While the outbreak lasted I, acting on behalf of the medical officer of health, visited all the homes where there were children known to have come into contact with notified cases. In this way I saw several incipient cases of diphtheria, and never failed to find that antitoxin cut them short at the start.

Let us look a little closer at the chart of the death rate from diphtheria. There is no decline worth noting in 1894 when Behring's antitoxin was first broadly introduced to the medical world by Roux at Budapest. The reception of antitoxin was very lukewarm in Great Britain, as I showed in an article I contributed to the *Edinburgh Medical Journal* in 1900, though much more striking results had been obtained in Paris and Berlin. From 1894 to 1902 there was no decline in the death rate in England and Wales, but there was then a fall, after which for twenty years the death rate remained about two-thirds of what it had previously been, at first declining slowly until 1910, and then advancing again towards 1920, with a slight rise during the war. In the four years after 1920 it dropped to the lowest point it has ever reached—namely, to 231 per million children under 15 years of age, or 21.5 per cent. of what it was in 1894—after which it has risen a little.

The result of the use of antitoxin during a third of a century or more, though by no means to be despised, cannot, then, be anything but disappointing to those who have realized its amazing efficiency in the laboratory, and raises the question whether still better results might not be obtained if the best possible use were made of it. I cannot help feeling that in many cases it might be given much earlier than it is. The pernicious practice of relying on laboratory diagnosis instead of having the courage of their own opinion, has led practitioners to wait for the result of the examination of a swab, and has prevented the early use of the remedy.

Let the doctor then *never* wait for the swab, but give antitoxin with the least possible delay whenever there is a reasonable suspicion of diphtheria. And when diphtheria is prevalent in his district let him not omit to carry with him a syringe and a bottle of antitoxin, lest he lose the few precious hours during which alone this wonderful remedy is able to save life.

It might perhaps be argued that the success of antitoxin in the treatment of diphtheria has been, to some extent, masked by a transference to that disease of cases that would formerly have been put down to scarlet fever, owing to a change in the criterion of diagnosis.

Now from the time when Bretonneau first distinguished diphtheria from scarlet fever the criterion of diagnosis was the presence or absence of a membrane in the pharynx. But by about the last decade of the nineteenth century the discovery of the diphtheria bacillus, and the increasing degree of certainty with which it might be cultivated from a swab and identified, was gradually leading to the substitution of the presence or absence of the bacillus for the presence or absence of a membrane.

This change undoubtedly led to many cases being diagnosed as diphtheria which would not otherwise have been so classified; but as such cases were non-membranous, they were almost invariably mild ones, and could not have added anything material to the death rate of diphtheria, while they must have greatly tended to reduce the case mortality. For the same reason the transfer of such cases to diphtheria, even if the majority of them would in former years have been classified as scarlet fever, could not have reduced the death rate from that disease. Moreover, the great and dramatic fall in the death rate of scarlet fever had taken place before the new method of diagnosis had come into use.

The fall in the death rate of scarlet fever from one or two thousand per million children under the age of 15 to no more than forty-five in 1931 has not been

accompanied by any great change in its prevalence, at least since the beginning of this century, as Miss Hilda M. Woods has recently shown. It is the severity of the disease which has changed.

Diphtheria, on the other hand, has not become milder: an increase in the numbers of cases so diagnosed, owing to the change of method, has no doubt led to a fall in the case mortality of the disease; but the disease, when the old-fashioned signs are well marked, seems to be as deadly as ever, and it is only antitoxin which prevents its mortality being as high as it used to be. A drop in the death rate to an average level of about 25 per cent. of what it was when antitoxin was introduced is something to be thankful for, but still better results seem to be within reach if only the antitoxin could be brought more quickly to the patient.

INTESTINO-VESICAL FISTULA

BY

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(With Special Plate)

The subject of intestino-vesical fistula does not appear to have attracted the attention of surgeons, perhaps because of the rarity of the condition. I have consulted several elderly general practitioners, long-standing in practice and keen observers, and also the honorary physician to a large hospital for incurable diseases, as to the number of cases of this condition that they have come across. None can recall a single case, even as a sequel to carcinoma of the rectum. The information thus gained confirms my conviction of the comparative infrequency of this type of fistula.

The monumental monograph of Harrison Cripps, *The Passage of Air and Faeces from the Urethra*, published as long ago as 1888, is probably still the best work available. This book analyses his collected series of sixty-three cases. He ascribes three causes of the condition: (a) trauma, (b) cancer, and (c) inflammation. He states that the fistulae were much more often due to inflammatory causes than to cancerous growths, and that therefore the prognosis by treatment was good. Two cases of his series were due to trauma, one being a sequel to labour lasting for four days, while in the second case the patient was impaled on a stake, which traversed the bladder and rectum. Cancer only caused the condition in nine instances. Cripps comments on how seldom a case of carcinoma of the rectum terminates in perforation into the bladder. An inflammatory condition was the cause of the perforation in forty-five cases out of sixty-three. His tabulation was:

Abscess	15	
Stricture	8	
Ulcer	4	27
	—	
Stone	2	
Exact nature not described	16	
	—	45

Cripps describes the situation of the fistulae in the following table:

Rectum	25
Colon	15
Small intestine	12
Colon and small intestine	5
Not stated	6
	—
	63

In the colon series the opening in eleven cases was the sigmoid flexure, while in four cases the exact site was not mentioned. In twelve cases the communication was with the small intestine alone, while in five instances both the large and small intestines were involved. Communications with the large are therefore about twice as many as with the small intestine.

I am describing six cases which have occurred in private and infirmary practice. One was due to a tuberculous adhesion between the small intestine and the bladder, one to a perforative colon sacculus, two to a malignant growth of the lower end of the pelvic colon, while a further two were due to a urinary calculus ulcerating into the rectum. In a modified search of the surgical literature I have found a record of odd cases only. My surgical registrar, Mr. J. C. Stanger, has also searched through a further portion of the general records of the Royal Victoria Infirmary, Newcastle, and can find only one case in addition to my own. This investigation took a very considerable time, for it was necessary to peruse carefully, not only all "intestinal" cases, but also the records under the heading of "bladder." This search, although limited, is further evidence that the condition is not a common one. Cripps makes no mention of sacculitis as a cause of the fistulae. I suggest that most of the twenty-seven of his cases under the heading of abscess, stricture, and ulcer were probably a sequel to an inflamed colon sacculi. He suggests that "probably the majority of them resulted from inflammation set up by accidental perforation of the bowel by fragments of bone or other foreign bodies." I am in agreement with his comment that it is a rare event for a carcinoma of the rectum to ulcerate into the bladder, causing a fistula.

CASE RECORDS

CASE 1.—TUBERCULOUS SMALL INTESTINE

A young adult female, who had tuberculous enteritis, developed urgent vesical symptoms, which included the passage of air and intestinal contents with her urine. At operation I excised an adherent loop of tuberculous small intestine, and a fistulous communication on the bladder fundus was closed in layers, thus providing a cure. This was a pre-war case, and the record has been lost. I have been unable to trace the case to ascertain the after-history.

CASE 2.—SACCUINITIS OF COLON

G. T., aged 56, a moulder, was admitted on January 18th, 1931, under my care, to the Royal Victoria Infirmary, Newcastle, on account of passing "wind in the water." Eight months previously the patient went to his doctor complaining of "backache and swelling of the bowels." He had had no abdominal pain, but was very constipated, and had had to take purgatives regularly; the motions had been normal. One month later he began to have urinary symptoms—a scalding pain on micturition, with frequency every two hours at night. The urinary stream was good. The urine later became chocolate-brown in colour and thick, and had an offensive odour. He was treated for cystitis, and one month later—that is, six months before admission—he began to pass wind with his water, and the urine was brown and frothy. He passed a little bright red blood in the urine on one occasion shortly before admission. He had lost flesh. The family history was unimportant.

Examination.—He was asked to micturate, and it was observed that the flow contained brown faecal material and air with the urine. The abdomen disclosed no abnormality—that is, there was no tender area, no muscle guarding, and no abnormal mass to be palpated. Nothing abnormal could be detected on a rectal examination. A barium enema was attempted, but as it was returned immediately the examination was negative. A cystogram (using 12½ per cent. sodium iodide) was employed, but no abnormality was detected. A diagnosis of colo-vesical fistula from sacculitis was made.

Operation, January 28th, 1931, confirmed the diagnosis. A mid-line suprapubic incision was made. There was a hard

nodular mass 1½ in. in length in the middle of the pelvic colon, which was adherent to the bladder on the left side. There was no glandular involvement; the liver and the rest of the abdomen were normal. The adherent colon was separated and resected, an end-to-end anastomosis being performed by direct suture. No further sacculi were seen. The area of the bladder denuded of peritoneum was invaginated by interrupted sutures of catgut. No definite fistula of the bladder was detected. A drain was inserted to the bottom of the pelvis. An india-rubber catheter was used per urethram for ten days, and then removed. On examination of the removed specimen the condition was found to be due to sacculitis. This was also producing stenosis of the bowel.

Progress.—He made an uneventful recovery. On examination on October 6th, 1932, his wound was completely healed. He had gained 1½ st. in weight. He looked the picture of good health, and expressed himself as feeling very well. His urine was clear and free from albumin, while microscopically no pus cells could be found in a high-power field. His bowels were functioning normally. A barium enema disclosed a normal colon, there being no sign of any stenosis, nor were any further sacculi detected. When seen on May 5th, 1933, he was in perfect health; he had gained 2 st. in weight and his urine was normal, chemically and microscopically.

Morbid Anatomy.—The specimen removed at operation (see Special Plate, Fig. 1) shows a portion of the colon laid open longitudinally. The middle part of the specimen shows very marked thickening of its wall, especially of the sub-peritoneal coat. The mucous membrane appears to be normal, except that it is thrown into numerous transverse folds, caused, no doubt, by the longitudinal contraction of the other layers of the bowel wall. There are one or two shallow pouches in the mucous membrane above and below the contracted area. There are two well-marked diverticula in the wall of the contracted portion of bowel, surrounded by a process of inflammatory fibrosis. A glass rod is shown passing from the lumen of the bowel into another well-marked diverticulum (seen on the peritoneal aspect of the specimen). This was the site of a fistulous communication with the urinary bladder.

CASE 3.—URINARY CALCULUS

On October 25th, 1920, I removed, in a private hospital, the prostate gland of Mr. T. E. T., aged 70, because of retention of urine. The excised gland consisted of enlarged lateral and middle lobes. Each was adenomatous, and scattered throughout were a large number of small prostatic calculi. Almost certainly some of these calculi were "spilt" during the prostatectomy, which was not an easy proceeding owing to considerable fixity. Unfortunately he had a markedly sacculated bladder, and doubtless some of the prostatic calculi gained access to some sacculi. His suprapubic sinus took a considerable time to heal, but it eventually did so. Two years later he had symptoms of a calculus in the prostatic pouch, and this was removed by the operation of suprapubic lithotomy. The wound soon healed up. At the end of a further two years his symptoms of difficulty with micturition returned. He became uraemic. All urine was voided via the anus, none coming per urethram. He died shortly afterwards, on February 7th, 1928, over seven years after the prostatectomy. Without a doubt a calculus (?with a "spilt" prostatic calculus as a nucleus) had ulcerated through into the rectum, providing a natural cure for his retention of urine.

CASE 4.—URINARY CALCULUS

In the early part of 1927 I saw in consultation James H., aged 76. For many years previously he had had symptoms of an enlarged prostate, but he was now suffering from retention of urine with overflow. He was enormously fat, and looked very ill. His bladder was distended to the level of the umbilicus, while a rectal examination indicated an adenomatous prostate gland. Owing to the distended bladder the size of the gland could not be gauged. I advised him to have his bladder drained, but he refused, and left hospital for home. Shortly afterwards the local practitioner was called in to see him, as the patient was said to be suffering from "severe diarrhoea." Examination showed that the hypogastric tumour had vanished, and he was intermittently voiding collections of urine from his bowel. No urine came per urethram. A calculus was never recognized in his motions,

but it is most probable that Nature had provided a cure for a vesical stone, which had ulcerated through the bladder base into the rectum. He lived for some weeks following the onset of the "diarrhoea," and died on May 22nd, 1927.

CASE 5.—CARCINOMA OF PELVIC COLON

On November 17th, 1920, Mr. A. T., aged 53, a commercial traveller, came to consult me on the recommendation of his doctor. For five years he had had symptoms of severe cystitis, and recently a bacteriologist had reported that he had found "tubercle bacilli" in the urine. Seven weeks prior to my seeing him the patient had noticed brown flakes in the urine, which had a marked faecal odour. Nothing abnormal could be found on an abdominal examination—that is, there was no area of tenderness, no muscular rigidity, and no abnormal mass to be felt. There was no enlargement of the liver. Nothing abnormal was found on a rectal examination. Cystoscopy disclosed a chronic oedematous ulcer on the bladder fundus, which suggested to me a fistulous communication with the bowel. A good deal of faecal matter was washed out of the bladder during the cystoscopy. In view of the bacteriological report a diagnosis of tuberculous fistula between the intestine and bladder was made, and operation was recommended as the only prospect of giving relief.

Operation, November 27th, 1920.—The abdomen was opened through a median suprapubic incision. A large mass was found in the lower part of the pelvic colon, lying almost transversely across the pelvis, and firmly adherent to the posterior aspect of the fundus of the bladder. On separating the adhesions a fistula was demonstrated between the colon and the bladder. A portion of the colon containing the mass and the fistula was resected, and an end-to-end anastomosis performed by direct suture. A piece of omentum was brought through the gap in the mesentery, and sutured partially around the line of the anastomosis to support it. The fistulous opening in the bladder was closed by infolding separately the muscular and peritoneal coats, using interrupted catgut sutures. A drain was employed, the wound was "bipped," and closed in layers above the site of exit of the drainage tube. There was no other abnormality noted—that is, there were no enlarged abdominal glands, and the liver was normal. An indwelling catheter was tied in per urethram, and left in for ten days. After the operation there was a considerable oozing of blood from the depths of the wound, but one injection of normal horse serum was effective. The patient made a good recovery.

Morbid Anatomy.—The specimen removed at operation (see Special Plate, Fig. 2) consists of a portion of colon divided longitudinally. There is a large ulcerated area, with an irregular base and thickened everted edges, occupying the middle part of the bowel. The lumen of the bowel is almost completely blocked at the upper end of this ulcerated area. The muscle layer of the bowel wall has disappeared opposite the central part of the ulcer, being replaced by new growth. Around this portion of the bowel there is a considerable increase of the subperitoneal fat. A pin demonstrates the site of the fistulous communication with the urinary bladder. Professor Stuart MacDonald, on December 3rd, 1920, reported: "This is a typical columnar-cell cancer."

After-history.—The patient is now alive and well, over twelve years after the operation. Ever since the operation he has continued to carry on his full work as a commercial traveller. I am informed that he is in perfect health, and that he has no abnormal symptoms. His bowels are regular, there is no abnormality with micturition, and his urine is quite clear. The case is of considerable interest bacteriologically, for there can be little doubt that the patient did not have urinary tuberculosis, nor had he ever had it. It demonstrates well the fallacy of relying upon the microscopical diagnosis of urinary tuberculosis. Had a guinea-pig inoculation test been done the error of the microscopical diagnosis would have been established.

CASE 6.—CARCINOMA OF RECTUM

In August, 1921, Mr. J. C., aged 65, came to consult me, complaining of passing blood and slime in his motions. On a rectal examination a malignant ulcer was found on the anterior wall of the rectum in the region of the bladder base.

It proved impossible to ascertain definitely whether the growth was fixed or not. In November, 1921, Professor Rutherford Morison opened his abdomen, and found a fixed inoperable growth of the upper part of the rectum. The abdomen was closed, nothing being done. The course of the malignant disease progressed slowly, and the patient was comparatively comfortable until October, 1922, when he suddenly began to pass flatus and faeces per urethram. His plight became a terrible one, for when every few minutes he tried to micturate, columns of soft faecal matter were voided per urethram. A colostomy was done, which gave some degree of relief, but death did not take place until three months later.

SUMMARY

Intestino-vesical fistula is uncommon.

A chronic inflammatory source is probably the commonest cause.

Cases due to colon sacculitis and colon cancer—both successfully operated upon—are described in detail.

Rectal cancer rarely ulcerates into the bladder; one such case is referred to.

In two cases a vesical calculus probably ulcerated through into the rectum.

In the remaining case a tuberculous loop of small intestine was the cause.

X-RAY TREATMENT OF MALIGNANT DISEASE OF THE LUNG

BY

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(With Special Plate)

Within recent years pulmonary tumours have received considerable attention, owing mainly to the increase in their occurrence. There now exists a profuse literature on the subject, but one preponderantly concerned with diagnosis. On the treatment of the condition very little has been written.

In order to assess the value of a particular form of treatment in a relatively rare condition two methods are open. These may be called the statistical and the personal. In the statistical method an analysis of cases is made from the records of patients, many, if not most, of whom were never seen in their lifetime by the compilers. The one advantage of this method is that only in this way can the results in a large number of cases be seen at a glance, since it falls to the lot of a very few observers to see in their own practice a sufficient number of cases from which to make reliable statistical deductions. This method has, on the other hand, several serious limitations. First, however accurately the records may have been kept, the compilers must lose much from having had no personal contact with the patients themselves. In particular the compilers tend to concentrate upon a comparison of the survival period in the treated and untreated cases. They lose sight of the effect of the treatment upon the patients during their survival, an aspect of the problem which, from a humanitarian point of view, is just as important as the possible prolongation of life. Secondly, if, as usually happens, the compilers are unfamiliar with the technique of the treatment, they are not in a position to assess the relative value of different modifications of technique or to distinguish between adequate and inadequate treatment. Thirdly, there is in this method nothing to prevent the same cases from being analysed over and over again by different compilers. This is an inevitable result of what may be called third-party investigation. It is quite clear that no advance can be made by the repeated publication of the same cases.

R. J. WILLAN: INTESTINO-VESICAL FISTULA

FIG. 1.—Case 2. Resected colon showing thickened area in wall with two well-marked diverticula surrounded by inflammatory fibrosis. The arrow indicates site of diverticulum leading to fistula.

FIG. 2.—Case 5. Colon divided longitudinally. Large ulcerated area of growth is seen almost blocking the lumen. A pin shows the site of the fistula.

FI. ROBERTS: X-RAY TREATMENT OF MALIGNANT DISEASE OF THE LUNG

FIG. 1.—Case 5, E. S. April 10th, 1931. Tumour of left lung. Collapse of left upper lobe.

FIG. 2.—Case 5. June 3rd, 1931. Tumour greatly diminished. Left upper lobe re-expanded.