspicious that a cancerous focus existed somewhere in the abdomen, but we could not define its position, the extensive hydrosphere masked everything. It was decided to evacuate the fluid through an incision in the abdomen, and then examine the viscera. As soon as this was done we were confronted with a typical leather-bottle stomach so intimately adherent to the adjacent organs that any hopeful surgical treatment was out of question. The free fluid was removed and the incision in the abdominal wall closed. The patient survived the interference three weeks.

The condition of the stomach is remarkable, but before we consider it let me briefly recall the leading features of the normal organ. The dimensions of the stomach vary with the age of the patient and the degree of distension at the time it is examined. The stomach of an adult is 12 in. long, 5 in. wide, and its walls are about one-fifth of an inch thick. In the living body the stomach is pink, glistening, soft, very vascular, and has a capacity of 40 fluid ounces. The stomach the subject of our observation (Fig. 1) measures 4 in. in length, 2 in. in width, and in places its walls are an inch in thickness. Instead of being flexible its walls are rigid, thick, and hard like a leather pouch. When pressed upon the wall does not collapse, and, as Brinton pointed out, it resists even considerable pressure, and returns to its original shape like a large artery or a caoutchouc bottle. So shrunk is this stomach that it has a capacity of 4 instead of 40 oz. The thickening involves the gastric walls from the cardiac opening to the pylorus. At the pyloric end it is sharply defined, and the thin walls of the duodenum are in striking contrast to the thickness of the walls of the stomach (Fig. 2). At the cardiac

Fig. 1.—A cancerous leather-bottle stomach. Natural size.

end the thickening involves the terminal inch of the oesophagus.

In normal conditions the omenta hang like veils about the stomach, but in our specimen the great omentum is a mere ridge of hard, shrunk tissue which, in contracting, has drawn up the transverse colon. Some parts of the transverse colon in relation with the stomach are also infiltrated and thickened. When the wall of the stomach is divided the tissues seem to be bloodless, and the boundaries between its various coats are easily discernible. The cut surface, traversed by glistening filamentous

bands, recalls the appearance of woven linen; this suggested to Brinton the term, "linitis" (*λινον, rete ex lino factum*). He regarded the change in the walls of the stomach as an "inflammation of the filamentous network of areolar tissue ensheathing the vessels."

The minute anatomy of the leather-bottle stomach has been studied with great care, and as much uncertainty exists in regard to this remarkable condition as in Brinton's day. Some writers believe it to be inflammatory in origin, others regard it as a diffuse form of cancer, a few consider it to be syphilitic, and it has been described as tuberculous, like the hyperplastic tuberculous thickening occasionally seen in the small intestine, and especially in the caecum.

Our specimen has been subjected to a thorough microscopic examination, and I am satisfied that the changes it presents are due to the infiltration of its coats with spheroidal-celled cancer, but as the whole of the stomach is so uniformly permeated and the mucous membrane shows no evidence of ulceration, it is impossible to determine the particular part of the mucous membrane in which the morbid change began.

The implication of the transverse colon is a fact of some interest. It is a well-known feature of cancer that it does not respect the individuality of organs but its cells invade adjacent organs freely. I have on several occasions known a cancerous focus on the anterior wall of the stomach to invade the peritoneum of the anterior abdominal wall lying in contact with it. The cells will permeate the subperitoneal tissue and form a muffin-shaped mass of cancer around the umbilicus. When this is well marked the umbilicus is retracted, and the appearance produced recalls in a striking way an atrophic breast with a mass of cancer surrounding a retracted nipple. This appearance resembles the crown of a codlin apple.

I have on several occasions diagnosed an otherwise obscure cancer of the stomach by this appearance alone. The codlin apple appearance of the umbilicus is also seen in the late stages of cancer of the breast when epigastric permeation has occurred.

Linitis plastica may be limited to the pyloric portion of the stomach and convert it into a rigid funnel-shaped tube. In well-marked examples the portion of the gastric wall implicated in the change may measure an inch or more in thickness. The change is sharply limited at the pyloric ring, but towards the cardiac regions of the stomach it shades away indefinitely. The pyloric orifice, though thickened, is not obstructed, although often greatly narrowed. The thickened portion of the stomach is usually buried in adhesions.

Professor Alexis Thomson has recently studied nine examples of localized fibrosis of the stomach, and states that seven of the specimens showed a visible punched-out ulcer; in the remaining two specimens there was superficial ulceration over the greater part of the affected area. Even in cases of cancerous leather-bottle stomachs it is impossible to deny that the infiltration began as a simple chronic ulcer which ultimately became cancerous. The study of these thickened stomachs makes it fairly clear that the condition predisposing to linitis plastica is an ulcer in the mucous membrane, which permits the connective tissue planes of the stomach to be permeated by infective agents associated with the ulcer, and the new connective tissue grows in response to the irritation they cause. The sharp limitation of the thickening at the pyloric ring accords with the anatomy of the stomach. The leather-bottle stomach produced by malignant disease has a similar history. A cancerous focus in the gastric

mucous membrane—probably a chronic gastric ulcer which has become malignant—allows epithelial elements to permeate the connective tissue planes of the stomach.

The main features underlying the production of these hard, unyielding stomachs may be studied in the gall bladder. It is not uncommon to find a shrunken gall bladder containing gall stones and its walls so thick as to raise a suspicion that they may be the seat of malignant change. On slitting the gall bladder open, after removal, an ulcer will often be detected at the fundus or in its neck, and some of these shrunken gall bladders are cancerous. An ulcer is not always detected in a stomach the seat of linitis plastica, but it is easily conceivable in infective cases that the primary ulcer has healed. The importance of deciding the nature of the change seen in leather-bottle stomachs is great because of its relation to treatment. Let me set before you the clinical history of another patient in order to illustrate the difficulties.

A woman was placed under my care, by a physician of experience and repute, on account of a movable lump in the left hypochondrium. The lump was reniform, and easily glided into the left lumbar region, but it rested most easily in the epigastrium; the extreme mobility and shape of this body led my colleagues to regard it as a mobile kidney, and he wished me to fix it. I satisfied

myself that it was connected with the stomach. When the parts were inspected through a median supra-umbilical incision I found a saddle-shaped tumour involving the lesser curvature of the stomach and the adjacent gastric walls equally. The whole stomach was so small and movable that it hung like a wallet between the oesophagus and the duodenum. Although there were no enlarged lymph nodes to be seen or felt, the hardness of the tumour raised the fear in my mind that it was cancerous, so I removed the stomach and joined the oesophagus to the duodenum. The patient recovered quickly, and improved rapidly in health. Three months after the total gastrectomy she reported herself in good health, and complained only of her inability to eat as big a meal as her husband, but she made up this deficiency by taking two extra meals. I saw her three years after the operation in good health, but a year later, as she did not report herself, I made inquiries, and was informed that she had been dead six months. I could not get any particulars concerning the cause of her death.

The examination of the tumour in this stomach led to much difference of opinion in regard to its nature. Immediately after removal the stomach was hardened and sectioned. The walls in relation with the lesser curvature were very thick, measuring in some parts 2 inches. In no part of the mucous membrane could we discern any trace of ulceration, and in no part could I find microscopically any evidence of cancer. With great surprise I received from the Cancer Laboratory a report that the mass in the stomach wall was cancerous. I expressed my doubts very frankly, and sections were prepared from various parts of it. The pathologists persisted in the belief that the scanty islets of epithelium were cancerous, but I still believe that the mass was a localized linitis plastica, and that the epithelial nests were peptic glands, separated and isolated by connective tissue, producing an appearance like that seen in sections of mammary gland affected with chronic mastitis. I think the long survival (three and a half years) after gastrectomy supports my opinion that the lump was not cancerous.

Surgeons during the last twenty years have often opened the abdomen expecting to find a condition of stomach suitable for gastro-jejunostomy, and on exposing

Fig. 2.—The duodenum, pancreas, and transverse colon of the specimen represented in Fig. 1 shown in section. The cancerous infiltration stops at the pylorus; the duodenum is normal, but the walls of the colon are permeated. Natural size.

the mass have found a hard pylorus embedded in adhesions. Dismayed by such experiences, they have considered the condition to be cancerous, and closed the incision. A man, aged 38, was admitted into the Cancer Charity with the diagnosis of gastric cancer, and he had, in the epigastric region, a scar left by an exploratory incision; the surgeon who made this incision believed that this patient had an inoperable pyloric cancer. I watched the patient for many weeks, and doubting the accuracy of the diagnosis, advised him to submit to gastro-jejunostomy. In the course of the operation I found the pyloric half of the stomach completely fibrosed; its walls resembled scar tissue in colour and consistence. The gastro-jejunostomy was successful; the man left the Cancer Charity, and returned to his occupation. This operation was performed in January, 1912. In November, 1913, the man reported himself in good health, and was earning his living by hard work such as hop-picking, pulling turnips, and digging. We examined the condition of the stomach by means of the x rays and a bismuth meal; the new stoma could be seen discharging its functions very efficiently. It is of the utmost service to us that the improvements which follow the establishment of a new stoma in the stomach are capable of visual demonstration.

Reports on the results of gastro-jejunostomy often contain accounts of patients who have been submitted to operation in the belief that a localized lump in the wall of the stomach was cancerous; the surgeon has been surprised, on examining the patient two years afterwards, to find that the suspected cancerous lump has disappeared. So many of these cases have been observed and reported that surgeons willingly admit the difficulty of deciding between a stomach converted into the semblance of a leather bottle by cancer, or by inflammation. Such changes are not confined to examples in which the stomach is uniformly affected, for the change may be limited to a relatively small area of the stomach, but it shows clearly the advantage, in doubtful cases, of giving the patient the benefit of the doubt as well as the benefit which gastro-jejunostomy will bring him if the lump in his stomach is of inflammatory origin. All surgeons who have had much experience of gastro-jejunostomy for tumours of the stomach will admit that patients often make excellent and permanent recoveries after an operation, in spite of a dismal prognosis.

BIBLIOGRAPHY.

- Brinton, W.: *Disease of the stomach*. London, 1854.
 Lyle, H. H. M.: *Linitis plastica (cirrhosis of stomach)*. *Annals of Surgery*, 1911, p. 625.
 Thomson, Alexis, and Graham, J. M.: *Fibromatosis of the stomach and its relationships to ulcer and to cancer*. *Edinburgh Medical Journal*, 1913.

TWO YEARS' OPERATING TO THE CLOCK.

BY

JOHN O'CONOR, M.A., M.D.T.C.DUB.,

SENIOR MEDICAL OFFICER, BRITISH HOSPITAL, BUENOS AIRES.

In a very interesting leading article in the *BRITISH MEDICAL JOURNAL* last year, my attention was attracted by an appeal to surgeons, not to forget that quick operating meant less exposure of parts, with consequent less liability to shock and supervention of sepsis. For years past I happen to have acted according to the idea that the success of a serious surgical operation on the unknown quantity, the human body, is in direct ratio to its rapidity.

Speaking recently to Mr. Maclaren, the famous cricketer, I was much interested by hearing him state "there are more matches lost by not playing to the clock than many people imagine." Might I venture to apply this remark to our "game," and say there are many more lives saved by a smart operation than probably many of us realize?

At the same time I emphasize the fact that I should not be credited with the opinion that quick operating is of value *per se* unless combined with conscientious and thorough workmanship, and unless compatible with the removal of the *fons et origo mali*, whether this be an infected appendix, Fallopian tube, or gall bladder, or other cause. Also in many septic cases deliberate care must be taken to isolate the operating area by sponge packing, so as to avoid further visceral or parietal infection, and a

most determined attempt must be always made to clear the "field of battle" of all dead material and to leave it as dry as possible. If these latter conditions cannot be, for one reason or another, complied with, then I unhesitatingly recommend free drainage every time. Furthermore, the size of the incision must be of such dimension as to afford every facility to the operator to carry out intelligently such measures as the exigency of the condition demands, and it should constantly be borne in mind that the peritoneal cavity in particular is not the place for the game of "blind man's buff."

Before recording the results obtained by me in working to the clock it will be well to describe briefly the general system on which the patients have been treated.

After a detailed organic examination has been made the patient has two days' preparation in hospital, consisting of light diet, calomel, magnesia, *mistura calcei lactatis*, and if debilitated, hypodermic injections of liquor strychninae. On the morning of operation a soap and water enema is administered, and the patient's skin is painted with tincture of iodine (1 in 50). If the condition is serious, a nutrient enema (strong coffee 3ij, brandy 3j, glucose 3j, peptonized milk 5v) is given half an hour before operation, also a hypodermic injection of morphine, gr. $\frac{1}{4}$ with atropine $\frac{1}{10}$, and fifteen minutes later a brandy and soda. Ether by the open method is the routine, unless there are contraindicating lesions.

My operating staff consists of an anaesthetist, my resident medical officer, my specially trained assistant nurse, the charge nurse of the operation theatres, her assistant, and the operation room porter. No headgear is indulged in, and gloves are worn only in very septic cases, for self protection. Our hands and arms are treated liberally to hot water, soap, and nailbrush, hot formalin solution (1 in 200), alcoholic mercuric solution (1 in 1,000), and aqueous acid mercuric solution (1 in 1,000) respectively.

During operation the sterilized instruments are kept in a basin of carbolic lotion (1 in 40); our sponges are all dry sterilized, except the Turkey sponges, which are kept in acid mercurial solution and thoroughly wrung out in warm carbolic lotion before being used. No lotions are used in wounds, and only in cases of abdominal pus collections are Turkey sponges employed, and then merely to form a more effective walling-off of the danger zone.

Sterilized silk is used for all intraperitoneal work except when pus is present; then Lister's catgut is exclusively employed. Wounds above the umbilicus are closed by interrupted through-and-through strong silk sutures; below the umbilicus we always employ tier sutures, except in septic cases with drainage. I never bury silk in any parietal wound, hernial or otherwise. All bleeding points are ligated, and if "dead" spaces cannot be avoided they are left open to drain themselves. No flushing of the abdominal cavity or of wounds is practised, except in curetting a womb and arthrotomy of infected joints. Dry sterilized gauze dressing is applied to all clean wounds. Collapse and shock are treated by saline infusion, hot saline and brandy enemata, temporary elevation of foot of bed, and hypodermic injections of aseptic ergot, camphorated oil, and strychnine.

The following summary includes, without any attempt at selection, all important operations performed by me in the British Hospital, Buenos Aires, during the two years May, 1910, to May, 1912. This period is chosen principally because Dr. K. McFarlane Walker and Dr. K. D. Pringle, who have been my assistants and who are responsible for all entries in the operation register, are still resident, a fact which considerably facilitates reference.

SUMMARY.

Hernia, Inguinal: Radical Cure (Halsted).—Number of operations, 50; total time occupied, 733 minutes; average to each, 14.6 minutes; maximum time 27 minutes, minimum 8. Result: Local sepsis in 1 case, the rest healing normally.

Some twelve years ago I abandoned Halsted's method on account of the frequency of testicular complications; a few years ago I was tempted to try it again, now it is my operation of choice; with improved technique, I find orchitis with subsequent atrophy is eliminated. In this operation I thoroughly expose lower shelf of Poupart, and pass the two lower sutures through Gimbernat's ligament and conjoined tendon; this, in my opinion, is the principal part in the piece.

Hernia, Inguinal: Radical Cure (Bassini).—Number of operations, 21; total time occupied, 332 minutes; average to each,