exceeding 99°. The tube in the distal end was removed on the third day, but the other, through which the faeces discharged, was retained and kept the wound perfectly clean until the thirteenth day. On January 4th the patient was considered quite convalescent. He felt well, and had an excellent appetite, so the enterotome was applied to divide the spur. As in the last case, I attacked the outermost half first, and in the course of a few days it sloughed through. So far everything had gone well, and I congratulated myself that at last I had to deal with a case in which the patient had every prospect of living for years to come, and in which we should be able to watch the result. However, it was not to be. On January 12th without any reason he vomited his dinner. This created no alarm in his mind or mine, and when he vomited again he said it was only because he had been eating much more strong food than he was accustomed to. I put him on careful diet, and did my best to stop the vomiting; but it was repeated from day to day until he became very thin, and his abdomen absolutely empty. In course of time he became completely exhausted and died, death taking place seven weeks after the operation, and three weeks since division of the spur was commenced. I confess I did not know the cause of his vomiting, though I ought to have done so. All we made out was that there was no local cause for it, as the alimentary canal and peritoneum were perfectly sound. A *post-mortem* examination was made by our pathologist, Dr. Abram, who found the cause of death to be uræmia due to advanced granular contraction of the kidneys; the right weighed $1\frac{1}{2}$ ounce, and the left $1\frac{1}{2}$ ounce, the structure being much degenerated and cystic. This was the only disease present in the body.

The *post-mortem* examination in this case, however, afforded a valuable piece of evidence respecting the condition of the bowel. It was found that the two ends were completely united as far as they were sutured together, and that it would have been quite safe to cut down the spur for a full 3 inches from the first. The knowledge of this fact added considerably to my confidence in the operation, and made me more reconciled to the unexpected loss of my patient.

CASES FOR WHICH COLECTOMY IS SUITABLE.

Having now recorded the cases, I wish to make a short and clear statement of my views as to those which are most suitable for operation, and as to the best and safest methods of accomplishing it.

First as to the selection of cases. Young subjects, with a comparatively short history, who are passing mucus and blood in the motions, and in whom the tumour is large enough to be felt, are the cases in which the growth is most malignant. Unless very large, the affected part can be safely removed, but recurrence must be expected. Older people, upwards of 45, with generally a longer history of gradually increasing constipation, frequently culminating in absolute and sudden obstruction, often have a ring stricture, which is much less malignant, and when satisfactorily removed may undoubtedly be followed by permanent cure. Personally I am willing to remove the growth in almost all cases in which there are no secondary deposits; but those who wish to select carefully should be content with colotomy in the former class, and restrict colectomy to the latter. In passing I again direct attention to the frequency with which the abdominal pain (colic), flatulence, and vomiting of the earlier stages of chronic obstruction are mistaken and treated for dyspepsia. The sooner the disease is recognised the better is the surgeon's chance of success.

MODE OF PERFORMING THE OPERATION.

The operation may be accomplished in two very different ways: one by immediate and one by delayed approximation; each in my judgment being suitable for a certain class of case. Each may of course be carried out by a considerable diversity of methods, but I have formed a distinctly favourable opinion of a special method for each. When the patient is in good condition, the abdomen not distended, the tumour small, and the proximal end of the bowel not greatly hypertrophied, I advise immediate approximation by Murphy's button method. But when the opposite of these conditions prevails I strongly urge that the ends of the bowel should be brought out in the manner explained and illustrated, and I feel sure, though I have been unfortunate in the sort of cases I have had to deal with, that this method of bringing out the ends is much safer than any plan of immediate approximation, all statistics notwithstanding. The important steps of the operation are as follows:

1. Explore first in the middle line unless the stricture has been located.
2. Make a sufficiently free incision over the site of the tumour.
3. Having cleared away any adhesions, ligature the mesentery with the help of an aneurysm needle, and divide

it sufficiently to free the bowel well beyond the growth on each side.

4. Let the loop of bowel containing the growth or stricture hang out of the abdomen, and sew together the mesentery and the adjacent sides of the two ends, as shown in the engraving. See that the stump of mesentery lies beneath the bowel, where, if deemed advisable, it can be drained by packing cyanide gauze down to it.

5. Ligature tightly a glass intestinal drainage tube into the bowel above and below the tumour and then cut away the affected part. Do not cut off first or blood will be unnecessarily lost. Only the proximal tube is really necessary. The distal end may be closed or included in the proximal ligature.

6. Close the ends of the wound with a few silkworm-gut sutures, passing through all the layers of the abdominal wall; no others are necessary.

When the operation is performed in this way all the vessels, except those in the primary incision, are tied before they are cut, and the intraperitoneal work is rendered quite bloodless.

The second stage of the operation, that of breaking down the spur with an enterotome, should generally be undertaken about three weeks later. As soon as this has been satisfactorily accomplished the artificial anus is closed by separating the rosette of mucous membrane from the skin, turning it in, and bringing the freshened edges of the latter together over it.

REMARKS ON THE LIMITS OF DRAINAGE. IN SUPPURATIVE CONDITIONS OF THE ABDOMINAL CAVITY.

By ARTHUR E. BARKER, F.R.C.S.,

Professor of the Principles and Practice of Surgery at University College, and Surgeon to University College Hospital.

I suppose there are few students of the history of surgery who would deny that the drain tube has played a large part in the modern advances of our art. And yet there are many of us who now feel that in the past we have often carried the practice of drainage far beyond what was demanded by the principles of wound treatment, and in some cases at least with mischief to the patient. Occasionally, at least, while laudably aiming at removing all traces of effused serum or blood which might prevent the coaptation of deep surfaces, and at the same time might form a most favourable soil for the growth of those putrefactive organisms which interfere dangerously with the vitality of healing tissues locally, and of the system generally, we have seen that our drain opening has not only carried off these products from the damaged tissues, but has given access from without to those very septic organisms against which we were anxious to guard our wound. In many cases too we appear to have lost sight of the fact that aseptic vital fluids, even in considerable amount, may be pent up under an unbroken skin or in a deep cavity without any disturbance, local or general, until they are absorbed completely. This is well illustrated by the case of large subcutaneous hæmatomata, which only rarely lead to dangerous conditions when left alone. In short, we have often ignored the capacity of the natural forces, when protected from external interference, to take care of the organism without any help from ourselves. We are now beginning to recognise this, and to make it a common practice to close even the largest wounds, provided they are clean, without any provision for drainage, and with almost absolute certainty that they will heal throughout, even in their deepest parts, as completely by first intention as superficial parts do under similar conditions.

But I venture to think that there is another aspect of the same subject to which we have not given a due amount of thought, namely, the limits of drainage in the case of certain conditions which are undoubtedly produced by the presence of saprophytic or pathogenic organisms, though perhaps not intensely toxic.

Some years ago I endeavoured to show¹ that tuberculous

¹ BRITISH MEDICAL JOURNAL, 1889, p. 121.

joint cavities, when cleared out to a certain degree, might be safely closed without drainage, and with every prospect of healing up soundly. Now, in clearing out a ragged tuberculous cavity, there could hardly be a pretence that every trace of infective tuberculous matter had been removed, and yet I showed that such cavities really did heal up, and in many cases remained soundly closed for at least years. In two cases of psoas abscess which I recently showed at the Clinical Society this was the case in the first after five years, and in the second at the end of eight months. Since then this practice has been largely employed by others, and I constantly hear of results bearing out the contention I then put forward. Nowhere is this better exemplified in the case of tuberculous disease than in the abdomen, although excision of joints and evacuation of psoas abscesses are adduced as the most striking illustration. Here, when we operate for tuberculous peritonitis, we evacuate as much of the morbid products as possible, but cannot pretend to have removed all the infective material which produced the original effusion. In such cases I have always held that the wisest course to pursue was to close up the abdominal wound as perfectly as possible without drainage, and increasing experience has strengthened this conviction. I have seen such cases heal absolutely, and all traces of the residual disease in the abdomen disappear absolutely in some cases, and show no signs of recurrence even after the lapse of years. Had drainage been employed in such cases there would have been considerable risk of prolapse of the bowel during the vomiting, which frequently follows the chloroform narcosis, or of septic infection being grafted on to the tuberculous infection, or of the drain track becoming a chronic tuberculous sinus, or of the scar in the abdominal wall being weak. These several risks, and others, such as greater liability to adhesions, were all avoided by immediate closure of the whole wound. Let me give a case in illustration, but briefly, as it has been already published in detail.²

CASE I.—Some years ago a girl of 18 was admitted into University College Hospital, with acute intestinal obstruction and stercoraceous vomiting. I opened the abdomen, found a strong fibrous band constricting the intestine, and divided it with complete relief. It sprung from fresh tuberculous patches, with which all the intestines and omentum were thickly dotted wherever exposed. Some pint or so of turbid effusion was also removed with flakes of lymph. The wound was carefully closed without any drainage, and the patient recovered without a bad symptom. I saw her some years after with a sound scar, and no trace of abdominal trouble.

In this case there could be no question as to the presence of infective tubercle in the abdomen when it was closed. It could be seen on all sides; and yet it was disposed of by the natural forces once the effused fluid was dried out and the cavity was stitched up, and the absence of drainage in no way impeded the cure. Such cases have since become common.

But, again, I have had other cases in which the infective material producing the peritonitis was certainly not tuberculous, and in which the careful removal of the inflammatory material and closure of the abdomen absolutely without drainage was followed by rapid recovery. And yet in all these cases there was no hope that every trace of the infective material had been removed out of the cavity by operation.

Let me quote three typical cases.

CASE II.—(Already recorded in *Clinical Society Transactions*, 1886, p. 149). Some six years ago I was asked to see a man, aged 26, who had previously been quite healthy, and who had acute intestinal obstruction for forty-eight hours. He was vomiting constantly, was in great pain, and his abdomen was much distended. I opened the latter, and evacuated some pints of turbid fluid with lymph flakes, released a coil of intestine which was deeply ecchymosed, washed the bowel, and closed the wound without any drainage. Recovery was rapid. I have seen him quite well (February, 1895).

CASE III.—A child of 7 was admitted three years ago under Dr. Barlow with the abdomen distended evidently by suppurative peritonitis. I did laparotomy, evacuated about a pint of creamy pus from over the intestines, washed out the abdomen with hot water, and closed the wound without drainage of any kind. Recovery was rapid and complete. Here there were no tubercles or evidence of disease of the appendix, but the suppuration was free and presumably infective.

CASE IV.—A child of 8 was admitted a short time after under Dr. Barlow with a similar but more acute condition. The treatment was the same, without drainage of the abdomen. Here I evacuated about a pint and a-half of pus from over the intestines, and closed the wound without drainage. Recovery was complete. It was, however, a little delayed by an accumulation of treacly blood and serum under the incision, which escaped by the stitch holes after complete union of the wound; but the general abdominal condition remained quiet. I have lately heard of this child as quite well.

In none of these cases probably would anything have been gained by elaborate drainage, while much might have been lost in the various ways indicated above.

Such cases and many others give us food for reflection as to whether in the past we have done well in employing the routine of drainage in all cases of abdominal inflammation, even when due to septic agents. It is quite plain that the abdomen as a large lymph sac can dispose of considerable quantities of septic material unaided by operation. We know, for instance, that many cases in which inflammation starts in the vermiform appendix, and reaches the stage of suppuration, get well without any operation under ordinary medical treatment, the inflammatory products being absorbed. Such cases, taken with others of proved suppuration, such as those just related, have convinced me that drainage is often unnecessary, and has many times been carried too far as a routine practice, and might be dispensed with in some cases, at all events without disadvantage, if not with great gain to the patient, even where septic suppuration is undoubtedly present.

Let me take a short review of four cases in which I have recently done excision of the vermiform appendix for relapsing appendicitis.

CASE V.—A coachman was admitted under my care for a moderately acute attack of this disease. Under rest, fomentation, restricted diet, and opium all his symptoms, except slight swelling over the appendix, disappeared. After being up for some days he was about to leave hospital when he had another attack, which subsided under the same treatment. Another attack succeeded to this, and he begged for operation. I cut down and removed a greatly swollen and inflamed appendix adherent to some coils of small intestine covered with lymph. The abdominal wound was closed without drainage. Recovery was most perfect, and many months after I saw the patient in the most robust health, and with a sound scar.

CASE VI (Private Case).—Here I was called one evening to see the patient, aged 26, who was in the ninth day of an attack of appendicitis, which was probably the second or third of the same kind. She was collapsed, and vomited stercoraceous matter. I opened the abdomen and found a very long appendix reaching into the pelvis, and surrounded there by a small, very foul abscess, which was shut in by coils of small intestine sharply kinked around it, hence the acute obstruction. The intestines released, the abscess dried out and mopped with iodoform emulsion. The wound was closed without drainage, and the patient made an excellent recovery. The deep stitches, however, had evidently been infected from the abscess during the operation, and a small subcutaneous abscess formed, which discharged through the lowest stitch holes in the skin. Some of the deep-buried sutures, as a consequence, came away subsequently after the patient was up, but this in no way interfered with the course of convalescence, the intra-abdominal condition remaining very satisfactory, and now six months after operation there is no weakness of the scar.

CASE VII (Private Case).—Here I was called in to operate for primary acute appendicitis of some days' standing. I opened the abdomen and found the perforated appendix surrounded by a small abscess. It was removed at its base and the abscess dried out. The wound was completely closed with stitches reaching through all the tissues of the abdominal wall, and without any drainage. These stitches, too, were infected from within, and began to cut, and when removed on the tenth day part of the wound gaped. It closed, however, when some pus had escaped, and all went well to satisfactory recovery.

CASE VIII.—A girl of 20 was admitted under Dr. Ringer's care in the third attack of acute appendicitis. This subsided under the usual treatment. A fourth and then a fifth attack followed while in the hospital, and as the latter was subsiding I removed the appendix with some difficulty. Its apex was surrounded by a small abscess, and was bound down to the brim of the true pelvis and to the small intestines by very firm adhesions, which had to be divided by scissors. There was fresh lymph also on several of the adjacent coils of intestine. The wound was completely closed by stitches through the whole abdominal wall. Recovery was absolutely uneventful. The stitches were removed on the tenth day, and the wound was soundly healed and has remained so ever since.

Now, in these 4 cases, too, there was an undoubtedly septic condition in the abdominal cavity. In 3 of them there was a definite abscess, and in 2 at least there had been a diffused peritonitis, which in the last case remained at the time of operation, the exposed coils of small intestine showing flakes of recent lymph; and yet in none of them does there appear to have been any loss from the absence of drainage.

There are of course other cases of suppurative appendicitis in which we have to deal with large collections of pus round a sloughing vermiform. In these drainage will always perhaps be considered imperative, and should be thorough. Some other varieties of suppuration, especially of the diffuse form, will also need the most elaborate drainage. But what I want particularly to suggest to my surgical *confères* is that we must not be misled by our experience in the latter class of cases to push drainage too far. Because they require careful provision for the escape of much virulent secretion,

it does not follow that in other cases in which the secretion is very moderate and localised, and not very virulent after thorough examination, cleansing of the focus of infection, and removal of the exciting cause it should be necessary to provide elaborate drainage for a secretion which the peritoneum itself can dispose of easily.

Another conclusion follows upon these considerations, if they be correct, namely that in those cases in which we open the abdomen for septic peritonitis, and regard drainage as indispensable, we may in many cases remove the tube at a much earlier date than has hitherto been the custom. The tube will have done all that is required of it in many cases in the first twenty-four hours, and though there may still be a certain amount of effused fluid to be got rid of, what does not leak away through the chink left by the removal of the drain, may often be left safely to be disposed of by the peritoneum. But only often, not always. It is for the surgeon of large experience in abdominal work to determine for each case which line he will adopt; but I would suggest again that where he can dispense with the drain tube he will find it a great gain.

OBSERVATIONS ON EXCISION OF THE RECTUM FOR MALIGNANT DISEASE, DESCRIBING A METHOD OF OPERATION.¹

By FRANCIS T. HEUSTON, M.D., M.Ch., F.R.C.S.I.,
Professor of Anatomy, Royal College of Surgeons in Ireland; Consulting Surgeon to the Coombe Lying-in Hospital and to the Cripples' Home; Surgeon to the Adelaide Hospital, Dublin.

THE operative treatment of malignant disease of the rectum has been for many years a subject of interest to surgeons, and of the different methods recommended for dealing with such cases none has had more vicissitudes than that of excision of the diseased portion of bowel and implicated structures surrounding it. Since the introduction of this operation by Paget in 1763 there have been periods when it held an acknowledged position, as there have also been periods when it was considered inadmissible. The reason for the disrepute into which this operation fell for so many years is evidently due to its adoption in improper cases. It is, however, my belief that, with our advance in surgery and a more accurate knowledge of the special circumstances which indicate the different methods of operation, its value will be more generally recognised. My object in bringing this subject forward is to state what I consider to be the best method of dealing with a certain class of such cases.

CASE I.—Mr. J. K., aged 58 years, was recommended to me by my friend Dr. Cooper Stawell, of Bagnalstown, in September, 1891, with the following history. For a lengthened period, although his bowels were relieved normally in the morning, he had a great desire to go again about 10 P.M., when he passed a small quantity of mucus. Some seven months since he noticed blood on the stools, and a little blood also appeared with the mucus when he went in the evening. From this time he had great desire at intervals, it being frequently necessary to relieve the bowels seven or eight times during the night, blood and mucus passing on each occasion with a feeling of soreness near the anus. For the month before I saw him he had pain and difficulty during micturition, it being necessary to stand and force for some time before the urine came. On examination I found a hard irregular growth implicating the anterior aspect of the bowel, extending from slightly above the upper border of the internal sphincter for about 3 inches upwards on the anterior and lateral walls of the bowel, but not implicating its posterior wall.

Operation being recommended and agreed to, the patient was retained in the lithotomy position by Clover's crutch, and an incision was made in the median line from the anus to the tip of the coccyx. The bowel was now separated in its entire circumference by a scissors, keeping below the diseased structures and above the attachments to the bowel of the levator ani and the sphincter muscles, when the bowel came down without trouble, except on its anterior aspect, where it was intimately attached to the prostate gland, off which I separated it by careful dissection with a blunt knife and scissors, when there was no difficulty in drawing the bowel down and removing the diseased portion. There was little hæmorrhage, as clip forceps were applied to each portion of the bowel before it was removed. Catgut sutures were now passed through the bowel about an inch above its cut extremity, including all its thickness, with the exception of the mucous coat, and then through the pelvic fascia and levator ani muscle; this closed off the superior pelvic space, and fixed the bowel in its position, thus hindering undue dragging on the second line of sutures which were applied, connecting the cut extremity to the attachment of the levator ani, the sphincter muscles and mucous membrane which I had left below when originally separating the bowel. A drainage tube was now placed into the space behind the bowel and the incision from the anus to the coccyx closed. After the operation,

the patient progressed satisfactorily, the bowels being kept from moving by opium until the seventh day, when the temperature showing an upward tendency, a dose of castor oil was given, after which recovery was uninterrupted, the patient being allowed out of bed a fortnight after operation, and being allowed home a week later, having full control over his bowels. I have on several occasions since heard of this patient from Dr. Stawell, who reports that he is in perfect health. Microscopic examination showed the tumour to be cylindrical epithelioma. It is now three years and six months since operation.

CASE II.—In June, 1891, I was consulted by Mrs. H., aged 51 years, as to a pain in the lower part of her back, from which she had suffered for some years; this had become very severe for the past fortnight, being continuous even when lying down, although much worse when sitting or standing. Her bowels were confined, and, seven months before seeing me, she noticed a swelling at the anus, and pain on going to stool, which was much worse when the bowels were confined; she also noticed blood on the stools. On examination I found internal piles, one of which was ulcerated, but could ascertain no other abnormal condition. Under treatment she rapidly recovered and returned to the country.

I next saw Mrs. H. in June, 1892, when she informed me that she had had a severe attack of influenza in January, after which she was greatly debilitated, and had a severe pain in her back, with a gradually increasing difficulty in obtaining movement of the bowels. When the bowels were relieved she had a feeling as if some obstruction existed, and had a severe burning pain for some time, after which a considerable quantity of blood and mucus passed. Believing her symptoms to be due to the influenza she consulted a physician, who ascertained the presence of a tumour in the bowel. She was then seen by a surgeon, who agreed in the diagnosis of malignant disease but declined operation, owing to the fixation of the tumour to the sacrum. The patient desiring my opinion I examined her, and found a well-marked growth, implicating the posterior wall of the bowel, between 2 and 3 inches from the anus; this growth lay between the rectum and the sacrum, on which it could be slightly moved. The mucous membrane over the tumour was ulcerated to about the size of a crown piece. Believing operation to be feasible I requested a consultation with Mr. Kendal Franks, who agreed with my opinion.

The operation was performed in a similar manner to that already described. When the tumour was reached I found it attached to the sacrum by cellular tissue, but had no difficulty in separating it, the diseased portion being removed, the bowel was drawn down and deep sutures applied as in the former case. When the second row of sutures uniting the extremities of the bowel were applied, I found a considerable cavity remained between the bowel and sacrum, a drainage tube was passed into this and the wound from the anus to the coccyx sutured, the tube being allowed exit at the posterior extremity of this incision. For some days after the operation the patient was very restless. The stitch nearest the anus tore through, and a large quantity of serous discharge came through the drainage tube. A purgative was given on the eighth day. She was allowed out of bed on the seventeenth day, and went home on the thirty-first day after the operation, having all but perfect control over her bowel, the only subsequent trouble being that for a short time a slight mucous discharge came from the bowel at its posterior aspect where the suture tore through. This patient has since communicated with me, and states she has no difficulty with her bowels, and that her health has greatly improved. Two years and nine months have now elapsed since operation.

I will now direct attention to certain points in connection with the operation. In these cases it is of importance that the peritoneal cavity be not opened; this may be usually attained by remembering that the peritoneum usually covers the anterior aspect of the rectum in the male to within 3 inches of the internal sphincter, while in the female you cannot be sure of more than 2 inches, although there may be much more in either case. At the posterior aspect of the bowel you can count on 4 or 5 inches. As a practical rule I consider that if the surgeon can, by digital examination, reach above the malignant growth, the peritoneum should be safe.

The great objection to excision of the rectum by the usual operation is the incontinence owing to the removal of the sphincters and the importance of overcoming this sequela is apparent; and to point out how this may be attained I will describe the usual operation, and compare it with the method employed in the foregoing cases.

The usual operation is commenced by an incision from the rectum to the coccyx, called by the old writers "the key to the operation;" then incisions were made round the anus meeting in front, the attachment of the levator ani to the rectum was cut and the bowel with sphincters drawn down; thus most of the external sphincter and the entire of the internal sphincter were removed, and incontinence, which was often permanent, resulted. Further the remains of the bowel not being usually united to the skin, owing to the frequency with which the sutures tore through, the raw surface thus left to granulate was a frequent source of septic infection and subsequent stricture.

The operation I employ is commenced by an incision from the rectum to the coccyx, as in the former operation; this being in the median line, severs the attachment of the external sphincter and levator ani muscles to the ano-coccygeal

¹ Read before the Surgical Section of the Royal Academy of Medicine in Ireland.