ditis in children immediate operation should be advised. No matter what the stage of the disease may be, I feel it much wiser to operate at once, and not delay in hopes that at a later date an interval operation may be performed. This advice is in accord with that of many surgeons for appendicitis at any age, but, as already expressed in this paper, I am not entirely in accord with such views, except in cases of children. The older the patient the less tendency there seems to me to be to spreading peritonitis, and the more unfavorable are the results of operation in grave cases.

My own experience with operations for general septic peritonitis has demonstrated to my own satisfaction that the results of the operation on young adults, if they be rapidly performed, are apt to be favorable, while those on patients over 40 or 45 are almost invariably fatal.

I thought it might be of interest to give the age statistics of 1,000 cases of appendicitis, at the time of their operation. While my operative cases number more than this, I have not included those of the last few months, as a round number like 1,000 seemed to me more convenient. I have also tabulated in 1,500 cases which I have personally seen, the ages at which, as far as could be ascertained, the first symptoms of inflammation of the appendix manifested itself.

TIME OF OPERATION OF 1,000 CASES.					
Age in Years.	No. of cases.	Per cent.	Age in years.	No. of cases.	Per cent.
1-2	3		15-16	14	
2-3	1		16-17	24	
3-4	7		17-18	28	
4-5	6		18-19	27	
1-5	17	1.7	19-20	20	
5-6	8		15-20	113	11.3
6-7	10		20-25	176	17.6
7-8	12		25-30	176	17.6
8-9	10		30-35	149	14.9
9-10	11		35-40	99	9.9
5-10	51	5.1	40-45	65	6.5
10-11	15		45-50	35	3.5
11-12	19		50-55	15	1.5
12-13	15		55-60	11	1.1
13-14	21		60-65	6	0.6
14-15	15		65-70	2	0.2
10-15	85	8.5	70-75	1	0.1

RATIO OF AGE TO FIRST SYMPTOMS IN 1,500 CASES.

The proportion which had the first symptoms in the first year is .003 per cent. of all cases.

In first 2 years	1.33
In first 5 years	7.5
In first 10 years	17
In first 15 years	31
In first 20 years	46
In first 25 years	54
In first 30 years	70
In first 35 years	82
In first 40 years	89
In first 45 years	94
In first 50 years	96
In first 55 years	98
In first 60 years	99
In first 65 years	99.5
In first 70 years	99.75
In first 75 years	100

From these statistics it will be seen that young adult life furnishes the largest number of cases of appendicitis. In those that demanded operation, the greatest number occurred between the ages of 20 and 35, the proportion being over 50 per cent. After 35 the proportion of cases becomes rapidly and progressively smaller, between 40 and 50 being but 10 per cent.

Before the age of 20, the proportion is 26½ per cent.; before the age of 15 years, 15 per cent.; before the age of 10 years, .068 per cent. The youngest cases in my series were 12, 12½, 16 and 20 months, respectively. Over 60 years, the proportion was nearly 1 per cent. (.009). The oldest case was 72½ years.

THE DIAGNOSIS OF APPENDICITIS.

SHOULD THE APPENDIX BE REMOVED WHEN THE ABDOMEN IS OPEN FOR OTHER CONDITIONS? *

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So much has been written and said about the ease of diagnosing appendiceal disease, so little stress has been laid on the occasional difficulty of making a correct diagnosis, that condemnation is heaped on those who fail to appreciate the real condition. Sight is lost of the fact that the best diagnosticians and abdominal surgeons are occasionally put to it to determine whether the appendix is the seat of the trouble or not. Mistakes are made by the very best surgeons. Each of us should profit by his own mistakes and the mistakes of his fellows, and each of us should be willing to give the whole profession his experiences, fairly and unreservedly.

I have only removed 272 appendices of which I have accurate records. In forty instances, multiple operations were done at the same séance, and in many of them the diseased condition of the appendix was not definitely diagnosed before opening the abdomen.

In 71 of these cases appendiceal disease was associated with or masked by one or more of the following conditions: In 4 cases by renal calculi; in 5 cases by gallstones or gall-bladder adhesion; in 18 cases by vague symptoms of indigestion, biliousness and indefinite colic; in 5 cases by frequently recurring dysentery or rectal disease; in 3 cases by acute intestinal obstruction, and in 2 cases of typhoid fever; in 12 cases by floating and diseased kidneys; in 1 case by acute septic nephritis; in 1 case by retroperitoneal tubercular abscess; in 3 cases by tubercular peritonitis; in 11 cases by marked menstrual disturbances; in 11 cases by disease of the uterine appendages; in 2 cases, retrocecal herniæ were mistaken for appendicitis, the appendices only becoming involved incidentally. In 2 other cases no diagnoses were made, but exploratory operations demonstrated appendiceal disease. In 1 case, in a young girl, a ruptured dermoid cyst was diagnosed appendicitis, and in another, a right salpingitis was diagnosed appendicitis.

I have done at one sitting, on the same patient, without unusual shock or prolonged convalescence, the following operations: Dilatation of the cervix and curettement of the uterus, removal of a number of enlarged cervical glands and hemorrhoids, anchoring a floating kidney, and removal of a diseased appendix. At another time I removed at the same sitting a diseased appendix, and did a gastroenterostomy for contraction of the pylorus consequent on gastric ulcers two years before.

In the process of evolution, medicine and surgery have reached a stage of development when such terms as colic gastralgia, acute indigestion and intestinal indigestion can no longer be loosely used in diagnosis without subjecting the user to just criticism. They are but symptoms of some definite chemie or mechanic defect in the digestive process, and careful investigation would reveal the underlying pathology, i. e., a contracted pylorus, gallstones or appendiceal disease, or partial intestinal obstruction from old adhesions.

Since Edebohls, Deaver and other leading members of the surgical side of the profession called attention to

* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Surgery and Anatomy, and approved for publication by the Executive Committee: Drs. DeForest Willard, Charles A. Powers and J. E. Moore.

the frequent association of appendiceal and pelvic inflammatory disease, a vigorous discussion has been waged pro and con, the one side claiming that inflammatory disease of the appendix is apt to involve the uterine appendages, and that disease of the appendages is often the direct cause of inflammatory appendiceal disease, while the other side argues with equal zeal that the conditions are separate and distinct and seldom correlated. They hold, therefore, that the appendix should not be interfered with when bound up in adhesions due to pelvic inflammatory disease, and that the freed appendix is not likely to give future trouble.

REMOVAL OF APPENDIX DURING OTHER OPERATIONS, INCLUDED IN CLASS 1 TO 13.

S.O.	Salpingo-oöphorectomy: R., right: D., double.	Class.	No.	Deaths.
Acute intestinal obstruction.....	1	1	..	..
Acute intestinal obstruction.....	4	1	..	..
Exploratory laparotomy.....	6	1	..	..
Exploratory laparotomy.....	5	1	..	..
Dilated stomach, contracted pylorus.....	5	1	..	..
Caseous deposit in R. kidney; nephrotomy.....	5	1	..	..
Tubercular peritonitis.....	5	3	..	..
Tubercular peritonitis.....	5	..	..	..
Ventral hernia, post. op.—repaired.....	5	1	..	..
R. S.O.....	5	2	..	..
R. S.O.....	5	..	..	..
Dermoid cysts of ovaries. D. S.O.....	4	1	..	..
D. pyosalpinx, D. S.O.....	5	1	..	..
D. pyosalpinx, D. S.O.....	13	1	..	..
Gallstones and adhesions.....	5	2	..	..
Gall-bladder adhesions.....	5	2	..	..
Gall-bladder adhesions.....	5	..	..	..
Nephrorrhaphy, right.....	5	6	..	..
Nephrorrhaphy, right.....	6	1	..	..
Ovarian cyst.....	6	1	..	..
Cystic ovary, R. S.O.....	5	1	..	..
Cystic ovaries, R. S.O.....	5	1	..	..
Cystic ovaries, ovariectomy; retro- verted uterus; D. ovariectomy.....	5	1	..	..
Sclerotic ovaries, morphin habitué. D. S.O.....	6	1	..	..
Prolapsed ovary, retroversion, R. O.....	5	2	..	..
Perineorrhaphy.....	5	1	..	..
Perineorrhaphy and trachelorrhaphy.....	5	1	..	..
Acute cholecystitis and general peri- tonitis.....	10	1	1	..
Endometritis, curettement.....	5	2	..	..
Retroperitoneal abscess.....	9	1	1	..
Acute nephritis; nephrotomy.....	1	1	1	..
Total.....		40		

APPENDICITIS (RECORD TO DATE, MAY 27, 1904).

Class.	Cases.	Deaths.
1. Acute (first attack and operating during attack).....	10	1
2. Interval (operation after one attack).....	9	..
3. Acute (operation during attack) chronic relapsing.....	3	..
4. Acute (operation during attack) recurring.....	5	..
5. Interval (operation during interval), chronic relaps- ing.....	87	..
6. Interval (operation during interval), recurring.....	29	..
7. Unclassified (belonging to above 6 headings).....	18	..
8. Abscess (operating during interval).....	5	..
9. Abscess (operating during attack).....	40	5
10. Beginning general peritonitis.....	19	3
11. Consultant (of which there is no record).....	79	..
12. Consultant surgeon (of which there is no record).....	23	..
13. Appendices removed during other operations—		
Class 2.....	1	..
Class 3.....	1	..
Class 5.....	4	..
Class 6.....	1	..
Total to May 27, 1904.....	232	9

	Total deaths, 9; cases, 232	Per cent. = 3.87
Deduct for *septic nephritis and septic cholecystitis.....	2	2
	7	230 = 3.43
Deduct for beginning general peritonitis.....	2	18
	5	212 = 2.35
Deduct for acute abscess.....	5	40
	0	172 = 0.00
	Cases.	Deaths. Per cent.
Beginning general peritonitis.....	18	3 = 16.66
Acute abscess (delayed cases).....	40	5 = 12.5

*One case belonging to class No. 1, the other to class No. 10.

Baldy, in a paper read before the Southern Surgical and Gynecological Association in Atlanta, December, 1903, argued very earnestly this side of the question.

Such argument, it seems to me, is contrary to our knowledge of these diseases, at variance with the best

clinical experience, and is conducive to incomplete surgery and unsatisfactory results.

Kelly, in his classical work on gynecology, gives the opinions of a number of the leading surgeons and gynecologists in this country on this question. Most of them were of the opinion that the removal of the appendix, unless markedly diseased, should not be a routine practice, the author agreeing with these.

The by-no-means infrequent incomplete cures following pelvic operations where appendices have been left, condemning the victim to chronic invalidism, the ever-present anxiety and danger of a severe and fatal attack of appendicitis, have impressed me with the advisability of removing the appendix during all pelvic operations when it shows the least evidence of disease, or when it is accessible and can be removed without undue prolongation of the operation or hazard to the patient.

Had I an appendix, I would feel that any surgeon opening my abdomen and leaving the organ, if accessible, had grievously sinned against me. I entertain this same feeling and a similar opinion for members of my own family. Holding such an opinion, entertaining such a feeling for my own loved ones, could I advocate less for the loved ones of others. Nowhere is the Golden Rule more applicable than in surgery, and the surgeon who does more or less for those who submit their health and lives unreservedly to his skill and honor than he would want done for him or his, under similar circumstances, is recreant to the trust reposed in him, and is unworthy the respect and confidence of honest men and women.

CASE 1.—Mrs. P. W. G., 25 years old. Gave history of having ovaries removed per vaginam one year ago. Since then has had repeated light attacks of pain in the McBurney region and in right side of pelvis. Chronic indigestion for several years. At times has a dragging sensation over right kidney. Admitted to St. Joseph's Infirmary June 26, 1903. Has marked tenderness over appendix; slightly movable right kidney; uterus free, it and cervix being atrophied.

Operation.—June 30, 1903. Gas-ether. McBurney gridiron incision; appendix found in pelvis: was thickened, very much enlarged, and attached by small adhesions. Doyen amputation. Layer closure.

CASE 2.—Miss E. S., 35 years old. Negative family history. Menstruation began at 13 years, was regular but always painful, so a curettement was done eight years ago. For the past four or five years she has suffered for five days before and five days after menstruation, with often severe pains over left ovary. A double salpingo-oöphorectomy, June, 1903, relieved her of all pelvic pain. Dysentery from November to February nine years ago. For years she has had general colicky pains lasting from a few hours to a day or so. Two years ago was in bed a month with "bilious" colic and suffered great abdominal pain. Five months after ovaries were removed she was taken with pain in epigastrium, which became localized in a few hours to appendiceal region. Since then any jolting or exercise caused pain in the left iliac region. A similar attack began ten days ago and pain continued until admitted to St. Joseph's Infirmary March 25, 1904.

Operation.—March 28, 1904. Gas-ether. McRae transverse incision with longitudinal opening of peritoneum, enlarged by a transverse cut. There were thick, dense adhesions of omentum, passing from cecum into pelvis to stump of removed ovary; a retrocecal appendix was dissected out of adhesions by working over and behind border of friable cecum. Appendix tore out of cecum, its lumen being closed. This umbilication was covered over by peritoneum and adhesions, a cigarette drain being carried to this point. Peritoneum closed with No. 1 catgut, silkworm gut being used for the remainder. Very little discharge followed, patient going home well April 25.

CASE 3.—Mr. W. L. L., 30 years old; traveling salesman. History of typhoid at 7, rheumatism at 10 years of age. From five to two years ago he had a diarrhea each spring, ending in a dysentery, all lasting from five to eight weeks, being confined to bed three or four days with the latter. Eighteen months before operation he awoke with slight pains in appendiceal region, which soon went to left iliac region and passed off in about five hours. No nausea or soreness. In two months a similar attack, lasting six hours, another in two months lasting eight hours, etc., an attack about every two months, each getting a little longer. Never any nausea or soreness after the third day, until six months ago, when he was in bed ten days with nausea, marked pain in the McBurney region, with a spasmodic pain in rectum, penis and perineum. Was sore for a week thereafter. Similar attack, lasting six days, two months later, with daily formation of gas in cecum since. Under stomach specialist for weeks, without relief.

Admitted to St. Joseph's Infirmary Aug. 14, 1902. Appendix could be felt (?) with thickening of cecum; urine contained a few casts.

Operation.—Aug. 21, 1902. Gas-ether. McBurney gridiron. Omentum and large intestine only found at wound. A median incision was made, when stomach and transverse colon came into wound; the latter could not be traced to the left, but seemed to enter pelvis on the right side. At first, no small intestine was found; was later located matted in pelvis and collapsed like an obstruction. Tracing the bowel for a short distance, a small Meckel's diverticulum was found; beyond this intestine was thickened, rough, granular, looked tuberculous, and soon became firmly fixed in pelvis surrounded by adhesions, so could not be brought up.

Through the McBurney wound, appendix was found in pelvis surrounded by adhesions. Doyen amputation done. Everything bled freely. Abdomen flushed with saline and each wound was closed in layers, a cigarette drain being placed in the lower angles.

Patient very much depressed for twenty-four hours. Rallied and made uneventful recovery. In two months weighed more than ever before.

CASE 4.—Mrs. H. V. J., 41 years old. Family history good. Oldest child 23 years. Was in labor twenty-four hours; placenta adherent to right side and had to be removed; was very sick for several days following. Never strong thereafter, having a dragging sensation in lower abdomen and pain when wishing to defecate instead of normal reflex. Second child 21 years old. Had hemorrhage after labor and was in bed five weeks. Two years later menses became irregular and she aborted at three weeks; was weak and had a leucorrhea thereafter, and when she walked, hemorrhage returned. Two years after abortion was in bed three weeks, at beginning of pregnancy, from weakness. Three months prior to labor, was "swollen all over" and could not lie down on account of difficult breathing. Four years after this labor was in weakened condition, when lacerated cervix and perineum were repaired, she becoming very much better, but could not walk long at a time. Was told she had prolapsus uteri. For past seventeen years menses have been regular, but she always had a dragging in pelvis and acute, general abdominal pain, which came on irrespective of quietude and lasted one to three hours, being relieved by a hot douche, enema or hot applications to abdomen. One year ago was in bed a day with acute pain over appendix and thereafter had a tearing pain in appendiceal region, when she rested on left side; much walking would also cause it.

Present Illness.—On April 21 was taken with acute pain in the McBurney region, which increased until relieved by morphia six hours later. In another six hours pain had returned and increased until bowels acted.

Admitted to St. Joseph's Infirmary April 23, 1903. Temperature 100, pulse 85, nauseated, weak, tender over right side of abdomen. Rectal feeding until operation, May 10.

Operation.—Gas-ether. Considerable debris from curettement. Laparotomy. Appendix found adherent to right ovary and tube; was much enlarged, brawny, tearing from slightest

pressure. Appendix was too rotten to make cuff, so a chromicized catgut ligature was tied about same, and cauterized and stitched over. Right tube enlarged and thickened; ovary was a cyst, size of an orange; both were removed, the raw surface being closed over and stump stitched to abdominal wall to support the retroverted uterus. Layer closure. Uneventful recovery.

"Now in better health than in twenty years."

CASE 5.—Mrs. D. R. W., 33 years old. Bilious fever and later dysentery, seventeen years ago. Eighteen years ago she fell six feet and was unconscious for several hours and menstruation was delayed for six months. For twelve years after marriage she had a continuous leucorrhea, which was profuse at times. During summer of 1899 she had abscess of both vulvo-vaginal glands, followed by severe pain over left ovary, which continued, at intervals, until the fall, when an application of tincture of iodine and carbolic acid was made to interior of uterus. Peritonitis resulted, confining her to bed for two months, opiates being used to relieve pain. In January, 1900, left pyosalpinx was removed, after freeing adherent intestines, which formed a roof to that part of the pelvis. Was in good health then for a year, when she had la grippe, and tuberculosis was suspected.

Present Illness.—For two or three years has had attacks of pain in right kidney, lasting from two to three days. For a year these have been frequent, with almost constant aching, pain being relieved when she replaced the floating kidney. Has eaten little for the past two years. The smallest amount of food causes pain in right hypochondriacal region.

Operation.—March 29, 1904. Curettement, and sphincter divulsed. Ferguson incision and delivery of right kidney, which was large, hard, and capsule firmly adherent. Posterior flap of capsule stitched to muscles and anterior flap sutured between edges of wound, which was closed with silkworm-gut suture, a cigarette drain being used.

A McBurney gridiron incision was then made, when the cecum and a long appendix, surrounded by adhesions, were found under the border of the liver, the colon passing to left hypochondrium, thence to right iliac region and into pelvis. Layer closure and uneventful recovery.

CASE 6.—Mrs. J. C. H., 35 years old.

History.—Since she can remember, has had a chronic laryngitis. Always a dysmenorrhea, which was not so bad after first child, which is 11 years old. Has had hemorrhoids, almost a continuous leucorrhea and backache since birth of this child. During second pregnancy, eight years ago, she had a violent pain, like colic, in right side of abdomen; a mass soon developed in the right iliac region which was pronounced a "tubal abscess," which later "discharged through uterus" while she was pregnant! She was in bed nearly a year. At times since, has felt this mass in side of abdomen; had frequent attacks of colic, thought to be ovarian, but was conscious of two distinct kinds. Nausea, but no vomiting. Has not been able to walk much for several years on account of pain, and riding was torture. Amputation of cervix and ligation of piles one year ago.

Admitted to St. Joseph's Infirmary Jan. 13, 1904. Had right floating kidney and tenderness over appendix.

Operation.—January 14. Gas-ether. Ferguson incision and delivery of right kidney; posterior flap of capsule sutured to muscles, anterior flap brought between edges of wound. Silkworm-gut closure, with drainage. McBurney gridiron incision. Appendix found in pelvis, surrounded by adhesions and stricture near base. Doyen invagination amputation, raw surface closed over and wound closed in layers.

These appendices ought to have been removed when the first operations were done, and might have been without difficulty, and far less danger than submitting to second operations necessitated. The patients would have been cured, and the operator would have saved himself the discredit of "successful operations that failed to cure the patient."

While laying more stress on removal of the appendices before closing the incisions after pelvic operations,

I also want to put on record as holding the same view with reference to other abdominal operations. How often is the focus of infection that lights up gall-bladder disease an inflamed appendix! The frequent association of chronic appendicitis and movable kidney is now so well recognized as to hardly require mentioning.

Where the two pathologic conditions obtain, the correction of one seldom cures the other. If I am not mistaken, I did the first combined operation for removal of the appendix and the anchoring of a movable kidney through the same incision. I reported two cases before the meeting of the Southern Surgical and Gynecological Association in Atlanta. Both the cases then reported have been kept under observation, and both seem to have been perfect cures.

I have latterly, however, preferred to make separate incisions for each operation, as it requires little more time, and the work can be much better done.

FACTORS IN THE MORTALITY OF APPENDICITIS.*

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Infectious inflammation of the vermiform appendix has occupied the attention of the medical profession for many years, has been discussed and debated at hundreds of society meetings, and has furnished a fertile theme for thousands of good, bad and indifferent medical authors. Books have been written on the subject in France, in Germany, in England, and in the United States describing the historic episodes, the pathology, the diagnosis and the treatment of the disease.

The vermiform has been cut off, tucked in and turned inside out; the patients have been purged, narcotized, packed in ice or baked in poultices; they have been starved or instructed to walk on all fours like quadrupeds; leucocytes have been gazed on through the barrel of the microscope and tested for glycogen, and the urine assiduously examined for indican, acetone or albumin, and yet, with all this study, all of the examinations, a fatal appendicitis caused by a little 8x1 cm. organ has doomed thousands of suffering humanity to an early and untimely end. The lack of common sense and ordinary intelligence in eliciting the history of the attack or the neglect of the use of the only instrument of any service in the diagnosis of this disease, the palpating hand of the practitioner, is responsible for much of the mortality.

ERRORS IN DIAGNOSIS.

Errors in diagnosis are to be considered under two headings:

1. The time that elapses between the onset of the disease and the production of sufficient symptomatic reaction to attract the attention of the patient.
2. The delay of the physician himself in reaching a diagnosis.

In regard to a period of latency, it is undeniable that in a few cases the most prompt diagnosis and early operation discloses advanced pathologic changes, with a thin, seropurulent fluid throughout the peritoneal cavity. The appendix may show little macroscopic evidence of disease, or may be perforated and gangrenous. Many of these patients recover, some of them die, and

in the latter event neither the practitioner nor the surgeon can be reproached for an error in judgment. They were operated on at the time of election, and were the few exceptions to the rule. Some patients suffer habitually from colicky pain in the abdomen, due to intestinal fermentation and the accumulation of flatus; some women suffer abdominal pain at the menstrual epoch; many patients have acquired the too ready habit of using laudanum or paregoric for every abdominal ache or pain, and especially when the sufferer is a child.

In such the onset of serious symptoms may not have given warning that something unusual and more severe has occurred until the disease has advanced into the later stages. It is the duty of the practitioner to continually and persistently impress on his patients the danger that lies in the uncontrolled use of opiates, particularly in children, in whom the percentage of the more severe grades of appendicitis is greater than in adults.

The failure to make an early diagnosis of acute appendicitis is responsible for most of the factors entering into the mortality of the disease. With a nearly unanimous agreement among experienced surgeons that operation is indicated in the early hours of the attack, the great importance of prompt diagnosis can be clearly perceived.

In every sudden abdominal pain the probability of an appendicitis should be borne in mind, and no other diagnosis considered until that disease can definitely be excluded.

An abnormal position of the appendix may make the diagnosis difficult at times, and in certain of the fulminating types when there is a very obscure history, it is often difficult to locate the source of the peritoneal infection. Salpingitis, cholecystitis, perforated gastric ulcer, acute pancreatitis, intestinal obstruction, mesenteric thrombosis, enteric fever, basal pneumonia, diaphragmatic pleurisy and a few other conditions are often confused with appendicitis; but the history, the onset and the sensation experienced by the palpating hand will usually differentiate the true condition.

The subject of the differential diagnosis is outside the province of this paper.

In children abdominal pain is of such common occurrence that an appendiceal colic is very apt to be unrecognized. This is especially true in the first year of infancy, and cases with comparatively mild local symptoms are certainly rarely diagnosed. If the process goes on to abscess formation, the condition is more readily discovered if the possibility of an appendicitis is not forgotten.

One of the greatest fallacies which has ever been propagated to account for appendiceal symptoms is rheumatism. In an extensive experience with appendicitis I have always found true appendiceal symptoms to be due to a diseased appendix in every case, even where rheumatism has been held responsible for the symptom-complex prior to operation. Without dilating further on the diseases that may be diagnosed when appendicitis is the true lesion, it may be well to consider why such confusion continually arises.

Acute appendicitis in the great majority of cases is easy of perception, even in the earliest stages. The disease is so prevalent, the cases observed by every practitioner of medicine so numerous, that one can but wonder at the continuous stream of pus-bearing abdomens that flow into a large hospital yearly. Every physician

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