The whole abdomen was rigid and tender, and the lower half tumid.

The abdomen was opened in the middle line, when a considerable quantity of brownish-yellow free pus escaped. The pus was not faeculent. On examining the pelvis an opening leading into an abscess cavity in the neighbourhood of the left Fallopian tube was found. Evidently the abscess had ruptured into the peritoneal cavity, and excited a generalizing peritonitis. The appendix, which was healthy, was cut across about 1½ in. from the caecum, and the stump fixed in the upper angle of the wound. A No. 6 rubber catheter was passed through the stump into the caecum. Two large rubber tubes were placed in Douglas's pouch, and brought out through the lower part of the incision, and the patient put back to bed. No attempt was made to cleanse the peritoneum.

The patient was propped up in the Fowler position, and a pint of warm saline solution passed into the colon every hour. Twelve hours later the pulse had fallen to 90, and was of good volume; the temperature was normal; the cheeks had filled out, and the patient looked and expressed herself as feeling very comfortable. The irrigation was kept up for twenty-four hours, during which time 24 pints of saline solution passed into the bowel. Of this, only about 5 pints escaped from the rectum. There was a copious discharge from the tubes, and a large amount of urine excreted. The catheter was withdrawn from the appendix, and on the second day the silk stitches connecting it to the skin were cut, and the stump allowed to retract. No escape of faecal matter occurred, then or later. Subsequent progress was uneventful, and the patient was discharged at the end of three weeks, with a single tube from which there was very little discharge.

APPENDICOSTOMY: WITH NOTES ON THE SURGICAL ASPECT OF COLITIS.*

By J. BERNARD DAWSON, M.B., B.S., F.R.C.S.,

LATE HOUSE-SURGEON ST. MARK'S HOSPITAL.

THE appendix vermiformis, which has occasioned a literature probably unequalled by that of any other part of the human system, seems of late to have, in some measure, justified its existence. Instead of being regarded as an unnecessary and dangerous possession, there have been found for it uses. The operation of appendicostomy, whereby the appendix is used to establish a temporary or permanent communication with the exterior, was first proposed in 1894¹ by Keetley, who suggested that by bringing the appendix through the abdominal wall and amputating the apex it might be used as a spout to relieve the distension of a case of obstruction occurring at a point below the caecum. He put this suggestion to the test during 1906. The credit of first performing the operation seems to be due to Weir, of New York, who in 1902² reported a case of ulcerative colitis upon which he performed the operation with marked success.

THE OPERATION.

The surgical procedure is simplicity itself. Nevertheless, although, as in Weir's original case, the appendix may conveniently present itself, yet if adhesions be present, if the organ is kinked, or if it passes behind the caecum, the operation may be long and difficult, rarely, however, should it be found impossible to liberate a sufficient length of well-nourished appendix to extend through the thickness of the abdominal wall. A small oblique incision, large enough to admit two fingers, is made through the abdominal wall in the region of McBurney's point. If the split flap method is used, the muscular fibres should be notched at right angles to their direction, otherwise the vessels in the meso-appendix may be so constricted as to cause sloughing of the organ. If the appendix is free it can at once be brought out through the wound; if, however, there are adhesions, or the appendix is for some reason inaccessible, the incision must be enlarged. The appendix should be pulled out until the caecum is flush with the parietal peritoneum, care being taken that there is no twist in its mesentery. Two fine silk sutures are inserted to secure the meso-appendix and the free border of the appendix to the edges of the incision in the peritoneum. The muscles are allowed to fall back, and if necessary brought into apposition with a loosely tied catgut suture. The skin incision is sutured, the last suture taking in the sero-muscular coats of the appendix protruding through one angle of the wound. A dressing of gauze and collodion is applied, covered by wool and bandage, and the patient returned to bed.

Two or three days later the tip of the appendix is severed within ¼ in. of the skin and the appendical artery secured. The exposed mucous membrane is caught with fine catch forceps, dragged out a little and secured by one or two sutures to the edge of the skin. A rubber catheter is introduced into the caecum, and, if desirable, irrigation or other treatment can be at once proceeded with. If difficulty is experienced in passing the catheter, one designed by Mr. Keetley, having a tapering solid end extending beyond the eye of the instrument, can be used. Beyond a slight risk of infecting the wound, there is no reason why the appendix should not be opened and a catheter introduced at the time of the operation, if immediate entry is required. Should the lumen be small, it is very easy to dilate it gradually to admit a No. 10 or 12 English. It is desirable to leave the catheter in continuously during the first ten days to overcome any tendency to contraction on the part of the wound producing stenosis of the appendical lumen. Later it is sufficient to pass the catheter once daily.

There are several difficulties which may arise in the operation:

1. In the first appendicostomy I saw performed the surgeon, accustomed to appendicectomy, inadvertently tied part of the meso-appendix. Subsequently the distal end of the appendix sloughed below the level of the skin, but, fortunately, not below the level of the muscular layers. The only consequence was a great tendency of the opening to close.

2. A similar condition occurred in another case, in which the appendix was kinked upon itself in such a manner that only sufficient was obtained to just reach the skin margin.

3. When the tip is amputated, unless the mucous membrane is secured to the skin edge at once, it retracts within the sero-muscular coats, and a tendency to stenosis arises.

THE POSSIBILITY OF THE OPERATION.

The question naturally arises whether there may not be a percentage of cases in which the appendix is so situated as to render appendicostomy impossible; in 100 autopsies at St. George's Hospital the appendix was a fibrous cord without a lumen in 2; in 2 the lumen admitted a bristle only; in 96 appendicostomy would have been possible.

INDICATIONS FOR APPENDICOSTOMY.

The following classification is modified from that of Jacobson and Rowlands.³

Appendicostomy may be performed:

1. For irrigation and medication of the colon.
2. For obstinate and protracted constipation.
3. For drainage of the caecum and relief of abdominal distension.
4. For nutritive purposes.
5. For irrigation and medication of the lower ileum.

THE SURGICAL TREATMENT OF COLITIS.

The terms, colitis or enteritis membranacea, pseudo-membranacea, pellicularis, tubularis, muco-membranacea, crouposa, fibrinosa, pseudo-enteritis, catarrhus⁴ desquamativus, diarrhoea membranacea, tubularis, etc., have been invented, but to my mind the condition is one simply of a mucus secreting, epithelium covered membrane subject to inflammatory reaction of various degrees. There are, however, rare forms of colitis dependent upon definite and well recognized general constitutional disorders which do not come within the scope of this paper. Such are the colitis due to injury, pyaemia, diabetes, Bright's disease, purpura, scurvy, amyloid degeneration, venous or arterial stasis, and spinal cord lesions.

In dealing with colitis due to local lesions the question of some form of classification arises. The following is simple, and I think sufficient:

- Simple acute.
- Simple chronic.
- Ulcerative acute.
- Ulcerative chronic.

Whilst there are distinct cases both of simple and ulcerative colitis, yet the demarcation between these two varieties is by no means well defined. A simple inflammatory condition of the colonic mucosa may or may not proceed with greater or less rapidity to definite destruction of the mucous epithelium. Cases brought under notice in

* Read before the York Medical Society.

this intermediate stage have received names, some describing the macroscopic appearance, such as "follicular colitis," "granular colitis," "colitis punctata," and some suggesting an underlying nervous origin, such as "colica mucosa" and "nervous colitis."

I have avoided the use of the word "membranous," since the shreds and casts which, in some cases, are passed, have been conclusively shown to be inspissated mucus, containing a few epithelial cells and no leucocytes.

Acute simple colitis is a condition similar pathologically to acute pharyngitis. It may react to treatment or pass on to acute ulcerative colitis, or subsides into chronic simple colitis.

Chronic simple colitis may be a sequela of acute simple colitis, or may arise without any apparent acute stage. It is similar pathologically to hypertrophic rhinitis, and has been called "colitis hypertrophica." It is justifiable to use the term "chronic simple colitis" when on examination with the sigmoidoscope the mucous membrane of the sigmoid is seen to be thickened, oedematous, and discharging copious mucus without ulceration. There may, of course, be some ulcers higher up which will account for the condition; but since it has been shown that in colitis the most marked destruction and damage occurs at the sigmoid, the absence of evidence there is sufficient for clinical purposes.

Acute ulcerative colitis is theoretically a sequela of acute simple colitis, but the inflammation may be so intense as to produce ulceration practically from the onset. Dysentery, due either to Shiga's bacillus or to the amoeba, is the commonest form of acute ulcerative colitis, but the condition may occur without either of the above organisms being present.

Chronic Ulcerative Colitis.—The ulceration may be superficial and punctate, consisting of erosions, or it may be extensive, serpiginous, and progressive, passing on to pericolicitis, abscess, or to perforation. This form of colitis resembles the various forms of gastritis and gastric ulcer.

Mucous Colitis with Casts.—The so-called muco-membranous colitis of nervous origin has been attributed to various causes by different authorities.

(a) Einhorn ascribes it to enteroptosis, and considers it a common associate of achylia gastrica.⁴

(b) Glenard considers it due to enteroptosis, which, by dragging on the bile passages, produces an alteration in bile tension and flow, causing a diminished secretion of mucus, which favours precipitation of mucin by acids in the intestine.⁵

(c) Geoffroy regards enterospasm as the chief underlying cause.⁶

(d) Letcheff and Akerlund give disease of pelvic organs a prominent place in the etiology.⁷

(e) Vanni, Mannaberg, and others adhere to the view that coprostasis is the predecessor of the condition.⁸

(f) Von Noorden regards constipation as the exciting cause, but only in neurasthenic and hysterical subjects.⁹

(g) Nothnagel prefers to consider the phenomena as due to hypersecretion of mucus from anatomically sound mucosa.¹⁰ Nothnagel quotes a case of a boy of 16 who in the course of acute endocarditis had a spinal embolism; in addition to the paraplegia, retention of urine, etc., which resulted, for several days he passed $\frac{1}{2}$ litre of clear thin mucus through his paralysed sphincter ani. No one who has appreciated the full distress of waiting to be called to a dreaded viva voce examination will deny the existence of nervous control over the movements and secretion of the colonic mucous membrane; but it is another thing to ascribe colitis of this type to a nervous origin. Since this is not a fatal disease *post-mortem* information is scanty, but that which Nothnagel himself presents is not at all conclusive.

Jagic and Weigert¹¹ describe a case of a woman, aged 48, who had had symptoms of colitis with passage of casts, and who died from diabetic coma. *Post mortem* the pancreas was atrophic; the kidneys, one atrophic and the other hypertrophic; the stomach and small intestine were normal; the large intestine contained faecal masses, and the mucous membrane was striated with adherent white viscous material, which on staining was shown to be mucin. There were no macroscopic signs of inflammation. Lieberkuhn's crypts were distended, and the goblet cells swollen and broken off; but on microscopical examination the tissue round the crypts was found infiltrated with round cells in greater quantity than normal. Especially was this the case where the secretion of mucus was most abundant.

Pye-Smith¹² quotes the case of a woman of 50, who passed mucous casts for two years. Casts were found *in situ* after death, and could be washed off, showing a normal mucosa underneath. There was, however, a carcinomatous stricture in the sigmoid.

Rothmann's¹³ case had passed mucous casts for some time, and had been treated with rectal irrigation without improvement. The woman died of carcinoma of the base of the skull. *Post mortem*, the large intestine was found to contain some

faecal masses and thickened viscous mucus adherent to an obviously reddened and inflamed mucous membrane. An interesting point in this case was that the mucosa of the ileum was also inflamed, but without adherent mucus, thus tending to show that the inflammation was the primary condition.

Edwards¹⁴ describes a case of a man aged 71 who passed casts in his stools. He died of meningitis. No macroscopic change could be found in the mucosa, but a microscopic examination was not made.

Thus we find that of four cases of colitis with casts, in which a *post-mortem* examination was made, two showed inflammatory phenomena in the mucous membrane, in one there was a carcinomatous growth in the sigmoid, and one showed no change in the mucous membrane when examined macroscopically.

In a recent paper Lockhart Mummery¹⁵ gives particulars of 9 cases of colitis with passage of casts which he had under his care. The analysis of these cases provides the following figures:

Total number of cases 9—
Female 7. Average age 41.7 years.
Male 2. Average age 46 years.

Careful sigmoidoscopic examination revealed the following conditions:

No cause found	...	1 case
Chronic inflammatory condition of mucosa resembling that of granular pharyngitis	...	3 cases
Similar condition, but in addition shallow ulcers scattered over mucous membrane of rectum and sigmoid	...	1 case
Adhesions binding down sigmoid flexure	...	1 case
Cancer of sigmoid flexure	...	2 cases
Retroflexed uterus pressing on rectum	...	1 case

It is such evidence as this that makes the position taken up by Nothnagel untenable. Apart from those cases showing a definite organic change, such as adhesions or new growth, the sequence of events seems to have been as follows:

1. Obstinate and protracted constipation almost always.
2. Possibly ingestion of drastic and irritating purgatives.
3. A catarrhal inflammatory condition of the mucosa.
4. Chronic ulceration of the colon of varying extent and depth, in some cases.

The influence of enteroptosis may be a primary one, producing or helping to produce the constipation, or the displacement of the viscera may be in part due to the retention of faecal matter. The average age of women, 41.7, is one at which a relaxed abdominal wall is common, for want of tone in the abdominal muscles is given an important place in the etiology of enteroptosis by Keith in his Hunterian Oration¹⁶ upon this disease.

The theory of nervous influences as a cause of mucous colitis seems to depend to no small extent upon the fact that it is a disease commonly associated with other neurasthenic symptoms. When the profound nervous phenomena which may accompany haemorrhoids are remembered, it is not surprising to find a similar condition in patients, usually women, suffering from obstinate constipation followed by diarrhoea and the passage of much mucus, possibly with severe pain.

TREATMENT.

A.—Of Acute Simple Colitis.

There are two points to which I should like to draw attention.

1. *The Diet.*—It is usual to put patients upon what is either strictly or approximately a pure milk diet. Whether this is satisfactory is very doubtful. The object of dieting in colitis is to produce faeces which shall be the least irritating to the inflamed mucosa. A milk diet, whilst leaving a small residue, produces faecal masses which are small, globular, very fine, and undoubtedly irritating to the colon, which has to undergo prolonged and strong contractions to pass along such small masses. Since they do not produce an efficient distension of the bowel they are apt to remain too long in contact with the mucous membrane. As a remedy for this von Noorden recommends a liberal diet of food which leaves a bulky residue of cellulose, articles such as brown bread and vegetables being freely given, together with a daily allowance of cream or other highly fatty material, producing motions which, being bulky, soft, well lubricated, and unirritating, are easily voided from the colon. I have seen a patient who, when upon a milk diet, passed small hard faeces with pain and distress, able under von Noorden's diet to empty his colon of bulky masses without trouble.

2. *Intestinal Antisepsis*.—The value of so-called intestinal antiseptics has always been a matter of argument. I have had bismuth, salol, beta-naphthol, cyllin, turpentine, and calomel, and of these calomel given in fractional doses continuously is the only one which has had apparent effect. The work of Metchnikoff upon the fauna and flora of the large intestine is well known, and he contends that by the introduction of milk curdled by a fresh culture of the lactic acid bacillus, an organism antagonistic to those inhabiting the great intestine is brought into the alimentary canal. I have had the opportunity of trying this method in 3 cases. In 2, two women, aged about 35, both suffering from mild colitis, with some abdominal pain and regular passage of mucus four or five times a day, the results were most satisfactory. Nothing definite could be seen with the sigmoidoscope. They were given half a pint daily of milk curdled by a pure culture of *Bacillus lactis*, and were placed upon von Noorden's diet. At the end of fourteen or fifteen days both patients were relieved of their symptoms. The third patient was an almost hopeless case of ulcerative sigmoiditis, who refused appendicostomy. A transient improvement in temperature and pulse were the only results of the treatment.

B.—Acute Ulcerative Colitis.

The treatment of these cases along purely medical lines seems to me unscientific and unsatisfactory. The ideal treatment would be to keep the colon empty and at rest. That, unfortunately, is impossible, for to stop all food by the mouth is to starve the patient and reduce his power of resistance. To feed him by the rectum is to irritate and stimulate the diseased part. It is impossible to prevent the entry of gastric, hepatic, and pancreatic secretions, and the constant evacuation of mucus and blood precludes the possibility of resting the colon. By the operation of appendicostomy, however, the large intestine can be completely emptied once or twice daily, and mild medicinal lotions can be introduced into the whole length of the great gut. Moreover, by the removal of the toxic secretions of the diseased mucosa autointoxication is in no small measure prevented.

Dr. W. Murrell,¹⁷ in the *Lancet* of March 12th, 1904, reported 5 cases of acute ulcerative colitis at the Westminster Hospital as follows:

- Males 3. Average age 25.6 years.
- Females 2. Average age 33.5 years.
- Deaths 4. Average length of illness six months.
- Recovery 1. Length of illness ten months.

These patients were treated upon medicinal lines, and they one and all showed similar symptoms: Temperature 100° to 102° F., pulse 120 to 140, and ten to thirty motions a day, with abdominal pain and tenderness, accompanied by progressive weakness. In the course of treatment the following drugs were used: Opium and morphine in all forms, bismuth carbonate, lead acetate, perchloride of iron, beta-naphthol, salol, perchloride of mercury, ipecacuanha, and formaldehyde by mouth, and rectal injections of silver nitrate. In one case an appendicostomy was attempted and found impossible owing to adhesions, so that an enterostomy was done. This was, however, only undertaken after an illness of eleven months, when the patient was extremely weak.

On the other hand, Mr. Holton C. Curl¹⁸ reported 11 cases of dysenteric colitis in which either an appendicostomy or a caecostomy had been performed early, with 8 recoveries and 3 deaths; 2 of the fatal cases had extensive ulceration associated with nephritis, whilst the third was moribund when the operation was performed.

I should like to mention a fatal case which I had under my care at St. Mary's Hospital last year, because I now feel that, had appendicostomy been performed early, the result would have been different:

A woman, aged 60, was admitted with typical symptoms of acute ulcerative colitis. The temperature was intermittent, with an excursion of 3 to 4 degrees. The pulse remained above 100 continuously. She passed blood and mucus mixed with faecal material ten to twelve times a day. Intestinal antiseptics of various kinds were tried by the mouth, and rectal irrigation with various lotions. There was little or no improvement, and after an illness of two to three months the patient suddenly developed symptoms of general peritonitis and died within forty-eight hours. *Post mortem* the peritoneum was found bathed in pus, and a perforation discovered just below the hepatic flexure of the colon. There was deep extensive ulceration of the colon, which had perforated at the point mentioned.

C.—Chronic Ulcerative Colitis.

It is for this condition that the operation of appendicostomy is most useful, whether a sequela to acute ulcerative

colitis, or to chronic constipation coupled with the ingestion of irritating drugs, matters not. The symptoms may be severe or slight, being those of excessive mucus secretion from the large gut, the mucoid evacuations being possibly stained with blood, progressive but slow loss of weight, and pain and tenderness in the region of the great intestine, especially over the sigmoid flexure. Sigmoidoscopic examination usually shows one of the following conditions:

1. Superficial ulceration without destruction of the submucous tissue.
2. Discrete punctate ulcers in which the submucous tissue is involved.
3. Large irregular serpiginous ulceration with destruction of submucous coats.

The frequent calls to stool, the abdominal discomfort, the passage of blood by the rectum, the failure of medicinal treatment, all tend to reduce the patient to a state of neurasthenia and chronic invalidism. Appendicostomy by completely clearing the great gut daily, removing the excess of mucus, and leaving a medicated lotion in the colon, tends to that rest and cleanliness which is essential for healing.

I have been able to find records of 10 cases of chronic ulcerative colitis for which the operation of appendicostomy has been performed, including two which came under my own personal observation.

CASE I.

A fish hawker, aged 26, who had been a soldier, and had had two attacks of acute dysentery—in Africa in 1900, and in India in 1906—complained of six to eight motions of blood and slime daily, without pain, and no marked emaciation. His general condition was excellent; the sigmoidoscope showed considerable oedema of the submucous tissue, with chronic inflammation of the mucous membrane and superficial ulceration, especially marked on places exposed to friction, such as the edges of the rectal folds.

Appendicostomy was performed on July 23rd, 1907, by Mr. Swinford Edwards. Four days later irrigation was started, 6 pints of weak boracic lotion being slowly allowed to flow through the catheter into the caecum. A moderate-sized vulcanite tube was passed through the sphincter for about 3 in. The inflow was regulated so as not to allow of too great distension, and abdominal massage along the course of the great gut employed. After about six minutes the lotion began to flow from the rectum, bringing with it fragments of faeces. Before the outflow began and when the patient's abdomen was distended and tense the catheter was removed from the appendix, and, though no protection against backflow was taken, there was no trace of leakage, the muscular coat and the valve of Gerlach proving competent to prevent any escape of the lotion. After four days the lotion was changed to one of sodium bicarbonate, gr. x ad 3j, and this was changed after two days more to one of protargol, gr. iv ad 1 pint. The patient remained in hospital one month, and was taught to conduct the irrigation himself. It was found that after a few days the rectal tube was unnecessary, the patient evacuating the lotion as soon as the colon became moderately distended. He was sent home with an abdominal belt fitted with a flat, thin pad—a contrivance found to be unnecessary in subsequent cases.

After two months' self-irrigation daily with 6 pints of protargol lotion, he was again examined with the sigmoidoscope on October 29th, 1907. The mucous membrane was found to be slightly inflamed, and there was still some oedema of the submucous tissue, but no sign of ulceration. The patient himself stated that he was perfectly comfortable and at work; he occupied himself for half an hour every morning with the irrigation, and after that had no further trouble during the day. Throughout his diet was his usual one, and the only other treatment was the administration of gr. ʒ of calomel three times daily while in hospital.

CASE II.

A man aged 42, under the care of Mr. Rawlings, of St. Bartholomew's Hospital, to whom I am indebted for permission to quote the case, presented similar symptoms, except that the diarrhoea was more marked, there being about nineteen or twenty evacuations daily, and that the emaciation and weakness were severe.

Appendicostomy was performed, and the colon irrigated daily with astringent lotions. After two months the patient was free from trouble, continuing the irrigations himself, and being free from any evacuation after the washing was completed. He was delighted with the result, and had put on weight rapidly.

CASE III.

Dr. Robert F. Weir¹⁹ performed appendicostomy for ulcerative colitis in 1902. This is the first reported case of this operation.

CASE IV.

Mr. Stretton,²⁰ of Kidderminster, reported a case in 1906.

CASE V.

Mr. H. M. W. Gray,²¹ of Aberdeen, reported one case in 1904, with satisfactory result.

CASE VI.

Dr. Robert H. W. Dawbarn²³ reported one case, resulting in cure, in 1905. The lotions used for irrigation were 10 pints of 1:1000 solution of potassium permanganate, alternating with a similar quantity of normal saline solution.

CASE VII.

Mr. Hutchinson,²³ of London, reported a case resulting in cure in 1905.

CASE VIII.

Sir William Bennett²⁴ recorded a satisfactory case in 1905.

CASE IX.

Mr. Stanmore Bishop,²⁵ of Manchester, reported a satisfactory case in 1905.

CASE X.

A man, aged 42, under the care of Dr. Foxwell at the Queen's Hospital, Birmingham, who had been ill for three months, complained of pain, diarrhoea of blood-stained mucus. His serum clumped a culture of Shiga's bacillus in a dilution of 1 in 40, but not 1 in 100.

He was operated upon on March 16th, 1908, and washing out was commenced ten days later. Within a week his condition was improving, the pain was absent, and the diarrhoea less. A month later he was well and having a single well-formed motion daily.

D.—Chronic Simple Colitis.

Under this heading I place those cases in which there is a passage of mucus with the faeces and independently, but in which no sign of ulceration can be seen with the sigmoidoscope. I include also those cases of colitis with casts in which I can find no record of sigmoidoscopy. I do not consider the passage of casts a sign of simple chronic colitis, for I am convinced that casts may occur in all forms of colitis, and it is only by the use of the sigmoidoscope that a definite statement as to the condition of the mucosa can be made. There seems to be no satisfactory explanation why casts should form in some cases any more than there is any reason given for the fact that in some patients the mucus secreted by an inflamed pharynx should take on a membranous appearance. A hypertrophic form of colitis with abundant mucus can be recognized by the sigmoidoscope, and I very tentatively suggest that colitis with casts may be of the nature of an atrophic form.

I have collected the following cases, the first two coming under my own care when house-surgeon at St. Mark's Hospital:

CASE XI.

A woman, aged 38, married, two children. Abdominal examination revealed some tenderness over the sigmoid, and possibility of palpating both kidneys. The sigmoidoscope showed an inflamed mucosa with abundant secretion of mucus. Mucous evacuations nine to ten daily. No blood passed per rectum. Loss of weight.

Appendicostomy was decided upon because the patient had received some months' treatment by drugs and rectal injections without avail. The operation was performed on June 18th, 1907, by Mr. Swinford Edwards. The treatment and irrigations used were similar to those in Case I. The patient was discharged on July 13th, 1907, and self-irrigation conducted until October 29th, when she was again examined with the sigmoidoscope. The bowel was found healthy, with no inflammation or excess of mucus. She stated that she was quite well, had increased in weight, and found no inconvenience either from the daily wash-out or the presence of the fistula.

CASE XII.

A man, aged 35, was admitted for perianal papillomata, which were removed. For two previous years he had been treated with rectal injections, for mucous diarrhoea, with four to five evacuations daily, associated with some pruritus ani and the growth of the papillomata. There had been some blood with the mucus at times. Sigmoidoscopy showed chronic inflammation of mucosa with granular patches.

Appendicostomy was performed by Mr. L. Mummery on September 10th, 1907. Treatment was similar to that of the previous case. After one month the patient had lost the slight abdominal pain present before operation, and after his daily wash-out had no further trouble throughout the day. I have no record of a sigmoidoscopic examination after the operation.

CASE XIII.

Gray²⁶ of Aberdeen in 1904 reported a case of a woman with frequent evacuations and passage of casts. Appendicostomy produced a cure in four weeks. There was a slight tendency to relapse twenty months later.

CASE XIV.

Morley Willis²⁷ in 1906 reported a case of colitis with mucus but no casts in a woman aged 32. Appendicostomy produced much improvement in one month.

CASE XV.

Donald Armour²⁸ reported in 1908 a case of colitis with casts satisfactorily treated by appendicostomy.

CASE XVI.

Moynihan²⁹ recorded a case of colitis with casts cured by appendicostomy in 1905.

I would make an urgent plea for the more general and regular use of the electric sigmoidoscope. I am convinced, not only of its utility, but also of the necessity and advantage of its use in all cases presenting the symptoms of colitis in however slight a form. Apart from the accurate diagnosis of the cause of the mucous discharge, it has been the means of obtaining information of great value both to the patient and surgeon. It is well known that certain forms of carcinoma recti produce no symptoms beyond a mucous discharge, possibly blood-stained, and a vague sense of uneasiness in the lower abdomen—an aggregation of signs common to several forms of colitis. Should the growth be situated near the junction of sigmoid and rectum or opposite the third piece of the sacrum, it cannot be felt either with a finger in the rectum or by abdominal examination. Cantlie³⁰ has recently shown that the point of junction of the pelvic colon with the rectum is marked by a narrowing of the lumen of the gut, and by a thickening of the muscular coat approximating to a sphincter, to which he has given the name "sigmo-rectal pylorus." This constriction, and the increased friction and trauma produced thereby, may be an explanation for the occurrence of carcinomata at this site.

I can call to mind 3 such cases admitted to St. Mark's Hospital last year—cases which presented symptoms suggestive of ulcerative colitis, discharge of blood and mucus, and slight abdominal discomfort attended with little or no difficulty of defaecation. In all these cases the sigmoidoscopic examination revealed the presence of a malignant growth at the position mentioned, although the carcinoma could not be reached by bimanual examination. These 3 cases had been under medicinal treatment for colitis for some time.

The discharge of excessive mucus, with or without blood, from the rectum, is not a disease but a symptom, and it is only in accordance with modern surgical exactness to endeavour in all cases to diagnose accurately the pathological condition producing such symptoms.

Mr. L. Mummery,³¹ in a recent paper, published 36 cases, all of which had symptoms of colitis; mucus being present in the stools in all, blood in 22 cases, casts in 8 cases, intestinal sand in 2, and enterospasm in 1 case. The use of the sigmoidoscope in all 36 cases revealed the following conditions:

- 11 cases showed inflammation of the mucosa without ulceration;
- 7 cases showed ulceration;
- 7 cases showed malignant disease;
- 3 cases showed inflammation with constriction due to peritoneal adhesions;
- 1 case showed inflammation due to the pressure of a retroverted uterus;
- 1 case showed inflammation with presence of a polypus high up;
- 6 showed nothing to account for symptoms.

Beck,³² in 500 cases of chronic colitis, found inflammatory lesions in the colon in 394, or 78.8 per cent.

APPENDICOSTOMY FOR CHRONIC CONSTIPATION.

The question of surgical interference in cases of protracted constipation is one which crops up periodically, mainly on account of the work of Mr. Arbuthnot Lane. So much depends upon what degree of derangement of function is understood by the words "chronic" or "protracted." Mr. Lane does not lay down any clear definition of what he considers sufficient indication for operation. He talks of the auto-intoxication due to coprostasis, which surely is an elastic term, including the headache following a day's irregularity or the profound toxæmia seen in patients who allow weeks to elapse without relieving their abused colon.

Ordinary chronic constipation which necessitates the regular use of aperients, enemata or suppositories, is amenable to medical and hygienic treatment, but there are some few protracted cases in which perhaps fourteen days to three weeks may elapse between the acts of defaecation, in which the usual medicinal remedies produce no other result than abdominal distension and discomfort, and in which the early signs of irritation to the mucosa are manifest, where surgical interference is fully justified.

If the surgeon decides to operate, he may perform (1) ileo-sigmoidostomy, (2) ileo-sigmoidostomy with colectomy,

(3) appendicectomy with liberation of adhesions, (4) appendicostomy, (5) valvotomy.

The first two procedures are associated with the name of Mr. Lane, who has, however, practically abandoned ileo-sigmoidostomy alone for the more formidable operation of removing the great gut as far as the lower portion of the sigmoid flexure.

An analysis of Mr. Lane's recently published results³³ shows the following:

Total number of cases	...	...	...	39
Total number of operations	...	...	...	80
Average number of operations per patient	...	...	...	2.05
One patient underwent	...	...	...	9 operations
One " " "	...	...	...	7 " "
One " " "	...	...	...	5 " "
Three patients " "	...	...	...	4 " "
Six " " "	...	...	...	3 " "
Two " " "	...	...	...	2 " "

All these operations were not performed by Mr. Lane himself, some having been done prior to Mr. Lane's treatment. Most, however, were for adhesions or some manifestation of enteroposis.

Results.

Number of cases	...	...	39
Satisfactory recoveries	...	...	19, or 50 per cent.
Imperfect recoveries, patients still having intestinal symptoms or needing enemata, etc.	...	...	9, or 23 per cent.
Bad results	...	...	2, or 4 per cent.
Deaths (total, 9, or 23 per cent.):	...	...	
Immediate	...	...	7, or 17.9 per cent.
Remote	...	...	2, or 5 per cent.

Causes of Death.

Immediate, 7—death occurring at an average of 8.7 days after operation:

1. Suppuration in wound with perforation of intestine.
2. Shock and vomiting.
3. Shock.
4. Bronchitis.
5. General peritonitis.
6. Intestinal obstruction.
7. Perforation of gastric ulcer.

Remote, 2:

1. Complete relapse and death after one year.
2. Acute obstruction (no autopsy) after seven months.

The question to decide is whether a palliative operation, which in such skilled hands yields a total death-rate of 23 per cent., of which 18 per cent. is accounted for by the immediate results of surgical interference, is justifiable, especially when only 50 per cent. of cases so treated are given satisfactory relief.

To amputate the appendix and sever adhesions in a case of protracted constipation is too much of a shot in the dark. The appendix may be, and commonly is, the seat of extensive adhesions, the division of which with any other similar constricting bands may relieve the patient completely, but there can be no certainty that such will be the case. On the other hand, by utilizing the appendix to make a path whereby the large intestine can be reached for lavage or direct medication is surgically sound.

This method renders it possible to destroy any adhesions present, whilst at the same time the appendix ceases to be a dangerous possession, and is put to a valuable use. The procedure after the operation is to empty the colon by douches, preceded if necessary by small injections of olive oil to soften the faecal masses. I can only quote one case in which this method has been tried, but with a most satisfactory result.

Murray³⁴ in 1905 first suggested appendicostomy for protracted constipation, and later in the same year Keetley³⁵ performed the operation. His case was that of a young girl aged 15, who was subject to most obstinate coprostasis, which medicinal treatment failed to relieve. When seen by Mr. Keetley the bowels had not been emptied for fourteen days, and the patient showed signs of considerable toxæmia. Appendicostomy was done; the transverse colon, loaded with faecal masses, was found to descend below the umbilicus. After the introduction of warm olive oil, followed by a large injection through the appendix of a warm solution of magnesium sulphate, the patient passed with considerable pain and difficulty a great quantity of faecal material by the rectum. After this initial evacuation the daily introduction into the caecum of about 3x of warm magnesium sulphate solution, and later of warm water alone, enabled the patient to have an easy and normal motion. The appendical opening gave no trouble, and the transverse colon became gradually less pendulous. The patient would not, up to the time the case was reported, allow the opening to be closed, so that it is not possible to say if the daily lavage of the colon had a curative effect.

Inasmuch as the ptosis of the transverse colon tended to remedy itself, and as the regular distension and evacuation of the colon would constitute a sort of physical exercise for the gut, there are grounds for the opinion that the operation may have had a curative effect upon the lethargic intestinal muscles.

Valvotomy.

The procedure of incising the valves of Houston for chronic constipation comes to us from America. It has not been proven how far these plications produce arrest of faeces. The fact that they do not exist in quadrupeds seems to suggest that they have some function associated with the erect posture. It is possible that in a few cases one or more of the valves may be hypertrophied, so that good results may follow division.

Given, therefore, a case of protracted and obstinate constipation, for which surgical measures are indicated, we have the choice of two methods—one, ileo-sigmoidostomy, which in skilled hands gives a death-rate of 23 per cent., or appendicostomy, which our knowledge of appendicectomy leads us to believe would yield a death-rate of under 1 per cent.

APPENDICOSTOMY FOR DRAINAGE OF THE CAECUM AND RELIEF OF ABDOMINAL DISTENSION.

The use of this operation in cases of distension depends so much upon the exigencies of the moment that it is not possible to lay down any rules or indications. I have collected 3 cases, however, which indicate its scope in various abdominal conditions.

The suggestion that the appendix might be used as a spout for the relief of intestinal obstruction was first made by Keetley in 1894,³⁶ and put to the test by that surgeon in 1906.³⁷

The case was one of carcinoma of the greater curvature of the stomach, involving the transverse colon and causing obstruction therein. Appendicostomy was performed, and a few days later the lumen was gradually and successfully dilated until it admitted a No. 4 rectal tube. Through this the intestinal contents drained well, the colon below the obstruction being emptied by enemata. Later the gastric carcinoma produced obstruction of the pylorus with the usual signs of stenosis and dilatation of the stomach. Jejunostomy was then performed, through which the patient was fed. The patient lived for three and a half months, being fed directly into the jejunum and having the bowels evacuated through the appendix. Death was due to the progressive malignant cachexia, but was unaccompanied by the distress of either gastric dilatation or intestinal obstruction.

Jacobson and Rowlands³⁸ mention a case of volvulus of the caecum operated on by Mr. Maunsell, in which after unfolding the volvulus he performed appendicostomy, the result being that he effectually anchored the caecum and so prevented a recurrence, and also was able to clear the large intestine of faeces for the introduction of hot saline to combat shock.

Mr. Keetley³⁹ in 1905 operated upon a child aged a year and ten months for intussusception of the ileo-caecal variety. After reduction he performed appendicostomy, the advantages he claimed for the procedure being: (1) Evacuation of bowels, (2) prevention of recurrence, (3) rest given to caecum, (4) facility of giving saline fluid.

APPENDICOSTOMY FOR NUTRITIVE PURPOSES.

It has been suggested that this operation might be performed and the opening utilized for feeding. The unsatisfactory results of prolonged rectal feeding are so well known that the suggestion seems worthy of consideration. The operation *per se* is practically free from danger, and allows nourishing fluids to be passed into the colon, whence there is considerable absorption. It can at least be safely assumed that the amount of nutriment taken into the circulation would be greater than in the case of rectal enemata. This is borne out by the experiments of Goodard,⁴⁰ who showed that 10 per cent. of fat ingested is absorbed in the great intestine. The cases for which such treatment would be suitable are mainly those of ulceration or new growth of the stomach in which rest to that viscus is indicated. Since the patient has to undergo an operation, it would seem more reasonable at once to perform a gastro-enterostomy and not attempt the purely palliative measure.

It is possible, however, that there are cases in which appendicostomy for purely nutritive purposes would be useful, such as those in which, either through perigastric adhesions or previous operative measures, gastro-enterostomy is not possible, and those of profuse haematemesis, in which surgical interference with the stomach itself is dangerous.

APPENDICOSTOMY TO PERMIT DIRECT MEDICATION OF THE LOWER ILEUM.

It has been suggested by Ewart⁴¹ that use might be made of this operation to reach the lower portion of the ileum. He proposes it for the surgical treatment of typhoid fever. He was able, both in the cadaver and in the living subject, to pass a catheter through the ileo-caecal valve for some 6 to 8 in., and so to irrigate the bowel. He used a Jacques catheter mounted on a stilette of soft pliable copper, bent at a suitable angle.

I can find no record of this suggestion being put into practice, and how far it is justifiable I do not know. Since the typhoid bacillus is, during the course of enteric fever, present in the mesenteric glands, the spleen and other viscera, it seems unlikely that the most thorough irrigation of the ileum, would do much to lessen the toxæmia. Possibly healing of the ulcers might be hastened, and any tendency to perforation diminished.

CONCLUSION.

The foregoing are the uses to which this operation has been or it has been suggested might be put.

The use of appendicostomy for colitis was preceded by the operations of right inguinal colostomy and caecostomy. Right inguinal colostomy is not easy to perform; it is difficult to close satisfactorily, and places the patient in a most unenviable position. The constant flow of fluid, irritating faeces over the surface of the wound and surrounding skin, soon to become excoriated and sore, is most distressing, requires the constant attention of a nurse, and prolonged sojourn in bed. It is true that by this operation the faecal stream is entirely directed away from the colon, which is thereby given greater rest; but the complete daily evacuation and irrigation possible with appendicostomy seems to be sufficient for the purpose. Cases of colitis have a well-known tendency to relapse, and it is not easy to decide when to close the colostomy wound, for, having once closed it, the opening is not readily re-established. Thus, Hale White and Golding-Bird reported a case of colitis treated by this operation, which relapsed two years after the closure of the colostomy opening. With appendicostomy, however, if, after treatment has been stopped, the opening be allowed to stenose naturally, which it will readily do, it gives no trouble, and can be dilated at a later date with suitable bougies, presence of the mucous membrane preventing complete closure of the fistulous tract. For very similar reasons the operation of caecostomy has, in my opinion, been superseded by appendicostomy. Caecostomy is more difficult to perform and more difficult to close. There is practically always some leakage of faeces, and the result for the patient is unsatisfactory. When done to divert the intestinal contents from the colon the result is imperfect, since the diversion is incomplete.

It is interesting to note that the first use of the appendix for irrigation purposes was the result of an unlooked-for incident. Weir was about to perform a caecostomy, but in opening the abdomen the appendix presented itself so opportunely that he utilized it in the way stated.

I have quoted 20 cases in which the operation of appendicostomy has been performed, 4 of which have come under my personal notice and supervision. Summarized, they are as follows:

For ulcerative chronic colitis	...	...	10
For simple chronic colitis	...	...	6
For protracted constipation	...	...	1
For other abdominal conditions	...	...	3

This does not take into account the cases reported by Curl, for I was unable to determine in how many he performed appendicostomy and in how many caecostomy.

In all the cases the operation was successfully performed, and was of marked benefit to the patient. In the cases of colitis the following results were obtained:

For ulcerative colitis:			
Total cases	...	...	10
Cures obtained	...	...	9
For simple chronic colitis with and without passage of casts:			
Total cases	...	...	6
Cures obtained	...	...	3
Much improvement after one month	...	...	1
Apparent cure in four weeks with slight tendency to relapse twenty months later	...	...	1
Cure after six weeks, no subsequent history	...	...	1

Of untoward events following operation I have found no report. In my own experience of the procedure I met with three small misadventures which may be of interest:

1. Stitch suppuration in those cases in which the appendix was opened on the table.
2. Through the carelessness of a nurse a catheter was allowed to slip into the caecum. It was passed per rectum without any discomfort within twelve hours.
3. One patient, whose colon was washed out daily with six pints of boracic acid lotion for seven days, developed signs of poisoning. She complained of severe frontal headache, vomiting, a slow pulse of about 58, and an eruption over the trunk and limbs. The rash consisted of small discrete papules of a light pink tint. On discontinuing the boracic lotion and washing out the colon with sterilized water the symptoms abated, and disappeared in twenty-four hours.

REFERENCES.

- ¹ BRITISH MEDICAL JOURNAL, vol. ii, 1894, p. 1155. ² *New York Med. Rec.*, August 9th, 1902. ³ *Operations of Surgery*. ⁴ *Arch. für Verdauungsk.*, vol. ii. ⁵ *De l'Entéroptose*, 1889. ⁶ *Cong. Internat. de Méd.*, Paris, 1900. ⁷ *Thèse de Paris*, 1895. ⁸ *Rivista Clinica*, 1888, No. 4. ⁹ "Colica Mucosa," 1903. ¹⁰ *Encyc. Pract. Med.*, 1904. ¹¹ *Wien. klin. Rundschau*, 1901, No. 41. ¹² *Trans. Path. Soc.*, vol. xvii, p. 52. ¹³ *Zeitschr. für klin. Med.*, vol. xxiii. ¹⁴ *Amer. Journ. Med. Sci.*, April, 1888. ¹⁵ *Lancet*, June 15th, 1907. ¹⁶ *Hunterian Oration*, 1905. ¹⁷ *Lancet*, March 12th, 1904. ¹⁸ *Annals of Surgery*, April, 1906. ¹⁹ *New York Med. Rec.*, August 9th, 1902. ²⁰ *Lancet*, vol. i, 1906, p. 1833. ²¹ BRITISH MEDICAL JOURNAL, vol. i, 1906. ²² *Annals of Surgery*, vol. xxxvii, p. 613. ²³ BRITISH MEDICAL JOURNAL, May 13th, 1905. ²⁴ *Lancet*, vol. i, 1906, p. 419. ²⁵ BRITISH MEDICAL JOURNAL, March 18th, 1905. ²⁶ *Ibid.*, vol. i, 1906. ²⁷ *Lancet*, vol. i, 1906, p. 1180. ²⁸ BRITISH MEDICAL JOURNAL, vol. ii, 1905. ²⁹ *Ibid.*, vol. ii, 1903, p. 1430. ³⁰ *Ibid.*, vol. ii, 1907, p. 1340. ³¹ *Lancet*, vol. ii, 1907. ³² *Arch. für klin. Chir.*, vol. lxxiv, No. 1. ³³ BRITISH MEDICAL JOURNAL, vol. i, 1908, p. 126. ³⁴ *Ibid.*, vol. ii, 1905. ³⁵ *Ibid.*, vol. ii, 1905, p. 863. ³⁶ *Ibid.*, vol. ii, 1894, p. 1155. ³⁷ *Lancet*, vol. i, 1906, p. 1023. ³⁸ *Operations of Surgery*. ³⁹ BRITISH MEDICAL JOURNAL, vol. ii, 1905, p. 863. ⁴⁰ *Ibid.*, vol. i, 1905, p. 795. ⁴¹ *Operations of Surgery*, Jacobson and Rowlands.

LEUCOCYTOSIS IN APPENDICITIS.

By GEORGE MITCHELL, M.B., Ch.B., L.M.,

LATE HOUSE-SURGEON, ABERDEEN ROYAL INFIRMARY.

WHILE acting as house-surgeon in Mr. Riddell's wards in the Aberdeen Royal Infirmary I had the opportunity of examining the blood of a large number of patients suffering from appendicitis. The results of my early observations seemed so valuable that I continued the examinations during the whole year of office.

The behaviour of the leucocytes in most cases gives a sure index both of the intensity of the morbid irritant and of the individual's powers of resistance. Regarded in this light, and considered along with other clinical data, it is of great practical value in many cases. If taken by itself as a pathognomonic sign it would frequently be found to be as misleading as any other individual symptom.

The great drawback to such a method of clinical investigation in urgent cases is the fact that an apparatus and time are necessary; hence it is not so applicable to cases outside hospital practice. Reliable results can, however, be got after a short experience, provided a reasonable amount of care is exercised. On several occasions I have seen the blood of a patient examined by several different men, and the results in most cases were found to be practically similar.

This statement does not apply so accurately to the absolute count as to the differential count. Variations in the result of the absolute count are much more frequently encountered, but I am quite prepared to believe that probably such discrepancies are due to faulty technique.

ABSOLUTE COUNT.

Accurate information is got from studying both the absolute and the differential counts. In practically all cases of appendicitis and of acute abdominal or pelvic inflammation going on to pus formation or necrosis there is an increase in the number of leucocytes; and, speaking generally, it may be laid down that the greater the increase the more severe the nature of the lesion and the graver the prognosis. The great exception to this is to be found in severe cases of very sudden onset, especially in an individual whose powers of resistance are very slight. The reaction of the leucocytes depends mostly on the severity of the morbid condition and on the resisting powers of the individual.

In gangrenous and suppurative appendicitis, and in other acute suppurative abdominal conditions, the absolute