

ENTERO-VESICAL FISTULAE

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The term entero-vesical fistula includes all those cases in which a communication, direct or indirect, exists between the bladder and any portion of the intestinal tract, from the pyloric orifice to the anus. The condition is somewhat rare, as evidenced by a review of the literature. The first attempt to collect and classify these cases was made by Blanquinque in 1870. The older writers considered the condition beyond the reach of "the art," and the first suggestion as to rational treatment was made by Barbier de Melle in 1843. He believed the site of the fistula was always in the cecum and proposed colostomy as a means of cure. Pennell, in 1850, and Curling, in 1852, first used this procedure. However, up to 1870, only six colostomies had been performed for entero-vesical fistula.

In 1870 Simon operated on two patients with recto-vesical fistula, sectioning the rectal sphincter and making a direct suture of the rectal orifice of the fistula. He was successful in one case. Billroth, in the same year, performed this type of operation without success. Dumeni, in 1884, reported a case of recto-vesical fistula before the French Surgical Congress at Rouen, and highly extolled colostomy as a means of relief; it is probably due largely to him that this procedure became popularized. Suprapubic cystotomy and suturing of the bladder orifice of the fistula was first suggested by Le Dentu in 1884. This method was used for a time, but without success. In 1887 Czerny performed the first laparotomy for vesico-intestinal fistula; the operation, however, was unsuccessful. In 1891 Baiffin performed a similar operation with success.

Cripps, in 1884, reported thirteen cases of congenital entero-vesical fistula; in six of these cases the fistula was between the rectum and the prostate; in three, between the rectum and the bladder, and in one, between the distal end of the sigmoid and the bladder. The location was not mentioned in the remaining three.

Chavannaz, in 1897, Pascal, in 1900, and Parham and Hume, in 1909, writing on entero-vesical fistula, made excellent contributions to the subject and brought the literature up to date. Cunningham, in 1915, reviewed the literature and also reported eight cases of his own. G. Albano, writing in 1926, on the subject of entero-vesical fistula, reported 433 cases. He found that 75 per cent occurred in males, and that only 1.79 per cent of these fistulae healed spontaneously.

In reviewing the literature from 1926 to 1931, I have been able to collect but twenty-nine cases, making a total of 462 cases, to

which is added our series of eleven cases. Only two cases of congenital fistula have been described since Cripps reported his series, and the one in the series presented in this paper, makes a total of sixteen such cases reported in the literature. There is very little mention made of the congenital fistula by most of the writers on the subject. (Table I.)

TABLE I
ETIOLOGICAL TABLE—259 Cases*

A. Traumatic, 58 cases, 22.4 per cent.

<i>Accident</i>	<i>No. Cases</i>	<i>Per Cent</i>
a. Gunshot.....	37	63.8
b. Surgical.....	13	22.4
c. Childbirth.....	8	13.7

B. Non-traumatic

1. Inflammatory, 138 cases, 53.4 per cent.

	<i>No. Cases</i>	<i>Per Cent</i>
a. Diverticulitis.....	77	55.8
b. Tuberculosis.....	26	18.8
c. Lues.....	5	3.6
d. Appendicitis.....	11	7.9
e. Diverticulum bladder.....	3	2.1
f. Typhoid.....	2	1.4
g. Actinomycosis.....	3	2.1
h. Vesical calculus.....	11	7.9

2. Tumors, 58 cases, 20.1 per cent.

<i>Malignant</i>	<i>No. Cases</i>	<i>Per Cent</i>
a. Carcinoma rectum.....	14	26.8
b. Carcinoma sigmoid.....	11	21.1
c. Carcinoma bladder.....	6	11.5
d. Carcinoma uterus.....	7	13.4
e. Carcinoma, site not given.....	15	28.8

3. Congenital, 10 cases, 3.9 per cent.

*Table based on cases collected from the literature.

The above table shows the etiologic factor in 259 cases of enterovesical fistulae. Gunshot wounds were the cause of the fistulae in most of the cases classified as of traumatic origin. There had been a decrease in this variety in the past twenty years. Sutton found only one case due to bullet wounds in his series of thirty-four cases in which operation was done at the Mayo Clinic between January 1, 1907, and January 1, 1920. There was none in our series, and no reference to such cases was found from 1927 to 1931.

Trauma inflicted during surgical operation is the next most common cause in this group, as in Case II, where a fistula developed two weeks after a pelvic laparotomy which had been performed else-

where. Sutton reported one case in which the colon was nicked at operation. J. H. Morrisy reported a case in which two loops of the ileum were caught in the suture while a vaginal suspension of the uterus was being done. The patient developed an ileovesical fistula and died. Kustner reported a case which followed the removal of a dermoid cyst. The majority of the other cases were due to operations for removal of stones from the bladder through the urethra, and occurred before the advent of the modern cystoscope. Eight cases were reported as due to childbirth.

In the non-traumatic group the inflammatory lesions constitute the greatest proportion and heading the list of these is diverticulitis. This is considered by some observers to be the most common cause of vesico-sigmoidal fistula. It formed 29 per cent of the above series. In Sutton's series it formed 17.64 per cent. In a series of forty-two cases collected by Bryan twenty-two (52.28 per cent) were due to diverticulitis of the sigmoid. In our series two (18.18 per cent) were due to diverticulitis of the sigmoid.

The etiology of diverticula of the large bowel is still obscure. Chute thinks they arise from increased pressure in the bowel due to constipation or to an increased formation of intestinal gas. Wilson sums up his study as follows: "It may be stated briefly that diverticula of the lower bowel, while frequently following the course of the vessels, probably owe their origin more to congenital weakness of the circumferential musculature than to any other factor."

The clinical observation of acquired diverticulitis of the large bowel may be summed up as follows: All patients have certain features in common; most of them are over forty-five years of age; they are generally obese; males are affected more frequently than females; and excepting for this illness, the patients are otherwise in good health. The onset of symptoms is sudden, and characteristic of a localized peritonitis. The pain is acute and generally located in the lower left quadrant, comes in paroxysms and is associated with constipation. A tumor mass develops rapidly and usually is located to the left of the midline in the middle or lower quadrant of the abdomen.

The diverticulum becomes filled with stagnant feces and bacteria, and an inflammatory process is set up; this goes on to a peridiverticulitis and the formation of adhesions between the inflammatory mass and the bladder. The inflammatory process proceeds on to suppuration, and in some cases, a fistulous communication forms between the bowel and the bladder.

Tuberculosis is the second most frequent cause of entero-vesical fistula of inflammatory origin. In Sutton's series of thirty-four

cases, there were six in which tuberculosis was the etiologic factor; there were two cases of tuberculous salpingitis, one case of tuberculous of the left ovary and tube; one case of tuberculous peritonitis; one case of tuberculous and suppurative appendicitis; and one case of tuberculous postoperative fecal fistula. The other abdominal organs which were most frequently the site of a primary tuberculous lesion were the ileum, seminal vesicles, prostate and bladder.

Acute suppurative appendicitis with perforation is a rather common cause of fistula. The inflamed appendix becomes adherent to the bladder well, with a resultant inflammatory process in the bladder wall, which goes on to suppuration and the formation of a fistula between the appendix and the bladder. There are also cases in which an appendiceal abscess has drained through the bladder. Among other inflammatory lesions causing entero-vesical fistula are typhoid fever, syphilis, actinomycosis and infection in bladder diverticula.

In the cases due to tumor, carcinoma is most often responsible for fistula formation. The most frequent site of the primary lesion is the rectum, next the sigmoid, then the uterus and the bladder. In our series there was one case of carcinoma of the sigmoid, two of carcinoma of the bladder and two of carcinoma of the cervix. As a rule these cases are all far advanced when seen, and radical surgery is not indicated.

TABLE II
342 Cases*

LOCATION OF FISTULA		
<i>Location</i>	<i>Number</i>	<i>Per Cent</i>
Rectum and bladder.....	168	49.1
Sigmoid and bladder.....	81	23.6
Small intestine and bladder.....	16	4.6
Cecum and bladder.....	10	2.9
Ileum and bladder.....	16	4.6
Appendix and bladder.....	12	3.5
Colon and bladder.....	39	11.4

*Table based on cases collected from the literature.

The most common location of the opening in the intestinal canal is the rectum, and the sigmoid is next. Most of the thirty-nine cases listed under colon and bladder were probably in the sigmoid, but more definite information was not available. The location of the opening in the bladder is most frequently in the region of the trigone. In cases of diverticulitis of the sigmoid, the opening is to the left, this being due to the close proximity of the left bladder wall and the sigmoid. There are many cases reported in which the opening into the bladder was located on the posterior

wall, and a few on the summit of the bladder. The fistulous tract may be a direct communication between the bowel and the bladder, or a long and tortuous sinus. Carcinoma and tuberculosis generally give rise to the former, while the latter usually result from abscesses between the bowel and bladder, and an opening into these two structures at different levels.

The group of cases of congenital entero-vesical fistulae forms a small, but interesting series. Cripps reported thirteen cases in 1884. He found that they all occurred in the male, and that the anus was completely absent in the majority of cases. In six cases the fistula was between the prostate and the rectum; in three, it was between the rectum and the bladder; and in one, the bowel terminated at the sigmoid flexure, which communicated with the upper part of the bladder. He did not mention the location in the remaining three cases. Ten of the patients in this series died. I have been able to find only two cases of congenital fistula since that time, and with the addition of one of our own, the total is seventeen. One of these cases reported by Farr and Brunkow in 1925 had complete absence of the anus and the rectum emptied into the bladder. An anus was made and the rectum drawn down and opened. However, this did not relieve the abdominal distension, and a colostomy was done. The child died, and a post-mortem examination showed the recto-vesical fistula. The other case was reported by J. D. Eschemindia (cited by Lower). In our case the anus was entirely absent and there was a fistula between the bladder and bowel at the recto-sigmoid junction. A colostomy was done the second day after birth. On the third day, feces and gas were passed per urethra. A few days later, the abdomen was opened and the fistula was resected. Later on an artificial anus was made and the bowel pulled down to the anal opening and sutured there. The child made a satisfactory convalescence, and is now eight years of age, has no urinary symptoms, and has good control of the bowels, except when the stools are watery.

SYMPTOMS

The passage of gas and feces per urethra or the presence of urine in the rectum is pathognomonic of entero-vesical fistula. In eight of our cases there was a history of passing gas and feces per urethra. In one case there was no such history, but fecal matter was found in the bladder at cystoscopic examination. Prior to the establishment of a communication between the bladder and the gastro-intestinal tract, the symptoms depend upon the nature and severity of the disease, and the structure involved. Long standing complaints referable to the gastro-intestinal tract, such as constipation, transi-

tory attacks of abdominal pain, and areas of localized tenderness over the abdomen will point to the intestinal tract as the probable origin of the fistula. Diverticulitis of the sigmoid usually is accompanied by pain and colic, most frequently in the lower left quadrant of the abdomen. There frequently is gaseous distension. Judd says that there is blood in the stool in 18 per cent of cases of diverticulitis. Pus and mucus in the stool is not uncommon in diverticulitis. If the inflamed diverticulum is close to the bladder, there will be frequency of urination, urgency and burning. Urinary symptoms are almost always present in some degree before the fistula is formed. Long standing bladder affections, especially where there is ulceration of the bladder wall, indicate that this organ gave rise to the fistula.

The symptomatology of entero-vesical fistula is quite uniform in all cases. The majority of patients show pneumaturia as the most constant and annoying single symptom. It is accompanied by an odor and may be heard some distance from the patient. Pneumaturia, according to Parham and Hume, may occur after, (1) instrumental vesical manipulation, such as lithopaxy, (2) in certain neuropathic conditions, and (3) in glycosuric conditions, the decomposing urine containing sugar. These conditions should, however, not be difficult to exclude in the presence of such symptoms as passing of feces and gas per urethra and the passage of urine by rectum.

Feces, however, are not always present in the urine. Frequently the communicating lumen is so small as to permit only the passage of gas. The symptoms of urine in the rectum are those of proctitis and are seldom of much consequence. Chavannaz says that urine is found in the rectum only in one-third of the cases. There was only one case in our series in which there was a definite history of having passed urine by rectum.

Renal infection is not uncommon in cases of entero-vesical fistula. It is characterized by fever, chills and pain over the lumbar region. There were four patients in our series who had such symptoms. Pascal found kidney infection in eighteen of his cases and in fourteen it was bilateral. Sutton found definite kidney infection in only one of his thirty-four cases and says that it is not a common occurrence.

DIAGNOSIS

The diagnosis of vesico-intestinal fistulae as a rule should not be difficult. More important is the decision as to the part of the gastrointestinal tract involved in the fistula. The diagnosis usually can be made or suspected from the history, the cardinal symptoms being: (1) the passage of gas by urethra; (2) the passage of feces

by urethra; and (3) the passage of urine by rectum. Chute stated that if the bowel contents found in the urine are dark, and contain solid food particles, it may be assumed that the connection probably is into the small intestine.

Cystoscopic examination reveals the opening in the bladder in the majority of cases. The bladder shows more or less diffuse inflammatory reaction, depending upon the size of the opening and the amount of feces coming through. It is not possible to demonstrate a fistula in all cases. In Case I the fistula was found only at necropsy. In Case VII fecal material and gas bubbles were seen coming through an opening in the bladder during cystoscopy. In two of our cases cystoscopic examination showed an opening in the bladder wall and on distending the bladder with saline, the solution passed through to the rectum, and the patient expelled it. In Case IV an opening was seen in the bladder and argyrol was put into the bladder and was recovered in the stools. In Case VIII a dark opening was seen on the vault of the bladder, but it was impossible to demonstrate a fistula by probing or overdistending the bladder. A cystogram sometimes shows the fistula.

The location of the site of the fistula in the bowel is determined by proctoscopic examination, barium, enema, and after filling of the bladder with a colored solution, watching its exit in the rectum. The location of the opening in the rectum by inspection is more difficult than is the opening in the bladder, because the folds of mucous membrane may obscure the rectal opening. By injecting some colored fluid into the bladder with the proctoscope in the rectum, it is frequently possible to observe its point of exit in the rectum. The location of the opening in the rectum can be demonstrated frequently by means of a barium enema, the barium passing through the fistulous tract into the bladder. A study of the lower bowel by the barium enema is of great value, also, in determining the type of lesion. In most cases of diverticulitis of the lower bowel, a characteristic filling is seen. Associated with this filling is a marked spasm of the bowel which greatly exaggerates the haustra and gives the bowel the appearance of a partially closed accordion. A filling defect in the rectum or sigmoid is more characteristic of carcinoma. In the differential diagnosis between carcinoma and diverticulitis must be considered the duration of the disease, and the general condition of the patient. Diverticulitis is characterized by the intermittency of its symptoms, the patient is in relatively good health and there has been no cachexia or progressive loss of weight, and fever and leucocytosis are quite common. The palpation of a sizable tumor mass in the sigmoid points more to diverticulitis than to carcinoma, where the lesion is circular and not easily

palpable until late in the disease. In spite of all the diagnostic methods at our disposal, there are certain cases in which the diagnosis can only be determined by exploratory laparotomy.

PROGNOSIS

The prognosis depends upon the nature of the primary lesion producing the fistula. It is most unfavorable in the cases of malignancy. Many authorities contend that cases where tuberculosis is the primary lesion have a poor prognosis. However, Sutton reported good results in six cases of tuberculous origin. Another factor that influences the prognosis is the extent of the infection in the peritoneal cavity and in the genito-urinary system. Fistulae of inflammatory origin heal spontaneously at times. Case II of our series represents this group. In instances where the fistula is due to trauma or an inflammatory condition the prognosis is far more favorable. In the group of congenital cases, the outlook is poor. Of thirteen cases reported by Cripps, ten died, most of them at operation. The patient reported by Farr and Brunkow died a few days after operation. The patient in this series made a very satisfactory recovery.

In five of our cases the primary lesion was carcinoma; in three, the disease was too far advanced for radical surgery; and all these patients refused colostomy. In one, an exploratory laparotomy was performed and the disease was found to be so widespread that nothing could be done. In one case of carcinoma of the sigmoid with marked involvement of the bladder, cystectomy, transplantation of the ureters into the large bowels and resection of the sigmoid were done. This patient is still living six months after operation, but has signs of local recurrence. Of the first three cases, one lived nineteen months; one seven and a half months; and it has been impossible to trace the other. The patient on whom the exploratory laparotomy was done died ten months later. The remaining seven patients whose lesions were due to inflammation or trauma all are living, and the fistula has closed in all cases except one, where operation was refused. Though this patient is free from symptoms, cystoscopic examination still shows a small opening in the bladder wall. There was no operative mortality in the Cleveland Clinic series. One patient still has a colostomy which he has been advised to have closed.

TREATMENT

The treatment is essentially surgical, and may be considered as, (1) palliative, and (2) curative. The type of operation depends

primarily upon the nature of the pathologic process causing the fistula.

Under palliative treatment should be listed the removal of bladder stones, dilatation of urethral or rectal strictures to relieve obstruction, colostomy and suprapubic cystotomy. Colostomy is recommended to those patients who have advanced carcinoma of the bladder or rectum accompanied by marked bladder symptoms. Suprapubic cystotomy is done with the idea of allowing free drainage for the fecal contents in the bladder and should be reserved for cases of extensive carcinoma of the bladder in which nothing else can be done.

In cases in which trauma is the primary cause, or in which there is an inflammatory process, such as diverticulitis, appendiceal abscess, or salpingitis, radical curative surgery should be resorted to. This consists of abdominal section, excision of the fistula and repair of the opening in the bowel and bladder. At times it is necessary to resect a portion of the bowel, especially in cases with extensive diverticulitis. This was done in Case VIII of our series. The older writers suggested a preliminary colostomy as of advantage, especially in the inflammatory cases, as it diverted the flow of feces and gave the inflammatory process a chance to subside. Present-day surgeons do not use this procedure so frequently. The important point to be determined before performing a colostomy is the location of the fistulous opening into the intestinal tract, as the colostomy must be above the opening.

Some surgeons recommend perineal or vaginal approach in cases in which the communication is low down in the rectum. This operation seldom permits the closure of both openings of the fistula, and its success is based on separating the intestines from the bladder, and packing the wound, draining the bladder with an inlying catheter and preventing the bowels from moving until granulation tissue has formed in the opening.

The postoperative treatment of these patients is of the utmost importance. The patient should have inlying catheter drainage for at least ten days. The diet should consist of liquids for the first five to seven days, and then should contain very little residue for the following two weeks. In this manner there is little stress put on the closed areas. Some patients refuse operation, and in others, the disease is too far advanced to warrant operation. In these, certain measures must be carried out to make their condition more tolerable. The diet should be such as to contain the smallest possible residue and yet furnish the proper amount of nutrition. The bowels should be kept closed for a period of a few days and then evacuated by cathartics and enemas. The bladder should be irrigated daily

CHART OF CASES

Case	Sex	Age	Etiology	Location	Symptoms	Duration of Fistula	Method of Diagnosis	Treatment and Operation	Results
I	M	53	Ca. bladder on right side just inside the internal sphincter.	Vesico-sigmoidal.	Urinary frequency, urgency, dysuria and hematuria. No history of gas or feces in urine and no diarrhoea.	Of the carcinoma, 9-12 mo. from history. Duration of fistula not stated.	Diagnosis of ca. by cystoscopic examination. Fistula was found at post-mortem examination.	Two courses of deep x-ray therapy.	Patient obtained some relief from urinary symptoms. Tumor decreased greatly in size. Patient died of metastasis 19 months after diagnosis was made. Postmortem showed ca. of bladder with involvement of sigmoid, a vesico-sigmoidal fistula and metastasis to the liver.
II	F	46	Fistula developed 2 weeks following pelvic laparotomy which was done elsewhere.	1 cm. above rt. ureteral orifice communicating with the rectum.	Watery discharge from bowel, urinary frequency and urgency, cloudy urine, fever, and chills. No history of passing gas or feces per urethra.	2½ weeks.	Cystoscopic examination showed an opening in the bladder and on overdistending the bladder with saline solution passed into rectum and expelled.	Patient refused operation. The opening in the bladder was fulgurated several times. Diet with small residue prescribed, irrigation bladder and urinary antiseptics.	Only symptom patient complains of two years later is that stools are slightly watery at times. Cystoscopic examination shows very small opening still present, and on over-distending bladder with solution a small amount passes into the rectum.
III	F	60	Ca. primary in the cervix with widespread pelvic extension.	Rectum, bladder and vagina.	Gas and feces per urethra, urine and feces in vagus, loss of weight, marked urinary frequency and urgency.	3 months.	History of gas and feces per urethra. Cystoscopy revealed a large opening on left side of bladder through which there was a constant flow of fecal material; marked inflammation of the bladder. Solution introduced to distend bladder passed through the rectum and at once expelled. Proctoscopic examination showed opening in rectum.	Colostomy advised but patient refused this. Daily bladder irrigations, urinary antiseptics, non-residue diet and bowel regulation advised.	Patient died 7½ months after onset evidently from pulmonary metastasis. No postmortem examination.
IV	M	70	Diverticulum of the bladder near the left ureteral orifice.	Between bladder and rectum.	Marked urinary frequency, urgency and burning. Passage of gas and feces per urethra, fever, chills, and chronic constipation.	About 2 months.	History of passage of gas and feces by urethra. Cystoscopy showed an opening just above the left ureteral orifice. A colostomy solution was introduced into the bladder and recovered in rectum. Cystogram failed to show the fistula.	Abdominal section, excision of the diverticulum and the fistulous tract, closure of the opening from the bladder and rectum.	The fistula re-formed about ten days after operation. Patient treated conservatively with bladder irrigation, bowel regulation, etc., and two years later is free from any urinary symptoms and the fistula apparently has closed.
V	M	61	Ca. probably primary in the bladder.	Anterior surface of dome of bladder and colon.	Marked urgency, frequency and burning on urination, passage of feces and gas per urethra, chronic constipation, loss of 40 pounds in weight.	2½ months.	History, cystoscopic examination showed opening in dome of bladder, unable to demonstrate fistula by cystogram or barium enema. Proctoscopic examination of no aid in the diagnosis.	Exploratory laparotomy. Condition was found to be inoperable. Colostomy advised, but patient refused.	Patient did not return after discharge from hospital. Died at home 10 months after operation. No postmortem examination.

CHART OF CASES — Continued

Case	Sex	Age	Etiology	Location	Symptoms	Duration of Fistula	Method of Diagnosis	Treatment and Operation	Results
VI	M	26	Patient swallowed straight pin when child. At age of 16 stone removed from bladder with the pin as its nucleus. Patient passed small stones on several occasions.	Appendix and dome of bladder.	Urinary frequency and urgency for 10 years. Urine always cloudy and foul smelling; material resembling feces passed per urethra for 2 years before admission to hospital.	About 2 years.	History, cystoscopic examination showed an opening in dome of bladder on right side. Unable to demonstrate fistula by cystogram or barium enema.	Abdominal section done and the tip of appendix was found to be adherent to the right side of the dome of bladder. The appendix was removed along with a small area of bladder wall. Examination of specimen revealed a fistula between the appendix and the bladder.	Patient completely cured; seen 20 months after operation and has had no recurrence of urinary symptoms.
VII	M	51	Abscess in diverticulum of the rectum which ruptured through into the bladder.	Posterior wall of bladder and anterior wall of rectum.	Onset with acute lower abdominal pain radiating to penis associated with fever, chills, urinary frequency and urgency and passage of foul smelling urine and gas per urethra.	1 month.	History of passage of gas and feces per urethra, cystoscopic examination showed an opening through posterior wall of bladder through which fecal material and gas bubbles were seen to pass. Examination of urine showed undigested food particles.	Abdominal section, an abscess containing foul smelling pus and communicating with the bladder and rectum was found. The abscess was drained and the openings in bladder and rectum were closed.	Uneventful convalescence; left hospital twenty-four days after operation with fistula closed. Patient seen 6 months postoperatively and has had no recurrence of urinary symptoms.
VIII	M	50	Diverticulitis of the sigmoid.	Posterior surface of bladder and sigmoid.	Recurring attacks of colicky pain in lower abdomen, associated with constipation, urinary frequency, urgency, burning, cloudy and foul smelling urine. Patient not aware of having passed gas or feces per urethra, however, fecal material found in bladder at time of cystoscopic examination.	2 months.	Cystoscopic examination showed a dark opening on vault of bladder. Unable to demonstrate fistula by cystogram. Barium enema showed almost complete obstruction in mid-sigmoid but did not show the fistula.	Abdominal section; the sigmoid showed multiple diverticula, and at one point the sigmoid was adherent to bladder. Sigmoid was dissected from the bladder and it was found that there was a fistulous communication between opening in the bladder and bowel. The opening in the bladder was closed and the sigmoid resected and an end to end anastomosis was done. A colectomy was done at the same time and the patient given a transfusion. Colectomy done 5 weeks postoperatively.	Patient developed a fecal and urinary fistula at the operation site eight days postoperatively and 16 days postoperatively developed an enterovesical fistula. Colectomy was performed 5 weeks later. The enterovesical fistula closed spontaneously 13 weeks after operation. General condition fine 7 months postoperatively, no urinary symptoms, still has a colostomy which he has been advised to have closed.
IX	F	68	Ca. probably primary in the cervix.	Between rectum, bladder and vagina.	Marked urinary frequency and urgency, passage of gas and feces per urethra and vagina, blood and mucus in stools, loss of weight and quite marked emaciation.	2 weeks.	History, pelvic examination showed a recto-vaginal fistula. Cystoscopic examination revealed an opening in the posterior wall of the bladder and on overdistending the bladder the solution escaped through the vagina and rectum.	Case was too far advanced for radical surgery. Colectomy advised but the patient refused. Put on bladder irrigation, regulation of diet and urinary antiseptics.	Unable to trace patient.

CHART OF CASES — Continued

<i>Case</i>	<i>Sex</i>	<i>Age</i>	<i>Etiology</i>	<i>Location</i>	<i>Symptoms</i>	<i>Duration of Fistula</i>	<i>Method of Diagnosis</i>	<i>Treatment and Operation</i>	<i>Results</i>
X	M	42	Cs. sigmoid.	Between the sigmoid and bladder.	Marked frequency and urgency and hematuria, passage of gas and feces per urethra and loss of 15 pounds in weight.	5 months.	History of gas and feces per urethra. Cystoscopic examination showed fistulous opening between bowel and bladder when overdistending bladder with colored fluid and recovering it in the rectum.	Abdominal section; tumor mass found involving almost the entire bladder and four inches of sigmoid. Cystectomy was done, ureter transplanted into the sigmoid and the part of the sigmoid involved in the tumor mass was resected, and proximal end of the sigmoid used for a colostomy and the lower end was closed.	The ureter sloughed out of the sigmoid; patient developed an abdominal urinary fistula; left the hospital in 7 weeks in fair condition. Six months following operation still has the urinary fistula, colostomy working well. Patient has evidence of local recurrence of the malignancy.
XI	F	2 days	Congenital.	Recto-sigmoid junction and bladder.	Passage of gas and feces per urethra, starting the third day after birth.		History, passing gas and feces per urethra.	Child was born with imperforate anus. Colostomy done on second day after birth. On 7th day after birth abdomen opened and fistula found between bladder and sigmoid. This was resected and the openings in the bladder and bowel closed. Several days later an artificial anus was made and the rectum was brought down and sutured to the opening. Colostomy was closed 5 weeks after operation.	Convalescence was uneventful. Fistula remained closed. Child now 8 years old and is completely free from any bladder symptoms. Only complaint is that at times the stools are watery and this causes fecal incontinence. Has good sphincter control otherwise.

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and some soothing oily solution left in for the relief of the vesical irritation. Opiates should be used as indicated.

CONCLUSIONS

1. Entero-vesical fistulae are due more often to inflammatory or infectious processes than to carcinoma or trauma; diverticulitis is the most frequent predisposing lesion.

2. The most common site of the fistula is between the rectum and bladder, and next, between the sigmoid and bladder.

3. The cardinal symptoms of entero-vesical fistulae are (1) the passage of gas by urethra; (2) passage of feces by urethra; (3) passage of urine by rectum. Bladder symptoms of more or less severity are generally present, depending upon the size of the opening in the bladder and the amount of fecal material passing through. Proctitis is the most annoying bowel symptom, but is relatively uncommon.

4. Ascending kidney infection is not common.

5. Diagnosis depends upon the use of the cystoscope, the proctoscope, a study of the colon by barium enema, cystogram and the use in the bladder of a colored standard solution such as methylene blue to detect the opening in the rectum. Even with all these devices it is not always possible to demonstrate the presence of such a fistula before operation.

6. The prognosis depends upon the type of lesion causing the fistula. It is most favorable in those cases due to trauma and inflammation. Those due to carcinoma are generally far advanced when seen. In congenital cases, the prognosis is poor, because of the operative mortality. Some cases of inflammatory origin heal spontaneously.

7. Treatment is essentially surgical.

REFERENCES

- 1 Albano, G.: Vesico-intestinal fistulas. *Arch. ital. de Chir.*, 16:133-172, 1926.
- 2 Bailey, N.: Acquired vesico-intestinal and urethro-intestinal fistulae. *Brit. J. of Urol.*, 1:175, 1929.
- 3 Bagger, S. V.: Sigmoid-bladder fistula. *J. A. M. A.*, 77:900, 1921.
- 4 Ballinger, E. G., and Smith, W. R.: Ileo-recto-vesical-fistula, probably of luetic origin. *Southern M. J.*, 16:532-534, 1923.
- 5 Bryan, R.: Sigmoido-vesical fistula. *Ann. Surg.*, 63:353-363, 1916.
- 6 Craig, R. G., and Lee-Brown, R. K.: Enterovesical fistula. *Surg. Gynec. and Obstet.*, 44:753-755, 1927.
- 7 Cripps, H.: On diseases of rectum and anus. P. Blakiston, Son & Co., Philadelphia, 1894, p. 25.
- 8 Cunningham, J. H., Jr.: Rectovesical and enterovesical fistulae. *Surg. Gynec. and Obstet.*, 22:510-518, 1915.

- 9 David, V. C.: Sigmoidovesical fistulae with special reference to sigmoid diverticulitis. *Ann. Surg.*, 90:1015-1026, 1929.
- 10 Doggett, F. F.: Vesico-intestinal fistula. *Boston M. and S. J.*, 185:22, 1921.
- 11 Farr, R. E., and Brunkow, C. W.: Congenital abnormalities of intestines; intestinal aplasia; atresia of the rectum and anus complicated by rectovesical fistula with report of cases. *Arch. of Surg.*, 11:417-433, 1925.
- 12 Fowler, H. A.: Vesico-intestinal fistula. Report of a case. *Trans. Amer. Ass. Genito-Urin. Surgeons*, 22:347-363, 1929.
- 13 Jacobs, L. C.: Vesico-intestinal fistula. *Calif. State J. Med.*, 19:19, 1921.
- 14 Judd, E. S., Marshall, J. M., and Hartwell, S. W.: Vesico-sigmoidal fistulae. *Surg. Clinics of N. A.*, 10:7-22, 1930.
- 15 Keefe, J. W.: Diverticulitis of sigmoid or pelvic colon with sigmoido-vesical fistula. *Boston M. & S. J.*, 194:577-586, 1926.
- 16 Knapper, C., and Bartelink, D. L.: Fistula between bladder and small intestines. *J. A. M. A.*, 86:80, 1926.
- 17 Kurstner, H.: Zur operation von Dickdarm — Blasenfisteln. *Monatschr. f. Geburtsh. u. Gynäk.*, 85:26-30, 1930.
- 18 Lower, W. E., and Farrell, J. I.: Appendico-vesical fistula (case). *Ann. Surg.*, 93:620-630, 1931.
- 19 Lower, W. E., and Farrell, J. I.: Vesicovaginal and rectovesical fistulae with report of a case of congenital rectovesical fistula. *J. Urol.* 26:141-146, 1931.
- 20 McKay, H. S.: Vesico-intestinal fistulae. *Jour. Missouri Med. Assoc.*, 17:489-491, 1920.
- 21 McKenna, C. M.: Diverticulum of large intestines communicating with the bladder. *J. Urol.*, 13:443-453, 1925.
- 22 Morrissey, J. H.: Vesico-intestinal fistulae. *Trans. Sect. Urol., A. M. A.*, pages 297-307, 1930. *J. A. M. A.*, 96:843-847, 1931.
- 23 Parham, P. W. and Hume, J.: Vesico-intestinal fistulae. *Ann. Surg.* 50:251-286, 1909.
- 24 Pascal, A.: Quoted by Cunningham.
- 25 Phillips, C. E.: Diverticulitis of sigmoid, complications — pelvic abscess, septicemia, intestinal obstruction, ileo-vesical fistula. *Surg. Clin. N. A.*, 8:1495-1502, 1928.
- 26 Rankin, F. W., and Judd, E. S.: Vesico-appendiceal fistulae (2 cases). *Surg. Gynec. and Obst.*, 32:153-155, 1921.
- 27 Schiffmann, J.: Fistulas between intestines and bladder in female. *Ztschr. f. Urol. Chir.*, 18:23-28, 1925.
- 28 Schmidt, H. R.: Recto-vesical and recto-vaginal fistulae. *J. A. M. A.*, 77:241, 1921.
- 29 Schwyzer, A.: Vesico-intestinal fistulae. *Surg. Clin. N. A.*, 3:1449-1475, 1923.
- 30 Sutton, G. O.: Vesico-sigmoidal fistulae. *Surg. Gynec. and Obst.*, 32:318-327, 1921.
- 31 Veseen, L. L.: Diverticulitis of sigmoid with rupture into bladder. *J. Urol.*, 20:598, 1928.
- 32 Wilson, L. B.: Diverticula of the lower bowel, their development and relationship to carcinoma. *Ann. Surg.*, 53:223-231, 1911.