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PERFORATING INFLAMMATION OF THE
VERMIFORM APPENDIX;

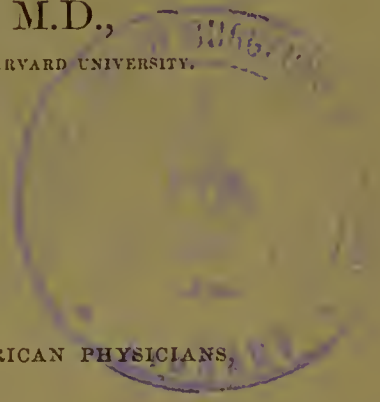
WITH

SPECIAL REFERENCE TO ITS EARLY DIAGNOSIS AND TREATMENT.

BY

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SHATTUCK PROFESSOR OF PATHOLOGICAL ANATOMY IN HARVARD UNIVERSITY.



REPRINTED FROM THE

TRANSACTIONS OF THE ASSOCIATION OF AMERICAN PHYSICIANS,

JUNE 18, 1886.

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It appears that even the most recent systematic writers are by no means agreed as to the exact relation of inflammation of the cæcum and that of the appendix to peritonitis and perityphlitis. The vital importance of the timely and appropriate treatment of the disease in question is becoming more and more apparent. Such treatment is often postponed till hopeless, even if its application is at any time entertained. It was, therefore, to be anticipated that the critical consideration of a large number of unquestionable cases of perforation of the cæcal appendix might serve to make prominent the features essential for diagnosis and treatment.

In 1834, James Copland, in his *Dictionary of Practical Medicine*,¹ first discriminated between inflammations of the cæcum, the vermiform appendix, and the pericæcal tissue. Isolated cases of fatal inflammation of the appendix had been published from time to time before this date. Their importance did not become well recognized, however, till after Dupuytren's views had been made known concerning the relation of the cæcum to the production of what had hitherto been termed iliac abscess, or phlegmon of the iliac fossa. At the instigation of this eminent surgeon, Husson and Dance² published an article on the subject, apparently expressing his ideas. These were subsequently personally presented by him in his *Lectures on Clinical Surgery*.³

In consequence of the interest thus aroused, Goldbeck,⁴ at the sug-

¹ Vol. i. p. 277.

² Répertoire Gén. d'Anat., etc., 1827, iv. 154.

³ Leçons Orales de Clin. Chir., 1833, iii. 330.

⁴ Ueber eigenth. entz. Geschw. i. d. rechten Hüftbeingegegend, 1830.

gestion of Puchelt, of Heidelberg, wrote his graduation-thesis upon the same subject. He adopted the views of the French writers, and applied the term perityphlitis to the disease described. His essay contains the report of a case of perforation of the appendix and associated peritonitis. But he regards it as one of fecal retention, and as quite distinct from the perityphlitis or inflammation of the connective tissue around the cæcum. He states that in fatal cases of the latter affection the appendix has been found intact.

Of the various names connected with the early history of the disease under consideration that of John Burne, Physician to the Westminster Hospital, deserves particular mention. In the first¹ of two admirable articles separated by an interval of two years, he calls attention to the material difference in the character of inflammation of the appendix and that of the cæcum. He attributes this difference to the peculiar conformation and situation of the former. His second paper² contains an additional number of cases of affections of the cæcum and appendix, a criticism of the opinions of the French writers, and a reiteration of his own views with such modifications as a more extended experience permitted. The name typhlo-enteritis is offered as an equivalent for inflammation and perforative ulceration of the cæcum and of the appendix.

In the interval between the publication of the above-mentioned articles, Albers³ contributed a paper on inflammation of the cæcum. He first introduces the term typhlitis, and discriminates between acute, chronic, and stercoral typhlitis and perityphlitis. He charges Puchelt and foreign writers with confounding the last affection with the acute and stercoral varieties of typhlitis. The frequent termination of the perityphlitis in abscess is recognized, likewise the possibility of communication between the pus-cavity and that of the appendix or cæcum. This communication he regards as secondary. He says,⁴ "It is not at all clear just why the *processus vermiformis* should be so often affected, for in this disease perforation of the cæcum should be far more likely than that of the appendix."

Although the term perityphlitis thus became synonymous with inflammation of the pericæcal tissue, the tendency was inevitably

¹ Med.-Chir. Trans., 1837, xx. 219.

² Ibid., 1839, xxii. 33.

³ Beob. auf d. Geb. d. Path. und Path. Anat., 2ter Theil, 1838, 1.

⁴ Op. cit., p. 19.

toward the recognition of a somewhat similar clinical picture and a different anatomical seat. Oppolzer¹ discriminated between cases of perityphlitis where the inflammation was situated in the connective tissue about the cæcum, and others where the inflammatory swelling lay between the iliac fascia and the bone. These were further distinguished from cases of encysted peritonitis in this region, and from perforation of the appendix. The latter was stated to be always productive of a circumscribed peritonitis, except when the perforation took place through the adherent peritoneum. Then both peritonitis and inflammation of the subperitoneal tissue would occur. The anatomical seat of the inflammatory process was thus further complicated. Oppolzer suggested the term paratyphlitis, which, according to Eichhorst,² represents an inflammation of the connective tissue behind the cæcum, while perityphlitis designates an inflammation of the peritoneal coat of the cæcum and appendix. Typhlitis is applied to an inflammation of the appendix and of the cæcum. Whittaker³ uses the same definitions, while Ziegler⁴ applies the term typhlitis to inflammation of the vermiform appendix, and perityphlitis to that of the parts in its vicinity.

The clinician obviously recognizes as of the chiefest importance the parts to which local treatment may be directly applied. His attention is thus conspicuously directed to the cæcum, which may be evacuated, or to the perityphlitic abscess, which may be emptied. The pathologist looks for the seat and causes of the disease, and finds that in most fatal cases of typhlitis the cæcum is intact, while the appendix is ulcerated and perforated. He sees that the so-called perityphlitic abscess is usually an encysted peritonitis. Furthermore, if an abscess exists in the pericæcal fibrous tissue, it is in most instances caused by an inflamed appendix. Finally, if the encysted peritoneal abscess, or the abscess in fibrous tissue behind the cæcum, does communicate with the latter, such an opening is usually the result, not the cause, of this abscess.

With,⁵ influenced by the predominant importance of the independent consideration of inflammation of the appendix and its results, uses the term appendicular peritonitis to indicate the perityphlitis proceeding

¹ Allg. Wiener med. Zeitung, 1858, xx. 81; xxi. 86.

² Handb. d. Spec. Path. und Therap., 2te Aufl., 1885, ii. 188.

³ Pepper's System of Pract. Med., 1885, ii. 814.

⁴ Lehrb. d. Path. Anat., 4te Aufl., 1885, ii. 1.

⁵ Nordiskt Med. Ark., vii. 1. London Med. Record, 1880, viii. 213.

from disease of the appendix. As a circumscribed peritonitis is simply one event, although usually the most important, in the history of inflammation of the appendix, it seems preferable to use the term appendicitis to express the primary condition. This may terminate as an appendicular peritonitis or as a paratyphlitis. In like manner the rare, primary, perforating typhlitis (cæcal perforation) may be followed by a perityphlitis—that is, an encysted peritonitis about the cæcum, or by a paratyphlitis. The perityphlitic abscess of the surgeon, when seen early, is thus usually an encysted peritonitis of appendicular origin. More rarely, at this date, it may be the result of a suppurative paratyphlitis. The causes of this last affection are numerous and by no means confined to the appendix or cæcum, although a perforating inflammation of each of these parts of the intestinal tract may act as a cause.

Any attempt at explaining the various results of an inflammation of the appendix must necessarily be preceded by a statement of the peculiarities it may present with respect to structure and position. These peculiarities, though in part of congenital origin, in most instances bear evidence of having been acquired as the result of previous disease. This statement, based upon a long personal experience, is more than confirmed by the observations made elsewhere. Matterstock¹ states that Tüngel, during a period of two years at the Hamburg Hospital, found 30 instances of partial or complete obliteration of the appendix, 43 cases of catarrh and fecal concretions, 12 of abnormal adhesions, and 11 of tuberculous ulcers. All these in addition to perforations, and despite the fact that attention was not invariably directed to such peculiarities. Toft, as referred to by With,² found the appendix diseased in 110 out of 300 post-mortem examinations, every third person thus possessing a diseased appendix.

Personal observations have enabled me to recognize considerable variations in the length of the appendix, the longest being nearly six inches. Wister³ alludes to one which was nine inches long. It is frequently seen with an attached fold of peritoneum and fat tissue, suggesting an omentum or mesentery. Its free end has been found in the iliac fossa, as well as behind the cæcum; along the brim of the pelvis and hanging into the cavity of the latter. Irregular positions

¹ Gerhardt's Handb. d. Kinderkrankh., 1880, iv. 2, 897.

³ Trans. Coll. Phys. Philada., 1856-62, N. S., iii. 147.

² Loc. cit.

have often been associated with fibrous adhesions. The appendix has been found thus attached not only in the places above mentioned, but also with its tip directed upward and its course more or less parallel with that of the cæcum, either behind, to the right, or to the left of this structure. It has also been found adherent to the mesentery with its tip bent at right angles and lying between the appendix and this structure. Kraussold¹ observed its course directed upward and backward, forming a loop around the ileum with its tip directed forward. It has been seen pointing outward, then forward, forming a loop around the lower end of the cæcum with its tip behind the latter.

Firket² records the adherence of the appendix to the ileum throughout the length of the former, with a communication between the cavities of the two and without an evident ulceration of the mucous membrane. Adherence to the rectum with a communication between the cavities of each is recorded.³ Adhesions of the tip to the mesentery, the rectum, and bladder are frequent. Its presence in a hernial canal led Shaw⁴ to suspect a disease of the testicle. Thurmann⁵ records a like occurrence, and the formation of a scrotal tumor as large as the two fists in consequence of an inflammation of the appendix. Its tip has been found⁶ adherent to the abdominal wall in the vicinity of the navel, and pus has been discharged from it at this point.

Complete or partial obliterations of the canal are frequent. In the former instance a solid cord results. In the latter, a considerable cystic dilatation of the tip may follow; or a funnel-shaped pouch at the origin is often associated with obliteration of the remaining portion of the tube.

These variations in length, position, and patency, whether congenital or acquired, are of obvious importance in explaining many of the apparent differences in the clinical histories of typhlitis and perityphlitis. Their significance in the etiology of appendicitis will appear directly.

The presence of foreign bodies in the canal of the appendix is of frequent occurrence. These are a variety of seeds, especially of fruit. Less common are hairs, particularly bristles, worms or their eggs, shot, pins, pills, and gall-stones. By far the most numerous are

¹ Volkmann's Samml. klin. Vortr., 1881, cxci. 1707.

² Ann. d. l. Soc. Méd.-Chir. d. Liége, 1882, xxi. 58.

³ Trans. Lond. Path. Soc., 1876, xxvii. 161.

⁵ Prov. Med. and Surg. Journ., 1848, 477.

⁴ Ibid., 1848, i. 270.

⁶ Lancet, 1839-40, ii. 565.

moulded masses of inspissated feces, more or less cylindrical in shape and of extreme variation in density. Some are of the consistency of normal excrement, while others are of stony hardness in consequence of their infiltration with earthy salts. The relative frequency of their presence in the appendix is manifested by the records of fatal cases of appendicitis, but their actual frequency far exceeds the number of these cases. In my own experience, it is rather the rule than the exception for the appendix to contain moulded, more or less inspissated feces.

The frequency of such retention may be due to the congenital or acquired peculiarities of the appendix already described. German writers attach a certain importance to the presence of a valve-like projection of mucous membrane, discovered by Gerlach,¹ at the mouth of the appendix. Although a pinhole opening may result, any considerable obstruction must be of extreme rarity. The habits of individuals with reference to diet and regulation of the bowels are of unquestioned importance. Equally significant is the controlling fact that most persons suffering from habitual constipation and accustomed to swallow the seeds of fruit, escape inflammation of the appendix.

Recognizing the lack of agreement in the use of the terms typhlitis and perityphlitis, a collection has been made of 257 cases of perforating inflammation of the appendix. By limiting the attention to the essential features of these cases, it was thought possible to recognize the characteristics of this sharply defined affection, by means of which it might be differentiated from all others occurring in this region. At the same time a comparison is drawn between many of these characteristics and those occurring in cases of typhlitis and perityphlitis. The latter terms are sufficiently indicative of a clinical picture, although its seats and causes suggest the importance of shades of distinction; 209 of these cases have been collected, and serve as the basis of a series of tables to be contrasted with those obtained from the analysis of the 257 cases of appendicitis.

The etiological importance of the presence of fecal masses and of foreign bodies in the production of inflammation of the appendix is well recognized. Matterstock² found in 169 cases of fatal perforating appendicitis, that fecal concretions were present in 53 per cent., and foreign bodies in 12 per cent. In the series here collected, out of 152

¹ Zeitschr. f. rat. med., 1847, vi. 12.

² Op. cit.

cases the percentage¹ of fecal masses was 47 per cent., that of foreign bodies 12 per cent. It thus appears that in nearly one-half of the cases more or less inspissated feces were found, and that in nearly one-eighth of the series foreign bodies other than feces were present. Thus, in about three-fifths of all cases of perforating inflammation of the appendix either dried feces or foreign bodies were present in the tube. When seeds are stated to have been found, the evidence is not always sufficient to exclude the possibility of a mistake having been made as to the nature of the foreign body. Notwithstanding this large percentage, the reality is undoubtedly much greater. Many are overlooked at the time of making the examination, others are macerated in the contents of the abscess. Still others, perhaps, escape with the pus, which makes its way outward through the various channels by which the abscess may communicate with the surface of the body.

The frequent immunity of the appendix from inflammation in the presence of inspissated feces and foreign bodies suggests the importance of other factors in the etiology. External violence is occasionally recorded as an immediate precursor of the attack. Among the 257 cases were 19 who were supposed to have received an injury, the result rather of indirect than of direct violence: from lifting a heavy weight in 9 instances, and from a fall or blow in 10. Among 209 cases of typhlitis and perityphlitis external violence immediately preceded the attack of the disease in 10 per cent.

Digestive disturbances are of obvious importance in the etiology of inflammation of the appendix, since this organ is a part of the alimentary canal. There were 15 instances of prolonged constipation, 9 of diarrhœa, and 6 of vomiting. The attacks of diarrhœa and vomiting were usually the result of indiscretion in diet, but they were sometimes occasioned by the use of domestic remedies. These were administered for the relief of constipation or other disturbances attributed to a sluggish action of the stomach and bowels.

Among the cases of typhlitis and perityphlitis were 38 of constipation, 15 of diarrhœa, and 3 of vomiting; these symptoms being of apparent etiological importance.

Notwithstanding the frequency of typhoid fever and of intestinal tuberculosis, in which affections the mucous membrane of the appendix is often diseased, a resulting perforation seems to have been relatively

¹ In general whenever percentages are given, fractions will be disregarded.

infrequent. There were 8 of a perforating ulcer of the tuberculous appendix, and 3 of this lesion in convalescence from typhoid fever.

Among the 209 cases of typhlitis and perityphlitis were 2 occurring in tuberculous persons.

The consideration of sex in 247 cases gives the following result: 197 males, 80 per cent., and 50 females, 20 per cent. These percentages are the same as those found by Fenwick¹ in the analysis of 130 cases.

In 209 cases of typhlitis and perityphlitis there were 156 males, and 53 females; 74 per cent. of the former, and 26 per cent. of the latter.

The age in 228 cases of appendicitis is recorded as follows:

From 20 months to 10 years	.	.	22	=	10	per cent.
" 10 years " 20 "	.	.	86	=	38	"
" 20 " " 30 "	.	.	65	=	28	"
" 30 " " 40 "	.	.	34	=	15	"
" 40 " " 50 "	.	.	8	=	3	"
" 50 " " 60 "	.	.	11	=	5	"
" 60 " " 70 "	.	.	1	=	$\frac{1}{2}$	"
" 70 " " 78 "	.	.	1	=	$\frac{1}{2}$	"

The age of the youngest patient was 20 months, that of the oldest, 78 years; 173 cases, 76 per cent. of the entire list, were under the age of 40 years, and nearly 50 per cent. were under the age of 20 years. Fenwick's² table of ages is based upon the consideration of 97 cases, and shows smaller percentages for the several decades up to the age of 40 years.

The age of the patient in 178 cases of typhlitis and perityphlitis was:

From 4 years to 10 years	.	.	10	=	6	per cent.
" 10 " " 20 "	.	.	53	=	30	"
" 20 " " 30 "	.	.	53	=	30	"
" 30 " " 40 "	.	.	25	=	14	"
" 40 " " 50 "	.	.	18	=	10	"
" 50 " " 60 "	.	.	10	=	6	"
" 60 " " 70 "	.	.	7	=	4	"
" 70 " " 78 "	.	.	2	=	1	"

From the above consideration it is apparent that perforating appendicitis is a disease most frequently occurring among healthy youths

¹ Lancet, 1884, ii. 987, 1039.

² Loc. cit.

and young adults, especially males. Further, that attacks of indigestion and acts of violence, particularly from lifting, jumping, and falling, are exciting causes in one-fifth of the cases. A local cause is to be found in more than three-fifths of all cases in the retention in the appendix of more or less inspissated feces, or in the presence there of a foreign body. The retention of feces may be promoted by a constipated habit, but congenital or acquired irregularities in the position and attachments of the appendix frequently act as favoring causes. A fact in support of the last-mentioned statement is to be found in the frequency of successive attacks, one or more, of inflammation of the appendix. Among 257 cases were 28, 11 per cent., which presented similar symptoms of greater or less severity, at various intervals before the final attack. Recurrence is mentioned in 23 out of 209 cases, again 11 per cent., of typhlitis and perityphlitis.

The inflammatory process once excited, its course and results show extreme variations. A simple catarrhal appendicitis is to be recognized anatomically, but it is doubtful whether its clinical appreciation is possible. This appendicitis, in the absence of a concretion or foreign body, may progress toward ulceration, even to a peritonitis, which may terminate fatally. In the presence of a foreign body or concretion these events are of likely occurrence. On the one hand, the inflammation may result in the more or less complete obliteration of the canal of the appendix, with or without circumscribed dilatation. On the other, the ulcerative process becomes associated with a necrosis of the wall, a peritonitis, usually circumscribed at the outset, and perforation. In those cases where the appendicular peritonitis represents the extension of an inflammation through the wall of the appendix without perforation, permanent adhesions of the appendix to neighboring parts remain as evidence of the process. When it is associated with necrosis of the wall, the inflammation of the peritoneal coat tends to become diffused and productive of serous and cellular exudations. The adherence of coils of intestine to each other and to the abdominal wall favors the accumulation of the exudation in a limited space, and thus the formation of the tumor. At this stage the anatomical condition is a circumscribed peritonitis, the appendicular peritonitis of With. In certain instances the term perityphlitis might be applied in an exact anatomical sense, as the peritoneal inflammation frequently extends to the serous investment of

the lower part of the cæcum. But in the last two cases of fatal appendicitis examined by me, the appendicular peritonitis was wholly pelvic. The changes observed in the appearance of the serous covering of the cæcum were of the same character as those affecting the peritoneum elsewhere. This peritoneal abscess may then become absorbed, or its contents may escape into the general peritoneal cavity through ruptured or softened adhesions. In the latter event, as a rule, death rapidly follows. The exceptional case reported by Markoe¹ may be regarded as one of extreme rarity. A child with symptoms of general peritonitis on the second day, died a month later from another disease. The appendix had been perforated and the intestines were adherent in different places.

The product of the circumscribed peritonitis varies exceedingly in quality and quantity. Although it is usually thin, discolored, and very offensive, it may be thick, yellow, and odorless. In the *post-mortem* examination of a case of recent occurrence, where general peritonitis was the cause of death, the abscess contained perhaps an ounce of pus. The peritonitis was the result of a secondary mesenteric thrombophlebitis, while the primary appendicular peritonitis was apparently in a retrograde condition. The acute stage of the disease lasted more than six weeks. Barrett² states that he removed from a perityphlitic abscess, on the sixty-second day, more than a gallon of pus, liquid feces, and scybala. The presence of the last element indicates a communication with the large intestine.

If the case does not terminate as thus stated, the tumor may suddenly diminish in size with the discharge of pus from a hollow organ, as the intestine, bladder, or vagina. The anterior abdominal wall may become perforated and a sinus be established opening in the groin, lumbar region, or at the umbilicus. Shaw³ mentions the occurrence of multiple abscesses of the scrotum from a perforated hernial appendix, and Thurmann⁴ records a similar instance. Such sinuses often remain open for a long time, even many years. Through the kindness of Dr. A. T. Cabot, of Boston, I saw a patient with a fecal fistula which had existed for nineteen months. At the outset a tender swelling in the right groin had been incised, but the wound never

¹ Am. Med. Monthly, 1857, viii. 231.

² Va. Med. Monthly, 1875-76, ii. 120.

³ Loc. cit.

⁴ Loc. cit.

healed. After an operation to promote the healing of the sinus, about an inch of the perforated appendix protruded from the wound. A similar protrusion had taken place six months earlier. The outer surface of the appendix was smooth, of a dusky red color, and the margin of the opening was sharply defined. Pressure upon the abdominal wall over the cæcum, caused soft, yellow, intestinal contents to appear in the wound.

The abscess may contain sloughs of tissue and yet be intraperitoneal. In a recent post-mortem examination I removed from the encysted abscess around the appendix, a slough, three inches in length, representing the detached peripheral portion of the tube. Ballou¹ records a case where the sloughed appendix was discharged per anum, the patient recovering. In the case reported by Pooley,² apparently the entire appendix escaped as a slough from the wound.

The more protracted the course of the disease the greater is the probability of the destruction of the peritoneum forming the wall of the abscess. With the perforation of the parietal peritoneum may occur extensive necrosis, purulent and fecal infiltration of the abdominal walls. Within three weeks the iliac muscle may be destroyed and the ilium be bared. The course of the psoas and iliacus may be followed into the thigh, and extensive and deep-seated destruction of tissue with fecal infiltration be present in this region. The pus may extend through the obturator foramen, forming a deep-seated abscess of the hip and thigh, and may enter the hip-joint.

Moore³ has shown that disease of the hip-joint may follow perityphlitis, and Gibney⁴ has called attention to the possibility of mistaking cases of perityphlitis for disease of the hip-joint. The primary appendicular peritonitis may in like manner be continued into the tissues behind the cæcum, and thus a secondary paratyphlitis or perityphlitic abscess be occasioned. So various are these possibilities that every case of so-called perityphlitic abscess must be regarded as primarily one of a perforating appendicitis unless proven to be the contrary.

With the frequent eventual destruction of the peritoneal wall of the abscess is the possibility of death from hemorrhage. Conant⁵ describes the case of a young man who died at the end of three weeks. There

¹ Trans. R. I. Med. Soc., 1877-82, ii. 418.

³ Lancet, 1864, ii. 514.

⁵ Am. Med. Monthly, 1858, x. 359.

² N. Y. Med. Record, 1875, x. 267.

⁴ Am. Journ. Med. Sci., 1881, lxxxi.

was no general peritonitis, but the abscess communicated with the cæcum (the appendix being destroyed) and held a pint of clotted blood. Fatal hemorrhage from ulceration of the deep circumflex iliac artery is recorded by Bryant.¹ This case is not unlikely to have been one of appendicitis, although the condition of the appendix is not stated. Again, Powell² reports a case where the appendix was adherent to the internal iliac artery, the cavities of the two being in communication. The colon and cæcum were distended with gas and dark blood.

The occurrence of disease of remote parts may be alluded to, as abscesses of the liver from pyelphlebitis or portal embolism in consequence of a mesenteric thrombophlebitis near the appendix. The affection of the liver and portal vein may be the result of a direct continuance of the phlebitis, or may follow putrid embolism from a thrombus in the immediate vicinity of the appendix. The extension of a secondary paratyphlitis may cause perforation of the diaphragm with a consecutive pleurisy or pericarditis.

In considering the symptoms of appendicitis, it is to be noted that attacks of inflammation frequently occur without giving rise to any characteristic symptoms, and often without a suggestion of any distinct malady.

A comparison of the results of post-mortem examinations with the records of the previous histories of patients justifies this statement, unless it be urged that the disease occurred so early in life as to have been unappreciated or forgotten. Out of 227 cases of perforated appendix, however, 22, about 10 per cent., were under the age of ten years. This number is far too small to account for the occurrence of evidences of disease of the appendix in more than one out of every three autopsies.

The records of the Massachusetts General Hospital state that an individual with an appendix a half inch long, thickened, curved, and intimately adherent to the thickened and opaque subjacent peritoneum, never had symptoms of inflammation in this region. Another patient was never sick before his fatal illness, although the appendix and cæcum were closely united to the neighboring parts by old fibrous adhesions, and the canal of the appendix was obliterated. Still another patient was always well and strong till within eleven days of

¹ British Med. Journ., 1884, ii. 43.

² N. O. Med. and Surg. Journ., 1855, xi. 468.

his death, yet the appendix was converted into a solid fibrous band intimately united by firm adhesions to the posterior wall of the cæcum. The severity of these lesions suggests the probability that apparently slight disturbances of digestion were overlooked. The diarrhoea, constipation, or abdominal pain, especially when occasionally recurrent, were regarded as characteristic of a feeble digestion. There can be little doubt that a diagnosis of bilious attack, colic, gastritis, enteritis, gravel, ovaritis, congestion of the womb and the like, may not unfrequently conceal the existence of an inflamed appendix.

The latency of the symptoms in certain cases of appendicitis is such that the eventual diagnosis is obscured, and the desirable method of treatment hopelessly postponed. Buck¹ reports that a sailor was at work rolling barrels of flour till the day of his admission to the hospital. He then had a prominent iliac tumor extending along the outer half of Poupart's ligament. Fluctuation was transmitted from it to below the inner half of the ligament. Another sailor left Portland for New York, April 12, 1886, and arrived five days later. In the meantime he purged himself in consequence of a right iliac pain. Although suffering, he kept at work during the following week. He then left for Boston, where he arrived on the thirteenth day after the beginning of the pain. Symptoms of general peritonitis were evident, and he died the next day. General peritonitis was present, the result of an encysted inflammation about the appendix. This organ formed a gangrenous slough lying in the cavity of the abscess.

The latency, as well as the frequent obscurity, of the symptoms of appendicular inflammation is thus apparent. The presence, therefore, of the symptoms now to be mentioned, in individuals from whom the history of one, and particularly of several such attacks is to be obtained, is of marked importance in aiding diagnosis.

Sudden, severe abdominal pain is the most constant, first, decided symptom of perforating inflammation of the appendix. It occurred in 216 out of 257 cases, 84 per cent. In most instances it is present in apparently healthy individuals, in a few it follows an attack of diarrhoea.

The pain is usually intense, rarely slight, and is occasionally accompanied by a chill, or nausea and vomiting.

¹ New York Medical Journal, 1866, ii. 40.

The following table shows its localization in 213 cases of appendicitis, and, by way of contrast, in 92 cases of typhlitis and perityphlitis:

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
In right iliac fossa . . .	103	= 48	55	= 60
“ abdomen . . .	76	= 36	31	= 34
“ hypogastrium . . .	11	= 5	0	
“ umbilical region . . .	9	= 4	2	= 2
“ epigastrium . . .	4	= 2	4	= 4
“ stomach . . .	3	= 1	0	
“ hepatic region . . .	3	= 1	0	
“ left iliac fossa . . .	3	= 1	0	
“ right hip and groin . . .	1	= $\frac{1}{2}$	0	
Total . . .	<hr/> 213		<hr/> 92	

It is quite probable that the number of cases of more exactly localized pain would have been considerably greater had attention been specially directed to this point. Many of the recorded cases of abdominal and hypogastric pain would undoubtedly have permitted a more definite localization, especially as firm pressure often discloses a sensitive spot at some distance from the referred seat. Though usually limited to the fossa, the pain sometimes extends upward as far as the liver, or downward to the rectum, testicle, perineum, or thigh. The attack is occasionally associated with great nervous anxiety, and is at times followed by marked prostration from which the patient rallies in the course of a few hours.

This sudden intense pain is presumably due, not to the actual beginning of the disease, but to the separation of the fresh adhesions of an acute appendicular peritonitis, and often, perhaps usually, to the perforation of the inflamed appendix. It generally represents the beginning of a more extensive peritonitis. An attempt has been made to ascertain the date of occurrence of this most important symptom. This was possible in 61 cases of appendicitis, and in 64 cases of typhlitis and perityphlitis. It occurred as follows:

	Appendicitis.		Typhlitis and perityphlitis.	
	Cases.	Per cent.	Cases.	Per cent.
On the 1st day in . . .	41	= 67	48	= 75
“ 2d “ . . .	5	= 8	10	= 16
“ 3d “ . . .	12	= 20	2	= 3
“ 4th “ . . .	2	= 3	4	= 6
“ 5th “ . . .	1	= 2	0	
Total . . .	<hr/> 61		<hr/> 64	

If the pain is not accompanied by nausea and vomiting, these symptoms are not unlikely to follow. Their occurrence is recorded in 15 cases of appendicitis, and in 44 out of 209 cases of typhlitis and perityphlitis. The vomit quickly becomes green in color, but in general this symptom is not distressing at this stage of the disease. Diarrhoea is rarely present, while constipation is the rule.

The abdominal pain is followed by fever as the next constant symptom. The date of its appearance is noted in but 38 cases of appendicitis, and in only 16 of typhlitis and perityphlitis. It was present

	Appendicitis.	Typhlitis and perityphlitis.
On the 1st day in	5 cases.	6 cases.
“ 2d “	18 “	7 “
“ 3d “	9 “	0 “
“ 4th “	6 “	3 “
Total	<hr/> 38 “	<hr/> 16 “

The temperature is rarely very high, and the constitutional disturbances usually associated with an elevated temperature are frequently slight, if not absent. The maximum recorded in the cases here collected is 103.5° F., but the range is usually between 100° F. and 102° F. With¹ noticed an elevation of nearly 106° F. If violent or extreme changes take place, a complication may be expected, as an abscess of the liver, or a pleurisy from an extension of the local inflammatory process.

During the first three days following the onset of the pain, micturition is occasionally disturbed. Perhaps unusually frequent on the first day, it is likely to be difficult on or after the third day. In certain instances the use of the catheter is required. A satisfactory explanation of this latter feature is to be found in the abundant use of opium usually necessary at this stage of the disease. The right testicle may be retracted and swollen, in which case the course of the pain is apt to be toward this gland.

The circumscribed swelling in the right iliac fossa now demands consideration. This symptom, when present, is evidently of the utmost value in diagnosis, as its appropriate treatment most favorably modifies the prognosis. The swelling represents the accumulation of

¹ Loc. cit.

the increasing exudation, at the outset the product of the peritonitis, and lies beneath the adherent coils of intestine which later become attached to the abdominal walls. Its usual seat is in the right iliac fossa, below a line extending from the anterior superior spine of the ilium to the navel, nearer the former and two finger-breadths above Poupart's ligament. It may lie nearer the median line or may approximate the iliac crest. The swelling may be found in the pelvis in those cases where the appendix becomes attached to the peritoneum of the pelvic wall. It is rare for the primary swelling to be paracæcal, although this variety occurs where the appendix lies embedded behind the cæcum.

The early products of the peritonitis are largely cellular and fibrinous; scanty, opaque, greenish masses are found encapsulated. This condition is obviously not to be recognized by physical signs. As the liquid exudation increases, dulness becomes apparent. This sign may be obscured by intervening and adherent coils of intestine, especially if they are distended with gas, when a superficial gurgling may be recognized. Again, the contents of the abscess may be partly gaseous, a condition more likely to occur later in the course of the disease. A circumscribed resistance is felt on palpation. As the part is often extremely sensitive to pressure and the abdominal muscles tense, the administration of ether or chloroform may be necessary to confirm the diagnosis. A rectal examination not infrequently permits the recognition of the tumor which abdominal palpation fails to disclose, and should always be made in the latter event. Owing to the position of the abscess beneath the transversalis fascia, and to the fact that it is often covered by adherent coils of intestine, a sense of fluctuation is rarely perceived till much later in the history of the case.

The clinical characteristics of the tumor and its composition are thus made evident by modified resonance on percussion, circumscribed resistance on palpation, and a sense of fluctuation. Notwithstanding the importance of these signs, the records of 257 cases of appendicitis give comparatively little information with reference to the date of their appearance. The 209 cases of typhlitis and perityphlitis give a more satisfactory result.

Dulness was first noticed on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	0 cases.	2 cases.
2d "	2 "	0 "
3d "	1 "	7 "
4th "	4 "	5 "
5th "	1 "	2 "
6th "	2 "	0 "
7th "	1 "	1 "
8th "	1 "	4 "
9th "	0 "	1 "
10th "	0 "	3 "
Total	12 "	25 "

Palpation showed the presence of the tumor on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day in	1 case.	4 cases.
2d "	3 "	6 "
3d "	4 "	8 "
4th "	2 "	8 "
5th "	4 "	3 "
6th "	5 "	6 "
7th "	4 "	4 "
8th "	1 "	7 "
9th "	0 "	11 "
10th "	0 "	11 "
Total	24 "	68 "

An attempt has been made to determine the date at which fluctuation becomes evident. As a rule, its appearance is so late in the course of the disease (after the second week) as to be of little diagnostic value. An exploratory puncture with the needle of the aspirator is frequently recommended to determine the nature of the tumor. Too much stress is not to be laid upon this method of examination. If the aspirator fails to show the presence of pus, even after repeated punctures in divers spots, it by no means follows that pus is absent. Operators have frequently exposed the transversalis fascia over the tumor, and have then punctured it in several places. Pus not appearing, the wound has been dressed. In the course of a few hours an abundant discharge of fetid matter has made its appearance in the dressings and at the bottom of the wound.

It is evident, from the consideration of the above table, that the

presence of the abscess may be expected as early as the third day. It may be large enough to contain some three pints of fluid on the fifth day. The following case reported by Peckham¹ apparently justifies the above conclusions.

His patient was a man twenty-seven years of age, who had suffered from abdominal pain and diarrhœa for twenty-four hours. He was then seized with a severe pain in the right iliac fossa, which was fuller than the left, tender, and dull. On the following day the whole abdomen was tender, but there was no complaint of pain. The day after there were great tenderness, dyspnœa, cold hands and feet. The next day, the fifth of the disease, and the fourth from the occurrence of the right iliac pain, the patient died. There was acute peritonitis. In the lower part of the abdomen was a space bounded by the bladder, iliac bones, and small intestine, the latter pushed up and covered by false membrane. In the cavity were nearly three pints of fetid, purulent fluid.

The chief danger from the appendicular peritonitis is that it becomes general. Many of the records mention the time of occurrence, not only of the iliac pain, but also of the subsequent general abdominal pain. The latter is to be regarded as suggestive evidence of the beginning of a general peritonitis, as the former calls immediate attention to the exact nature of the disease. The date of its occurrence is recorded in about one-fourth of the cases of appendicitis, most of which were fatal, while it is noted in but about one-tenth of the cases of typhlitis and perityphlitis, which were nearly all instances of recovery.

General abdominal pain was present on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day	2 cases.	0 cases.
2d "	11 "	6 "
3d "	21 "	8 "
4th "	12 "	4 "
5th "	8 "	0 "
6th "	5 "	1 "
7th "	4 "	0 "
8th "	4 "	0 "
9th "	2 "	0 "
11th "	3 "	0 "
	72 "	19 "

¹ Boston Med. and Surg. Journ., 1882, cvi. 159.

In one of the cases in which this symptom appeared on the first day death occurred on the fourth day. It was stated that there was no perforation of the appendix, although this structure presented a deep purple color and contained a fecal concretion. General peritonitis was present and a considerable quantity of pus was found in the pelvis and vicinity of the appendix. In the other case the general abdominal pain came on three hours after moderate pain in the bowels. It radiated from the right iliac region. In sixty-six hours the patient was dead. The intestines were glued together by a butter-like lymph, but there was no serous or seropurulent exudation.

It was thought desirable to ascertain the date at which tympanitic distention of the abdomen appeared. At the same time it is recognized that this sign of a general peritonitis is of considerably less value than that already stated.

Tympanites was present on the

	Appendicitis.	Typhlitis and perityphlitis.
1st day	0 cases.	1 case.
2d "	7 "	5 cases.
3d "	13 "	8 "
4th "	14 "	2 "
5th "	3 "	2 "
6th "	1 "	1 "
	<hr/>	<hr/>
	38 "	19 "

It is evident, from the above tables, that the majority of cases of resulting general peritonitis begin on the second, third, and fourth days after the inflammation of the appendix is established. This is inferred from the date of the occurrence of the general abdominal pain in sixty per cent. of the cases of appendicitis, and from that of tympanites in nearly ninety per cent. of these cases. The source of this early peritonitis is to be found, in most instances, in the escape into the peritoneal cavity of the inflammatory product encysted near the appendix. Although usually small in quantity at this early period, its quality is exceedingly acrid.

The speedy death of the patient almost invariably results from the occurrence of the general peritonitis. In 176 cases the day of death was as follows :

On the 2d day in 8 cases	=	4 per cent.	} 98 in the 1st week, 56 per cent.	
“ 3d “ 20 “	=	11 “		
“ 4th “ 12 “	=	7 “		
“ 5th “ 20 “	=	11 “		
“ 6th “ 16 “	=	9 “		
“ 7th “ 22 “	=	12 “		
“ 8th “ 21 “	=	12 “		} 54 in the 2d week, 31 per cent.
“ 9th “ 10 “	=	6 “		
“ 10th “ 8 “	=	4 “		
“ 11th “ 6 “	=	3 “		
“ 12th “ 4 “	=	2 “		
“ 13th “ 4 “	=	2 “		
“ 14th “ 1 “	=		
“ 15th “ 3 “	=		} 8 in the 3d week, 4 per cent.
“ 17th “ 1 “	=		
“ 18th “ 1 “	=		
“ 19th “ 1 “	=		
“ 20th “ 2 “	=		
In the 4th week	7 “	= 4 “		
“ 5th “	4 “	= 2 “		
“ 7th “	4 “	= 2 “		
“ 8th “	1 “	= $\frac{1}{2}$ “		

In fatal cases sixty-eight per cent., more than two-thirds, die during the first eight days, and two-thirds of these die between the fourth and eighth days inclusive.

Errors in the diagnosis of appendicitis have been numerous, chiefly because the cardinal symptoms of localized pain, general heat, and circumscribed swelling have not been duly appreciated in their defined sequence. Again, the extreme rarity of acute perforating inflammation of the cæcum, as compared with that of the appendix, has not been made sufficiently conspicuous. The acute form of perforating appendicitis has been confounded with inflammation of the cæcum or typhlitis in an exact sense, intestinal obstruction from intussusception or strangulation, pelvic peritonitis (hæmatocele) of vesical, ovarian, tubal, or uterine origin, psoriasis, and renal or biliary colic. More rarely a movable kidney or a foreign body in the bladder has been suspected.

The chronic appendicular peritonitis and the chronic paratyphlitis resulting from a perforating appendix have been confounded with the results of caries of the spine and hip-joint, suppurative nephritis, intestinal tuberculosis, and cancer of the cæcum. An appreciation of the

previous history of the patient, the seat and character of the pain, the period of occurrence of the fever, and the date of the appearance of the tumor are necessary for an eliminative diagnosis.

A primary perforating inflammation of the cæcum is extremely rare even in chronic dysentery or in chronic tuberculosis. In an extensive research into the literature of the subject but three cases of acute primary perforation of the cæcum have been found: one from a fish-bone, another from a pin, and the third from strangulation of the bowel. Two cases of rupture of the cæcum are recorded. So rare is the affection in question that the possibility of a primitive, perforating cæcitis may be disregarded. Bartholow's¹ communication on this subject relates rather to the secondary perforation of the cæcum from without.

Stercoral cæcitis, on the contrary, is exceedingly common, and is, perhaps, the most important of all the conditions with which the perforating appendicitis may be confounded. The history of this affection usually makes evident a period of protracted constipation in a person not especially young, vigorous, and apparently healthy, who may have had similar attacks. The pain is trifling for a long time, and the sensitiveness slight. Fever is absent, or of late occurrence. The tumor is present at the beginning as a distinct nodular or doughy mass, elongated, and in the lumbar region. It is unnecessary to say that from a stercoral cæcitis may arise a perforative appendicitis which may end in perforation. Many of the so-called cases of typhlitis terminating in resolution, associated with fecal retention, and persisting after the removal of the feces, are undoubtedly of this nature.

Intestinal obstruction from intussusception or strangulation is characterized by the frequent absence of a suggestive previous history. The pain is not so localized or intense, and the fever is not conspicuous at an early stage. The abdomen is distended and tympanitic at the outset, and is, at the same time, unusually sensitive. Borborygmi and perceptible movements of the intestine are associated with or followed by fecal vomiting. Obstinate constipation and the retention of flatus are noticeable. The tumor is absent when the intestine is strangulated, and it is elongated, sausage-like, usually following the course of the colon when intussusception is present. Tenesmus and

¹ American Journal of the Medical Sciences, 1866, N. S., lii. 351.

the rectal discharge of bloody mucus are important signs of the latter affection, though they may occur when the appendix is inflamed.

As four-fifths of the cases of appendicitis occur in males, and as pelvic peritonitis suggests a doubt as to its diagnosis almost invariably in females, it is evident that the question of sex is of eliminative value in certain cases. But the doubt may arise in the case of the female. Barker¹ has reported two cases, the one of hæmatocele, fatal in forty-eight hours, diagnosed as inflammation of the appendix. The second patient also died on the second day; the autopsy showed an inflamed appendix and pregnancy, although the patient was supposed to have had a hæmatocele. Suppressed catamenia and the incipient symptoms of appendicitis not infrequently coexist. Again, the occurrence of symptoms of appendicitis within twenty-four hours after delivery is occasional, and more rarely it represents a cause of abortion. In general, the symptoms and progress of a pelvic peritonitis of pelvic origin would not be likely to suggest an inflamed appendix. The symptom which is of the greatest value in determining the onset of an appendicitis after delivery, is to be found in the rapid development of the tumor without an obvious cause. When the appendicular peritonitis is pelvic in its localization, the previous history and the absence of evidence of disease of the genital tract are to be relied upon to direct attention to the appendix as the cause.

An inflammation of the psoas muscle may be the result of an appendicitis. If due to other causes, and acute in character, the digestive disturbance is lacking, and the pain and sensitiveness are less, the tumor is more vaguely defined and tympanitic from its deep seat, while the motion of the leg is early impaired. A primary, acute suppurative process is of doubtful occurrence.

A biliary colic is rarely likely to suggest an inflamed appendix. The seat and nature of the pain, the absence of fever and peritonitis during the first week, and the possible occurrence of jaundice would tend to eliminate this affection.

In the passage of a renal calculus the seat and character of the pain differ. Fever and the iliac pain are absent. There is no iliac tumor, and the examination of the urine may indicate the probable presence of a foreign body in the ureter.

¹ New York Medical Record, 1880, xviii. 663.

In chronic cases of inflamed appendix the abscess is evident, and its treatment apparent. It may be mistaken for a psoas abscess of spinal origin. If the latter affection is present, evidence of disease of the vertebræ is usually to be obtained. In disease of the hip-joint the impaired mobility and localized sensitiveness of this articulation will be found more extreme than is apparent in the flexed and adducted thigh usually connected with a chronic perityphlitic abscess.

The histories of the cases of intestinal tuberculosis, chronic suppurative nephritis, and cancer of the cæcum are sufficient to eliminate these causes of iliac and lumbar tumors, when disease of the appendix is under consideration.

Perforating inflammation of the appendix sometimes proves fatal from shock. Death usually follows from the production of a general peritonitis by the direct extension of an appendicular peritonitis, or by the rupture of adhesions producing an intervening, encysted, peritoneal abscess. A general peritonitis may also occur by the intervention of a mesenteric thrombophlebitis and its continuance to the portal vein and liver, with or without portal embolism. Among the 257 cases of perforating appendicitis are 11 of pylephlebitis.

In the protracted cases death may result from exhaustion. Shock proves fatal within the first two days, death from an extended peritonitis within the first week, and from a secondary general peritonitis, as a rule, during the first two weeks.

The termination in resolution of a perforating appendicitis undoubtedly occurs, but our present sources of information give no absolute evidence as to the relative proportion of this class of cases to those ending fatally. The consideration of a large number of cases of typhlitis and perityphlitis offers a suggestion as to the possible frequency. Of 180 cases thus designated there terminated

By resolution	58 = 32 per cent.
Spontaneous evacuation	33 = 18 "
Operation	89 = 50 "
	—
	180

It will be generally admitted that the spontaneous evacuation of a perityphlitic abscess is an event to be anticipated and guarded against. Apart from the consequent dangers which may result, possible fatal complications which may precede the time of its expected occurrence

are a sufficient warning. It is, therefore, important to bear in mind that two-thirds of the cases of typhlitis and perityphlitis above tabulated were of unquestioned abscess.

The termination by resolution of nearly one-third may seem a sufficient warranty for recognizing this result as frequent enough to be anticipated in all cases.

That this conclusion is not justified appears from the fact that twelve of these, about one-fifth of the entire number, thus terminated at the end of the second week. Operative interference is demanded before this time in two-thirds of all cases, hence but one-fourth may be expected to undergo resolution.

An additional argument against the plan of waiting with the hope of the occurrence of resolution, is to be found in the frequency of recurrent attacks. Recurrence is recorded to have taken place in 28 out of 257 cases of appendicitis, and in 23 out of 209 cases of typhlitis and perityphlitis; that is, in about 11 per cent. of each. It is at least suggestive of the importance of not waiting too long for resolution, that the number thus terminating during the last two days of the second week is seven per cent. of those ending in resolution. This number may include a considerable part of the recurrent cases which operative interference would have prevented.

The possibility of a termination by resolution must be recognized, and the earliest therapeutic efforts should have this result in view; especially as these efforts also tend toward localizing the peritonitis. But, as Pepper¹ states, "the unjustifiable delay permitted in many cases of typhlitis, whilst hoping day after day for the more definite detection of suppuration, is the direct cause of many avoidable deaths."

To keep the bowels quiet should be the first and last thought. Absolute rest in bed, liquid diet in small quantities often repeated, and, above all, sufficient opium to neutralize pain. A sufficiency may seem enormous. Pétrequin² gave a grain of opium every hour till the pain was relieved, with the result of administering 107 grains in six days. Clark² gave a boy, fourteen years old, 1350 drops of laudanum in one day.

A cathartic or a laxative may be demanded by the patient or friends, and an enema be thought desirable as a diagnostic aid. It is to be

¹ Ext. Trans. Med. Soc. of Penna., 1883.

² Gaz. Méd. de Paris, 1837, 2me S., p. 438.

³ Amer. Med Times, 1861, iii. 258.

remembered that these may be the means of at once exciting a general peritonitis. With¹ states that in the milder cases the pain disappears in a few days, vomiting ceases, and within five or six days tenderness and distention disappear. The bowels open spontaneously a few days after the discontinuance of the opium. They may remain bound for twenty-four days, yet the general health need not suffer. Recovery may proceed quietly, steadily, and without disturbance, and the appetite return long before the bowels are opened.

If, after the first twenty-four hours from the onset of the severe pain, the peritonitis is evidently spreading, and the condition of the patient is grave, the question should be entertained of an immediate operation for exposing the appendix and determining its condition with reference to its removal. If any good results are to arise from such treatment it must be applied early. Burchard² is an enthusiastic advocate of "lumbar typhlotomy in acute perforating typhlitis." No surgeon would hesitate to give this additional chance for life were he satisfied that perforation had actually occurred, and a general peritonitis was imminent.

If surgical interference is not instituted within the first twenty-four hours after the onset of the sudden and intense right iliac pain, to keep the bowels quiet must still be the injunction. The formation of the tumor, the circumscribing of the peritonitis, is then to be awaited. It is sure to form, in the large majority of cases, if the patient lives long enough. It is only in a small fraction that it occurs before the third day. In more than two-thirds of the cases the contents will escape externally or internally. Without surgical aid the escape is into the peritoneal cavity in most instances, with a rapidly fatal result. In a smaller number the escape elsewhere not infrequently produces serious if not fatal sequels.

Iliac abscesses were sometimes incised before the days of Dupuytren and Grisolle.³ The latter writer recommended that they should be opened as soon as fluctuation could be detected, in opposition to the generally prevailing view that nature should take its course. It was left to Mr. Hancock,⁴ however, to operate before this sign could be recognized. He advocated incision into the tumor in certain stages and forms of mischief, resulting from the presence of impacted feces or

¹ Loc. cit.

³ Arch. Gén. de Méd., 1839, iv. 314.

² N. Y. Med. Journ., 1881, xxxiii. 1.

⁴ London Med. Gaz., 1848, N. S., vii. 547.

foreign substances, in either the cæcum or its appendix, which have hitherto, for the most part, invariably proved fatal. He contended that the typhoid condition into which patients affected with peritoneal inflammation fell, did not depend upon the violence of the disease, but upon the effused fluid, the removal of which he thought the only chance of saving the patient. His reasons for operating in the given case are thus stated: "As she was evidently sinking, and the previous treatment had been of no avail, I proposed to make an incision from the spine of the ilium to the inner side of the internal abdominal ring over the hardened spot, so that if it were intestine or omentum it could be freed, or if, as was thought more probable, matter had collected in the right iliac fossa, it could be let out, and thus give our patient a chance for recovery."

Some years later Lewis¹ contributed a paper on abscess of the appendix, which included an abstract of forty-seven cases, only one of which recovered. He referred to Hancock's communication, and urged the propriety of opening the tumor in case of threatening urgency even if fluctuation were absent. Willard Parker,² however, deserves the credit of having demonstrated the success of this operation in three out of four cases, and it is his advocacy of an early operation which has produced such favorable results since 1867. He thought surgery useless in the absence of adhesions, but opportune after the fifth day, when their presence is probable, and the fear of rupture imminent. He considered that an incision made between the fifth and twelfth days was practicable, safe, and justifiable. Even when the diagnosis was doubtful, "if no abscess had already formed, in case one should be in process of formation, an external opening would tend to make it point in a safe direction; and if no abscess should form, a free incision would relieve tension, thus adding to the comfort of the patient, and in no way prejudicing his safety."

In 1873 W. T. Bull³ published an admirable paper on perityphlitis, based upon an analysis of sixty-seven cases thus designated. Thirty-two, nearly forty-eight per cent., terminated fatally, and in fifteen of these there was perforation of the appendix. Noyes,⁴ in 1882, collected a series of one hundred cases of perityphlitis treated by operation, of which eighty were published after the appearance of Parker's

¹ N. Y. Journ. of Med., 1856, i. 328.

² N. Y. Med. Record, 1867, ii. 25.

³ N. Y. Med. Journ., 1873, xviii. 240.

⁴ Reprint from Trans. R. I. Med. Soc. for 1882-83.

paper. Of these, fifteen died, fifteen per cent. of the whole. Even this greatly lowered mortality might have been diminished by excluding one case of cancer and another of phthisis. The almost invariable fatality, in Mr. Hancock's time, of cases not terminating in resolution has thus been reduced to less than fifteen per cent. by the general acceptance of a given operation under definite conditions.

In the table¹ which has been prepared to show the day of death in cases of perforating appendicitis, it appears that 60 out of 176 cases, or 34 per cent., died during the first five days. This early mortality is sufficiently explained by the consideration of the table² of symptoms indicating the onset of a general peritonitis. It appears that of 73 cases of general abdominal pain, this symptom appeared during the first five days in 54 instances, or 74 per cent. Tympanites was noticed during the same period in 37 out of 38 cases, or 97 per cent. It is thus evident that the earliest date fixed by Dr. Parker is too late to afford the possibility of relief in more than one-fourth of all the cases. But early as this date may seem, it has almost universally been the custom to postpone the time of operating till later in the course of the disease. The following table is based upon the analysis of 87 cases of typhlitis and perityphlitis. The operation was performed :

On the	3d day in	1 case.	}	8 = 9 per cent.
"	5th	1 "		
"	6th	3 cases.		
"	7th	3 "		
"	8th	7 "	}	41 = 47 per cent.
"	9th	3 "		
"	10th	11 "		
"	11th	4 "		
"	12th	4 "		
"	13th	6 "		
"	14th	6 "	}	15 = 17 per cent.
"	15th	5 "		
"	17th	4 "		
"	18th	2 "		
"	19th	1 case.	}	23 = 26 per cent.
"	20th	3 cases.		
After 3d week	.	.	.	23 = 26 per cent.
				87

¹ Page 126.

² Page 124.

Hence if the indications for operating justified the election of a date as early as the fifth day, they still more justify the choice of the third day.

The result has shown the wisdom of the former step, and the evidence here presented seems not only to warrant, but to demand the latter. It is evident that the operation to be performed is that of opening the abdominal cavity. It is, therefore, unnecessary to state that an act which twenty years ago might have added to the risks of the patient, may at the present time, when properly performed, be confidently expected to reduce them very materially.

That the incision of the tumor, in cases of perityphlitis, is even now frequently omitted, is apparent from the consideration of the cases of inflamed appendix recently recorded. Of 57 cases occurring, for the most part, during the past five years, there were signs of a tumor in 16; an operation was performed in only 7. The tumor was opened in 4 cases, twice successfully. Laparotomy was performed as a last resort in 3 instances, the diagnosis being intestinal obstruction; the cause of the peritonitis was not discovered, and death speedily followed.

Notwithstanding this evidence of a fatal delay in the appropriate treatment of cases of appendicitis, the tendency to the performance of an earlier operation is growing. Bull¹ states that he operated on the third day after the patient was seized with chill, fever, vomiting, and constipation. There were severe right iliac pain and increased resistance on pressure. The aspirator showed pus in the lumbar region, and an abscess was opened behind the colon. Death occurred two days later, and the autopsy showed a perforated appendix, paratyphlitis, and general peritonitis.

Barlow and Godlee² made an exploratory incision in the median line on the fifth day. They found early general peritonitis and lymph near the cæcum surrounding a collection of fetid pus, presumably of appendicular origin. A second incision was made over the latter. Recovery took place.

Homans³ operated successfully on the sixth day of the disease, probably perforation of the appendix, and the second day after the patient was seen by his physician, Dr. Greene, of Dorchester. The incision

¹ New York Medical Record, 1886, xxix. 267.

² Medical Times and Gazette, 1885, ii. 852.

³ Boston Medical and Surgical Journal, 1886, cxiv. 388.

was made into the abdominal cavity over the seat of pain. The adherent intestines were separated, and some two ounces of pus removed.

Kecn¹ also operated on the sixth day after the occurrence of sudden, intense, right iliac pain. Although the symptoms had been characteristic, they were abating. There was increased resistance, however, dulness on deep pressure, a doughy sensation, and considerable œdema in the right iliac fossa. The aspirator showed pus, and a pint was removed after the abscess was opened.

The presence of a general peritonitis does not contraindicate the operation. The case of Barlow and Godlee shows that the general peritonitis may have begun yet the patient recover. Treves² operated upon a case of peritonitis of two days' duration, supervening upon an attack of pelvic peritonitis of some three months' standing. The patient recovered. Mikulicz³ operated on the sixth day after the sudden right iliac pain in a case where there was evidence of rupture of the abscess into the general peritoneal cavity on the fourth day. The wound was closed, slight improvement followed, but death occurred on the eleventh day.

If the encysted peritonitis becomes general, death has heretofore been almost inevitable. It is thus obvious that if laparotomy was successful in two out of three cases where a secondary general peritonitis was present, there is more than a chance of recovery by its use even in hitherto necessarily fatal cases. But it should be employed only when suitable, and not as a last resort when patients are moribund.

In conclusion, the following statements seem warranted :

The vital importance of the early recognition of perforating appendicitis is unmistakable.

Its diagnosis, in most cases, is comparatively easy.

Its eventual treatment by laparotomy is generally indispensable.

Urgent symptoms demand immediate exposure of the perforated appendix, after recovery from the shock, and its treatment according to surgical principles.

If delay seems warranted, the resulting abscess, as a rule intraperitoneal, should be incised as soon as it becomes evident. This is usually on the third day after the appearance of the first characteristic symptom of the disease.

¹ Medical and Surgical Reporter, 1886, liv. 165.

² Medico-Chirurgical Transactions, 1885, 2d series, l. 175.

³ Volkmann's Samml. klin. Vortr., 1885, cclxii. 2313.

