An Address ON ATONY AND PROLAPSE OF THE LARGE INTESTINE.

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SEVEN years ago I described some experiences of this subject,¹ and in the sudden week of mobilization in August, 1914, I had arranged to see patients, operated on in 1912 and 1913, for the purpose of this paper. Military work shelved it until six months ago, but I am dealing here mainly with those cases. They group themselves into three chief types.

CLASSIFICATION.

1. Affecting caecum and ascending colon only, the "cesspool caecum." This may be the mobile caecum alone, or combined with an appendix lying behind the caecum, colon, or terminal ileum, adherent to the posterior abdominal wall, either in iliac fossa, or internal to it, behind the end of the mesentery, and constituting Sir Arbuthnot Lane's "controlling appendix."
2. Affecting proximal colon—that is, as far as the centre of the transverse colon.
3. Where the whole colon has slipped down, sometimes alone, sometimes accompanied to some extent by stomach, small bowel, and liver—the visceroptosis described first by Glenard in 1885, and known by his name.
4. A fourth rarer type consists of prolapse of the omega loop of the pelvic colon, with lengthening of its mesocolon, and occasionally an approximation of the bowel at the two ends of the loop by thickened bands of peritoneum across the mouth of the loop. I attribute prolapse of this loop to the weight of long-retained solid contents, though a slight kink of the bowel, originated by Lane's "last kink" may start or expedite it.

In considering these changes in the large intestine, it may be argued that their results are merely due to intestinal stasis or alimentary toxæmia, and should be considered under that heading, a subject discussed so fully at the societies and written about so freely during the years 1913 to 1915.² This is to some extent true, but Lane, I think, lays most stress on delay in the small intestine—stasis of the ileal effluent—as the essential factor in the causation of the clinical picture he has so graphically portrayed, with all the widespread and far-reaching results he attributes to it. The state of the patient, as I see it, in cases of delay in the large bowel, varies considerably from this picture. My experience agrees with that of Mr. C. H. Fagge,³ who in 1913 said:

We may divide cases of stasis into those which involve the lower ileum and often simulate and probably produce gastric and duodenal diseases, and those which affect the flexures of the colon; the latter, though peculiarly amenable to surgical treatment by short-circuiting, in many cases get along by the aid of medical treatment.

ANATOMICAL AND DEVELOPMENTAL CONDITIONS.

The original source of the prolapse, the distortion and angulation of the bowel, and the presence of the accessory bands, membranes, and adhesions so commonly found in these cases is, in my opinion, primarily developmental, and due to one of two main causes: either failure of union of certain peritoneal surfaces, which normally become indissolubly fused, leaving no sign afterwards that this has taken place; or persistence of certain peritoneal bands present during intrauterine life which usually disappear just before or after birth.

By reason of the migratory changes of position of the developing proximal colon, by the rotation of the U-loop of the hind-gut at the second month of fetal life and the anchorage of its anterior limb in front of the right kidney, by the subsequent descent of the caecum from that position about and after birth, it will be apparent that the right side of the peritoneal cavity must be especially liable to such developmental changes. Thus if the caecum and ascending colon fail to unite with the parietal peritoneum

of the posterior wall, the mobile caecum results; if previously, after the rotation of the U-loop of the bowel, the caecum fails to become securely anchored in front of the right kidney, there is afterwards no fixed point at the hepatic flexure, and thus the proximal colon will almost certainly be prolapsed during life; and if, finally, the attachment of the posterior limb of the U-loop to form the splenic flexure fails to be attained, the whole large intestine is proptosed, constituting the three types of cases here classified. The last is, however, rare. I think the splenic flexure is the most generally fixed part of the intestine except the duodenal junction. During the last month I met with by far the most unusual duodenum I have ever seen. From the subhepatic pouch it passed down the right lumbar region, curved across the middle line between the third and fourth lumbar vertebrae, ascended vertically five inches to a ligamentous attachment to the root of the mesocolon, and then passed downwards rather acutely, though the jejunum distally for nearly three feet was as equally dilated and atonic as the duodenum, and gradually passed into a state of hypertonic contraction.

Jackson's membrane, a frequent accessory structure found in the right peritoneum, first described by J. N. Jackson of Kansas City in 1909,⁴ as caused by lymph stasis in pericolic tissue due to chronic infection from the lumen, is in close association with the ascending colon. After great diversity of opinion as to its origin, it is now, I think, pretty well accepted as a developmental structure, derived from a fold of the right edge of the great omentum, included in the adhesions which the ileo-caecal loop forms when rotated to the front of the right kidney, associated with persistence of the ascending mesocolon, and probably, in view of this, acting as a support to the ascending colon. This is the view of my colleague, John Morley, as the result of comprehensive investigations reported in 1913.⁵ He found this parieto-colic fold in 4 out of 36 fetuses at birth.

A month ago, operating on a case of general enteroptosis of the great bowel, I found a typical membrane, not confined to the right abdomen, but crossing the peritoneal cavity like a veil, and extending up to the attachment of the slipped splenic flexure and over the descending colon. I have never had this before, and have never seen it described.

Appendix.—I estimate that in 20 per cent. of all cases, but most commonly in Classes 1 and 2—prolapse of caecum or of proximal colon—the appendix is situated posteriorly, either retro-caecal or retro-colic, bound closely by adhesion, and frequently acutely kinked. This may be due to its being caught behind the caecum during the descent of the latter, or by its fixation under the end of the ileum by deficit in its mesentery, or by its inclusion in the bands so frequently formed in this region during intrauterine life—for example, the genito-mesenteric fold described by Douglas Reid,⁶ who says "that this fold is the commonest cause of the retro-colic position of the appendix. Its pressure on the adhesions it produces to the left of the caecum may arrest the completion of caecal torsion." An appendix so anchored would naturally undergo devitalizing changes, become kinked, and develop the signs of a chronic inflammation. But in addition I have always thought that an appendix originally free might, by reason of subacute infective inflammation, become thus fixed behind the caecum, and then, by distorting the axis of the caeco-colic junction forwards, initiate a bulge in the anterior wall of the ascending colon, developing into a localized proptosis, the typical "cesspool caecum" of Type I.

Lane's Band, determining the Typical Ileal Kink.—The congenital origin of this is upheld strongly in the excellent articles of Seton Pringle⁷ and Sir Henry Gray,⁸ published in 1914, where it is stated to be due either to the persistence of the genito-mesenteric fold or to excessive peritoneal fusion. More than once I have found this fold present in an abdomen opened for some reason quite independent of stasis.

Arthur Keith⁹ finds that accessory bands, once regarded as pathological, are present in at least 30 per cent. of newly-born children; but in colons removed by operation for stasis or colitis he has now no doubt that "adhesions are largely increased in number and extent by pathological states. Still, the chief adhesions, or the bands which have been regarded as the cause of obstruction or stasis are invariably found at the site of the embryological adhesions. In other words, pathological varieties are exaggerations of normal adhesions or bands."

Keith's work on the morphology, the anatomy and the functions of the normal colon, as well as the pathology of colonic stasis derived from minute investigation of specimens removed on that account, has shed new light upon the one, and given new conceptions of the origin and meaning of the other; for, as always, by sufficiency of knowledge of the normal will efficiency of treatment of the abnormal be evolved.

Causation.

In spite of the adhesions, accessory bands, the angulation and prolapse of the colon, my experience agrees with Keith's when he states that he has never yet obtained a single specimen which showed the usual signs of chronic obstruction—namely, marked constriction at the site of the adhesion with hypertrophy of the muscular coat of the intestine, which had to force its contents through the constriction. All the evidence points to stasis being due, not to mechanical obstruction, but to defect in the motor mechanism of the large intestine.

Excluding cases of long-continued colitis, I think all operators will agree that the bowel in stasis is not hypertrophied. It is dilated, with increased sacculization and more or less kinking or distortion. Its wall looks thin and atonic. It is quite a familiar sight to see the proximal colon thus affected as far as about the centre of the transverse colon; and the change in the appearance of the gut in the distal colon from that point onwards gives strong support to the belief in the divided function of the colon, the proximal half for bacterial digestion, the distal for evacuation. It also tends to support Keith's conviction that—

In the great majority of cases which are classified under the somewhat elastic term of intestinal stasis the symptoms do not result from any atony of the musculature of the bowel, but from a hypertonicity of those parts which are normally in a state of chronic contraction, such tracts as the terminal part of the ileum, and all that part of the colon which lies between the mid-point of the transverse colon and the junction of the iliac with the pelvic colon. The *x*-ray and anatomical evidence is altogether against the theory which regards peritoneal bands and kinks as a cause of chronic obstruction of the bowel, and altogether in favour of a disordered action of the intestinal musculature.

Keith attributes the control of rhythmic action in the gastro-intestinal canal to nodal tissue, situated in the myenteric or Auerbach's plexus, containing certain cells muscular in origin, with processes directly united with nerve cells on one hand and muscular cells on the other, having a higher degree of excitability than ordinary muscle and providing centres at which contracting waves take origin. It resembles, he says, the traffic along a railroad track, divided into sections, each placed under a pacemaker. The traffic of one centre has to be regulated in relation to adjoining sections, and there must be signal-systems which can control and act as pacemakers or regulators of neighbouring centres. The gastro-intestinal tract has six sections, each with its chief centre of excitability at the beginning or proximal end—namely, gastric, including first part of duodenum, duodenal, jejuno-ileal, proximal-colic, distal-colic, and rectal.

A potent reflex action, inhibitory as well as acceleratory, between portions of the gastro-intestinal tract, particularly between ilio-caecal junction and stomach and duodenum, as noted by Moynihan, Lane, and others, is well established. It appears equally reasonable that hypertonicity of the distal colon should, by inhibiting the proximal colon, result in its atony, dilatation, and prolapse. It appears to me also that a frequent clinical sign, the causation of which has never been explained, is attributable to the same influence—namely, ballooning of the rectum, as an indication of an obstructive lesion in the distal colon, its adjacent section.

From the point of view of treatment of enteroptosis, one more point in the dynamics of the abdomen must be mentioned—namely, the present view that viscera are merely slung from, and not supported by, the mesenteries, but are controlled by support of the abdominal wall by automatic reflex action, as in standing, and that their ptosis is due, not to congenital or acquired bands, but to defective action of the abdominal musculature.

CLINICAL FEATURES.

Whilst it is thus undetermined whether stasis is the result of the different bands or adhesions, or the disturbance

of the neuro-muscular action of the alimentary tract; whilst our knowledge of the anatomy and physiology of that tract is so incomplete, and needs establishing by the working out of many complex problems; whilst the question of what constitutes intestinal stasis has never yet been accurately defined, or its exact relation to toxic absorption determined; whilst it appears to comprise so many affections of widely separated portions of the alimentary system, it is manifest that the symptoms displayed must also vary widely in different types of case. Confining our attention chiefly to the large intestine cases, some indications may, by the light of experience, be noted:

1. The majority of cases have the history of a distinct starting point. Quite often it has been a continued and severe attack of abdominal pain, usually right iliac or lumbar, with confinement to bed for two or three weeks. After subsidence the pain continues, more marked at intervals, which tend to become shorter. When the pain is right iliac the symptoms strongly suggest a subacute appendicular attack, without pyrexia, and doubtless this has actually been present in many cases. Sometimes the pain is right lumbar, in the subhepatic area. In such cases one suspects kinking at the hepatic flexure.

2. Much rarer is left iliac pain in cases of pelvic colon trouble. When such cases are sent for surgical advice there is usually a tender spot at the original site of pain. In the cecum a caecum a succession splash is usual in the right semilunar line, above and outside McBurney's point, but below the level of the umbilicus. This may also be found on the left side in pelvic colon cases.

3. Constipation, though frequent, is not constant. In some cases it is lifelong, but more marked since the commencing or determining attack. Where there is a regular action of the bowels it may be suspected that the sacculi of the proximal colon are not efficiently emptied thereby; but constipation, as the patient understands it, must not be taken as a synonym for intestinal stasis.

4. Dull, aching abdominal pain and feeling of weight is very constant, either in the lower abdomen more marked to the right, or in the epigastrium. Its occurrence may or may not be associated with the taking of food, but it is often associated with the erect posture, and is then relieved by lying down, and often by manual support of the abdominal wall.

5. Gastric or duodenal trouble, sometimes with frequent vomiting, sometimes with epigastric pain after food; *x* ray indicates the actual condition. Whether it is due entirely to reflex action, or whether there is not also a mechanical factor by direct drag on the stomach and second part of the duodenum by the prolapsed and laden colon, is not yet determined.

6. Abdominal crises, such as accompany floating kidney, are associated with enteroptosis also, in my opinion.

7. Very marked pulsation of the epigastric aorta, sometimes visible pulsation, is frequent, as would be expected when the stomach is proptosed.

After some experience, paying attention to these points a diagnosis can generally be made. And yet I am confident that an individual with slipped bowel often passes through life without the troubles and signs of intestinal stasis. As such she may have minor troubles and be classed as a "neurotic abdomen"—a diagnosis now, with the advance of knowledge, becoming much rarer. Some determining factor appears to be necessary to constitute the signs of stasis. A distinct kink or partial torsion of the loosened bowel lasting some time, the effects of a pregnancy, some illness, or even a neurasthenic attack, supervening from general or nerve debility, may be sufficient to originate the disturbances in the bowel wall, from which it never recovers, but lapses into chronic stasis.

TREATMENT.

It will be apparent that practically all cases, when they come to my notice, are, by reason of some determining attack, with subsequent failure of compensation, or by long continuance of gradually advancing symptoms, likely to be benefited only by surgical interference. But it is essential that it should be widely recognized that in the great majority of cases, especially in their early stages, medical treatment alone is needed, and that very frequently, if carried out carefully and continuously, it effects either a cure or such amelioration as to render life comfortable and useful. This lies in the province of the family

medical man; hence the necessity of his keeping stasis always in his mental vision. In view of the reflex action of the muscles of the abdominal wall in supporting the abdominal viscera, the advisability of abdominal exercises to improve their strength and tone will be grasped. In cases where the lax abdominal wall and the prominence of the lower abdominal region show that enteroptosis is already present, whether progressive or due to constitutional growth, as shown by the typical thin, sallow-complexioned, long, narrow-chested condition, the "habitus enteropticus," support from a proper abdominal belt must be sought, and the compression of the lower chest wall by corsets forbidden.

To promote passage in the large intestine, paraffin is a sheet-anchor as a lubricant and to prevent the formation of faecal masses in the sacculi, which weigh down the bowel and drag on the stomach and duodenum. But paraffin, whilst a lubricant, is not a laxative. For this, in cases after resective operations on the bowel, I mostly employ small nightly doses of castor-oil, 1 drachm more or less, as found necessary, the essential being its exhibition regularly every twenty-four hours. Cascara will also serve, and I think Parke, Davis's "cascara evacuant" is the best form available.

Surgical Treatment.

In 1912-13 I operated on 32 cases, 2 of which were fatal. To ascertain "end-results" I have communicated with the remainder, and have reports from about 26.

Class 1.—An appendix, posterior, kinked and adherent, should be removed. If accompanied by the typical ileal kink, this should be freed by division of the underlying sickle band and peritonization of the surface thus divided. If the caeco-colon is markedly "cesspool," it must be dealt with by caecoplication, narrowing the lumen by invagination of the wall between the anterior and outer taeniae.¹⁰ Alternative methods are Coffey's colopexy,¹¹ anchoring the bowel to the parietal peritoneum, or Wilm's caecopexy, fixation of the caecum to the iliac fossa. I report 5 cases of this type, 4 completely successful. One was well, and working at munitions for four years. Symptoms then recurred, and six months ago I performed a successful hemicolectomy. In cases where a greater extent of colon is involved, or where, by long duration, the condition of the patient is worse, the choice of operation lies between short-circuiting by ileo-colostomy, hemicolectomy, and colectomy.

Class 2, Prolapse of Proximal Colon.—I favour hemicolectomy, and it was done in 12 cases now reported. One died on the sixth day of leakage from the suture, 3 have returned to good health, 8 are improved, 3 of which have only to be careful of diet because of gastric trouble, and one complicated by chest trouble is only slightly improved. During the last six months, since I was set free from military duty, I have been uniting the bowel by end-to-end anastomosis instead of lateral, as in the cases here noticed done before 1914, and I think future results will be notably better, as displayed in three patients shown at the clinical meeting a fortnight ago.

Hemicolectomy appears to me a sound procedure, having regard to the evacuator function of the distal colon, and because in this type of prolapse the terminal ileum and the centre of the transverse colon will always be found on operation lying parallel and adjacent to one another, as though Nature were indicating the site for resection of the gut. If, by prolapse of the proximal half of the transverse colon, its course has become nearly vertical in the abdomen, with a sharp angle at the splenic flexure, or if the pelvic mesocolon is short and shows signs of a mesosigmoid band, I should do an ileo-colostomy or a complete colectomy instead. The choice between these two must be decided in each case and is not always easy to make. Some weeks ago, in a case of completely slipped proximal colon, where the whole distal colon was closely bound down to the parietes and the iliac fossa, and where the lower pelvic colon appeared too adherent to afford a satisfactory ileo-colostomy junction except when freed by dissection, I decided against this and performed the colectomy. Sir Arbuthnot Lane says "the case of this depends on the operator's familiarity with the development and arrangement of acquired bands, particularly those controlling the splenic flexure." I think I have arfair knowledge of these, and did my best to apply it in

this case; but the separation of the distal colon proved most trying and took considerable time, and though no great amount of blood was lost, death from shock took place in three hours. There were no acquired bands, except at the splenic flexure and the pelvic mesocolon, and yet the freeing of the descending and iliac colon was difficult. Should I meet with another case like this I shall trust to short-circuiting, especially as in the contracted state of the distal colon any reflux of bowel contents into it from the anastomosis would be most unlikely. This reflux militates most strongly against ileo-colostomy in the opinion of some surgeons. The crux of the operation seems to me to consist in the making the site of the anastomosis in the pelvic colon as low down as possible. Of the cases here noted, 7 were ileo-colectomy; 4 have completely recovered, 2 are much better, and one is no better.

Colectomy.—In the present imperfect state of our knowledge of the functions of the large intestine and the mechanism of stasis in it, there is no doubt that in advanced cases where its whole course is proptosed or shows kinking at various scattered points, colectomy is the ideal remedy. In most cases it is a surprisingly easy operation, and is followed by no dangerous shock. In its technique I follow the course detailed by Lane, evolved by his long and extensive experience. Three colectomies are included in the present list.

1. Female, aged 56, admitted for intestinal obstruction, with extreme prolapse, died on the third day from cardiac failure.

2. E. B., female, aged 28; duration eight years; prominent symptoms vomiting and constipation. For two years before operation was too weak to stand or walk. Operation June 16th, 1912. The stomach was dilated and dragged down by distended and prolapsed colon; appendix bound down and showing the V-shaped kink. The ileum 6 in. from its termination was united to the pelvic colon by lateral anastomosis, and all the intervening bowel excised. The patient writes last week: "I am pleased to say the operation you performed has been very successful. I keep well in health, not exactly robust, but have been working as a glove-machinist for the last three years."

3. Mrs. E. W., aged 42, duration twenty years, following birth of her only child; uterine prolapse, haemorrhoids, severe constipation and constant vomiting. During the two previous years she had had, in hospital elsewhere, four operations—namely, removal of piles; double oophorectomy; ventrofixation of uterus; nephrorrhaphy of left kidney. Pain and constipation were even worse afterwards. Vomits several times a day, frequent blood in vomit. She had been confined to bed, had attempted her life, and on arrival in hospital was very weak, worn, and depressed. An operation was performed on November 2nd, 1912. The stomach could be pulled outside the skin level below the umbilicus, and the large intestine was much prolapsed. Lateral anastomosis between the ileum and the pelvic colon just above the rectum was performed, and then, as the patient's general condition warranted it, the colon was excised. She left hospital on the twenty-third day afterwards. She attended the clinical meeting of a fortnight ago, saying she is better now than ever before in her life, can eat anything, and has never taken a laxative since her operation. She started work six months afterwards, has worked in a cotton-mill, and is now dividing the day between cleaning offices and her own housework.

Cases like these prove the present value and status of colectomy. Whether, with the advance of knowledge—from the proposed research schools of applied anatomy and physiology—it will retain this position, is a question of the future.

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THE Ministry of Social Welfare, Belgrade, has invited the Committee of the Serbian Relief Fund, London, to organize and operate the bulk of their institutions for disabled and invalid Serbian soldiers, of whom there are between 175,000 and 200,000 in Yugo-Slavia. The English staff will work in close co-operation with the Serbian Government, and orthopaedic hospitals, tuberculosis sanatoriums, workshops, and agricultural schools will be established. A formal acceptance of the offer of the Ministry of Social Welfare to undertake this responsibility is being conveyed by Major Hardwicke, Director of the Serbian Relief Fund in Serbia.