

**Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota**

**Appendicitis
With Extension**

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume XII

Friday, November 8, 1940

Number 6

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Published for the General Staff Meeting each week
during the school year, October to May, inclusive.

Financed by the Citizens Aid Society

William A. O'Brien, M.D.

I. LAST WEEKDate: November 1, 1940Place: Recreation Room
Powell HallTime: 12:15 to 1:20 p.m.Program: Movie: "Set 'em Up"Rheumatic Fever in Childhood
Paul F. Dwan
Arild E. HansenDiscussion
Irvine McQuarrie
Dean Clark (U.S. Public
Health Service)
M. J. Shapiro
Arild E. HansenPresent: 170Gertrude Gunn
Record Librarian
- - -II. MOVIETitle: "The Pointer"
A Walt Disney ShortReleased by: R-K-0
- - -III. ANNOUNCEMENTS1. ROBERT R. TRACHT, M.D.Announces the Opening of Offices
specializing in
Care of the Eye404 Lowry Medical Arts Building
St. Paul, Minnesota
Tel: Cedar 2665 Hours 4 to 6
- - -2. STUDY SUBJECTfor the month of
November for the Minnesota State Medi-
cal Association is Prevention of
Blindness. The packet contains the
following items:THE CROSS-EYED CHILD -
Diagnosis and Treatment - Hendrie W. GrantCOMMON EYE INJURIES - Erling W. Hansen
GLAUCOMA - Edward P. Burch
GLAUCOMA Treatment and
Features of Interest
to the Internist - W. L. Benedict
SAFEGUARDS IN CATARACT
SURGERY - Frank E. Burch
BLINDNESS DUE TO
NEGLECT - Frank E. Burch
SOME PRINCIPLES INVOLVED
IN SURGERY OF THE
EXTRA OCULAR MUSCLES
- Avery DeH. Prangen
CAUSES OF BLINDNESS IN
MINNESOTA - Charles E. Stanford

The radio program is as follows:

William A. O'Brien, M.D., speaker
Time 11:00 to 11:15 A.M., Saturday
Stations WCCO, WLB and KDALNov. 2 EYE INJURIES
Nov. 9 GLAUCOMA
Nov. 16 THE CROSS-EYED CHILD
Nov. 23 CATARACTSNote: The talk on November 30 is for
the Minnesota State Dental Association.
- - -3. OUR GUESTS TODAYEdward W. A. Ochsner, New Orleans
Odair P. Pedro, San Paulo, Braxil
John I. Appleby, Bellevue, Ohio
Ellis E. Baker, Scottsbluff, Nebr.
M. A. Blackstone, Sioux City, Ia.
Julius Blom, Woodville, Wis.
Clarence E. Crook, Lincoln, Nebr.
W. Max Gentry, Gering, Nebr.
Harold W. Havel, Jordan, Minn.
Elmer N. Hunter, Detroit, Mich.
Harvey L. Jorgenson, Marinette, Wis.
F. Paul Kortsch, Prior Lake, Minn.
Arnold Larson, Detroit Lakes, Minn.
Everett H. Lindstrom, Helena, Mont.
D. S. MacKenzie, Jr., Havre, Mont.
Charles J. Meredith, Valley City, N.D.
Leslie A. Moren, St. Paul, Minn.
Arthur J. Offerman, Omaha, Nebr.
T. P. Ranney, Aberdeen, S. D.
Paul Reed, Rolla, N. D.
H. T. Skovholt, Williston, N. D.
John F. Sparks, Kingston, Ontario, Can.
Maurice L. Whalen, Bruce, Wis.
R. J. Wilkowske, Owatonna, Minn.

IV. APPENDICITIS WITH
EXTRA-APPENDICAL EXTENSION

F. B. Mears
B. H. Ramsay
C. Dennis

1. Incidence and Mortality

The studies of Aschoff upon necropsy material indicate that 75 to 80% of persons dying in the sixth and seventh decades of life exhibit evidence of previous disease of the appendix. Kraft of Denmark believes that about 10% of people during their lifetime have at least one attack of appendicitis. Among those recovering spontaneously from one attack, he estimates the recurrence rate to be 30%.

Estimates on the number of appendectomies performed annually in this country vary from 300,000 to 1,500,000. If one classifies the cases according to the age of the patient, it is found that 70% fall between the ages of 10 and 30 years.

In the United States the death rate due to appendicitis has increased rather than decreased with the passage of time. In 1910, 11.4 out of every 100,000 of the general population died of appendicitis, while 2 decades later, in 1930, the death rate from appendicitis had risen to 18.1 per 100,000. Each year from 18,000 to 20,000 persons die from the disease in this country. In 1935 appendicitis ranked as the fifteenth most important cause of death, and, according to various estimates, it is the second to fifth most frequent cause of death in patients from 5 to 19 years of age.

Separate consideration of the mortality rate in each stage of the disease shows that if inflammation is localized to the appendix itself at the time of appendectomy, the mortality rate is 0.48% in a large series of cases reported from a number of clinics (Table I). In those cases in which the process had extended beyond the appendix itself, the

Table I
Mortality Rates in Appendicitis with
reference to extra-appendical
extension

	<u>Number</u> <u>of cases</u>	<u>% Per-</u> <u>forated</u>	<u>Mortality rates in %</u>		
			<u>Without</u> <u>extension</u>	<u>With ex-</u> <u>tension</u>	<u>Total</u>
Coller & Potter (Michigan)	336	36.6	0.46	10.6	4.2
Reid et al. 1936 (Cincinnati)	2737	31.3	0.58	18.8	6.3
Finney (Union Memorial, Baltimore)	3913	17.35	0.57	10.8	2.3
Stafford & Sprong (Johns Hopkins)	1317	36.4	0.	10.	3.6
Barrow and Ochsner (Tulane)	1039	17.	0.8	27.3	5.3
Miller et al. (Child- ren only; Cook County)	1163	21.8	0.	11.8	5.4
Total	10,505	24.4	0.48	14.3	4.12

combined mortality rate was 14.3%. The proportion of total cases presenting extra-appendical extension on admission to the hospital varies from 15 to 50% among various clinics, averaging about 25%. In the

figures shown in Table I, a large part of the variation in mortality rates is due to differences in manner of classification of cases. Since 91% of the deaths in this group occurred in cases

with extra-appendical extension, it is here that most effort must be expended in attempting to lower the appendicitis mortality rate, and it is with this group that this discussion is concerned today.

2. Pathogenesis of Appendicitis

Many theories have been advanced to explain the occurrence of appendicitis. Blood-borne and enterogenous infection, spasm of the appendical vessels, dietary peculiarities, trauma, foreign bodies, and mechanical factors have all had their advocates.

The only means by which experimental appendicitis, comparable to that seen clinically, has been produced is through luminal obstruction. It has been shown at this clinic that the disease may be produced in species in which the appendix secretes fluid, namely man, the rabbit, and the chimpanzee, by the simple expedient of ligating the organ, sparing the blood supply. Increased intraluminal pressure places tension on the appendical wall with consequent pinching off of some of the vessels and resultant foci of ischemic necrosis, offering an open field for whatever bacteria happen to be present and a weakened area through which rupture may occur.

The nature of the obstructing mechanism has been considerably investigated by various members of this staff. Wangenstein and Bowers found all of a series of gangrenous appendixes to show complete or almost complete obstruction, usually by fecaliths; in a group presenting acute inflammation without gangrene, longitudinal section after formalin fixation failed to show luminal obstruction in 28% of the specimens. Dennis has shown that many of this last group present a spastic obstruction of sufficient degree to account for the appendicitis. Other mechanisms are occasionally found, such as kinks from adhesive bands. Edema of the lymphoid tissue of the appendix parallel with general lymphoid enlargement in certain types of infection has been blamed.

The type of bacteria present in the lumen at the time of obstruction is of

importance in regard to the virulence of the infection which follows in the appendical wall and in the peritoneum, if time and the local factors of degree of obstruction and secretory activity of the mucosa permit. In various reported series of cases of appendical peritonitis the following organisms were most often found, either in pure culture or in combination; colon group (70-90%), streptococci, anaerobes of the Welch type, bacillus fusiformis, and diphtheroids.

3. Factors in Extra-appendical Extension

A number of uncontrollable factors are involved in the occurrence of extra-appendical extension in appendicitis. It has been shown at this clinic that few if any cases resulting from spastic or other low-grade obstruction proceed to perforation or gangrene. On the other hand, nearly all cases in which complete luminal obstruction has occurred, whether from stricture or from stricture plus stone, and in which the secretory capacity of the appendical mucosa is normal, proceed to perforation or gangrene unless appendectomy is performed.

The importance of the identity of the predominant organism in the appendical lumen is not yet settled in reference to occurrence of perforation, but is undoubtedly important with regard to the virulence of the peritonitis induced.

Two controllable factors are also of importance in extra-appendical extension: time and purgation. If appendectomy can be done early in the course of the disease, sufficient time for extension will not have been allowed. Mont Reid and his associates, who operate on appendicitis when the diagnosis is made, regardless of extra-appendical extension, found 44 hours to be the average duration in unruptured cases, and longer periods in more advanced cases. (See Table II).

Table II

Relation of Duration of Appendicitis
to Findings and Mortality

	<u>Average Duration of Attack</u>	<u>Mortality</u>
Unruptured cases	44 hours	0.86%
Cases with abscess	127 hours	11.4%
Cases with general peritonitis	21 hours	33.9%

No date could more effectively express the need for early hospitalization, diagnosis, and appendectomy.

Purgation after the onset of appendicitis increases the mortality steeply. In Philadelphia, Bower found that of those patients with acute appendicitis who took no cathartic, one in 80 died; of those who took one cathartic, one in 13 died, while of those who took two or more cathartics one in 7 died. Insofar as we have been able to find, no evidence has been presented to prove that rupture occurs earlier if cathartics are used. Some experiments on rabbits at this clinic suggest, however, that the mechanism is through increased bowel activity and consequent prevention of walling off of the process after perforation.

In many instances in which appendectomy is not performed, the inflammatory process subsides spontaneously. Evidence has been found here that diminution or cessation of fluid secretion occurs under the influence of prolonged pressure elevation insufficient to cause rupture. Seepage of fluid through the appendical wall has also been shown to occur at the pressures involved. Such occurrences, as well as localization of the process by adhesions after perforation, explain much of the success of the conservative treatment of late cases.

4. Diagnosis of Appendicitis with Extra-appendical Extension

Inasmuch as appendicitis is primarily a closed loop obstruction without interference with the main fecal stream, the initial findings are more or less crampy

pain, only after some hours localized in the right lower quadrant, and local tenderness on pressure. Only after the ischemia secondary to increased intraluminal tension has set the infective factors in motion may one expect fever, increase in pulse rate, and elevation of the leukocyte count. Sudden cessation of pain with continuation of the other symptoms may mean gangrene or perforation. Continuous vomiting is indicative of gangrene, perforation, or intestinal obstruction. The majority of patients with generalized peritonitis of appendical origin exhibit generalized abdominal pain and tenderness, absence of peristaltic sounds on auscultation of the abdomen, rebound tenderness without reference on both sides of the abdomen, tenderness on both sides on rectal examination, and distention.

Localization of the process is indicated by limitation of rebound tenderness to the appendical region or reference of the pain to this region after sudden release of pressure from other areas in the abdomen. Mass formation palpable on either abdominal or rectal examination is strong evidence of localization, but its presence is dependent on the duration of the illness.

Elevation of the pulse above 120 and fever above 102 by mouth are corroborative points suggesting extension.

A scout film of the abdomen is of assistance in cases of suspected perforation. Obliteration of the peritoneal line on the right indicates edema or inflammation of the abdominal wall and bowel in this area. Separation of loops of bowel by fluid can frequently be

demonstrated in cases of generalized peritonitis.

5. Treatment

In a series of more than 4,000 cases of appendicitis, Stanton correlated the duration of symptoms, the peritoneal changes, and the mortality attendant upon appendectomy. Within 24 hours of the onset of symptoms, 30% of his cases presented peritoneal exudates, although without enough damage to the peritoneum to prevent healing after appendectomy. From 24 to 48 hours, 40% of cases presented a more marked reaction without prevention of healing. From 48 to 72 hours, however, 60 to 80% had severe peritoneal involvement with an incident post-operative mortality of nearly 10%. As progressively older cases were considered, the mortality reached a peak at the 4th day, and then dropped to 2.4% on the 10th day.

Table III

Effect of Duration of Attack on Mortality Rate Attending Appendectomy

<u>Days</u>	<u>Number of Cases</u>	<u>Mortality %</u>
1	1507	1.3
2	912	3.0
3	663	8.9
4	356	12.9
5	442	11.6
6	346	8.4
7,8,9	178	2.8
10 and up	288	2.4

Conservative Management

Because of the foregoing findings, late cases are treated by conservative measures with deferred operation in many clinics, as first outlined by Ochsner. Ochsner believes that 60 to 70% of cases of appendical peritonitis will subside under conservative management, and that in 20 to 30% of cases localized abscesses will form, with a mortality of 4 to 5% incident to drainage.

The principles of conservative manage-

ment of appendical peritonitis have been collected from the literature and listed as follows:

1. Bed rest.
2. Hot packs to the abdomen.
3. Fowler's position to favor localization of secondary abscesses, if any, in the pelvis.
4. Duodenal suction to put bowel at rest and combat distention.
5. Nothing by mouth.
6. Maintenance of fluid and salt balance by paroral fluid administration.
7. Administration of adrenal cortex extract to combat toxemia and to aid in maintenance of electrolyte balance.
8. Morphine (except in young children), to prevent distention by its tonic action on the bowel.
9. Oxygen in high concentrations to combat distention. (According to Haggard, oxygen either increases the resistance of the patient or decreases the virulence of the organisms.)
10. Repeated small blood transfusions to combat anemia and hypoproteinemia.
11. Constant search for and appropriate treatment of secondary intra-peritoneal abscesses with delay of drainage until intervention is forced by rising pulse and increasing fever.
12. Sulfanilamide administered subcutaneously as an 0.8% solution in 0.9% sodium chloride every six hours in quantity sufficient to maintain the blood level above 5 milligrams per cent. (Both Corry and Ravdin have reduced their mortality rates in appendicitis by over 70% with the use of this drug.)
13. Other chemotherapeutic agents (the recent use of sulfapyridine intravenously or by rectum at the Minneapolis General Hospital indicates that this drug is more effective than sulfanilamide), and
14. Interval appendectomy after an interval of 6 weeks to 6 months.
15. Certain additional agents with less wide use: bacteriophage, Welch serum, pitressin (McClure), and intravenous alcohol (Haggard).

Radical Management

Other groups feel unequivocally that the Ochsner treatment of appendicitis with extra-appendical extension is poor therapy. These surgeons subject all patients with acute appendicitis to immediate appendectomy regardless of the stage of the disease with the exception of special cases such as moribund patients. If there is a definitely walled off abscess apparent on laparotomy, some of these groups close the abdomen without removal of the appendix.

In these "radical" clinics, the pre-operative preparation of the patient is accomplished as rapidly and yet as completely as possible, and often the patient is routinely transfused upon the operating table. Drainage is used by some, but the general trend is toward omission of drainage to avoid post-operative adhesions. It is universally accepted that post-operative care of the patient should embody the majority of Ochsner's principles of conservative therapy.

This more radical group presents the following arguments in defense of operative treatment:

1. Even experienced surgeons are at times unable to tell when an acutely inflamed appendix has ruptured. Rhodes found that preoperative diagnoses were 34 to 53% incorrect with reference to the local pathological condition, position of the appendix, and the extent of the peritonitis.
2. It is not always possible to know the cause of peritonitis. The correct diagnosis at operation may prove life-saving.
3. They believe that the first step in treatment should be the elimination of the source of the infection and that the conservative principles of therapy should be applied only as adjuncts in the postoperative care. In Stafford's series the mortality has been cut in half since 1930 by the application of Ochsner's principles to postoperative care.
4. Operation on an appendical abscess does not spread the infection. In one series

of 283, only 2 were complicated post-operatively by a spreading peritonitis.

5. In using the delayed or conservative therapy, the appendix has not been removed at the time the patient leaves the hospital. A considerable number (50%, according to Stafford and Sprong) fail to return for interval appendectomy. Recurrent bouts may prove fatal.
6. Mortality statistics in the radical group are as satisfactory as in the conservative group.

Procedure at the University of Minnesota Hospitals

The treatment employed here is as follows:

1. Cases seen before 48 hours and lacking evidence of extra-appendical extension are subjected to appendectomy.
2. Cases obviously subsiding when first seen are allowed to wait 6 weeks for appendectomy.
3. Cases in which extra-appendical extension is evident receive conservative therapy.
4. Cases in which extension is doubtful are subjected to immediate appendectomy.

Conservative treatment at this hospital includes rest flat in bed, hot packs to the abdomen, nasal suction, limited clear liquids by mouth, parenteral fluids, morphine (or codeine in children), repeated small transfusions, observation for and drainage of abscesses, sulfanilamide, and occasionally oxygen.

Survey of Results of Treatment of Appendicitis with Extension at the University of Minnesota Hospitals

From January 1, 1935 to July 1, 1939, there were 1313 cases admitted to the University of Minnesota Hospitals with a diagnosis of: (1) interval appendicitis, (2) acute uncomplicated appendicitis, or (3) appendicitis with perforation. 207 of these cases (15.7%) were classified

as perforated, and have been studied in detail.

Cases of appendicitis with perforation have been divided into two groups:

Group I - Appendicitis with extra-

appendical localization, i.e., abscess or localized peritonitis, and

Group II - Appendicitis with generalized peritonitis.

Our mortality figures are presented here.

Table IV

Mortality Figures in Acute Appendicitis at University of Minnesota Hospitals

<u>Type of Appendicitis</u>	<u>Number of cases</u>	<u>% of Total Number of cases</u>	<u>Deaths</u>	<u>Mortality %</u>
Acute uncomplicated and interval	1,106	84.2	6	0.54
Perforative:				
I - with localization	139	10.6	4	2.88
II - with general peritonitis	68	5.2	13	19.1
Total	1,313	100.0	23	1.75

Of the 207 cases of appendicitis with perforation, there were 17 deaths, a mortality rate of 8.22%. It should be noted that the term "interval" designates cases admitted in the quiescent stage, without previous history of perforation, and operated upon in the interval between attacks. Cases of acute appendicitis with perforation discharged from the hospital after being treated con-

servatively, and returning later for operation, are included under the classification in which they were first seen.

The results of previous surveys of cases treated in this hospital are of interest for comparison with our present series. Such a comparison is presented in the next table.

Table V

Successive Studies on Mortality Figures in Acute Appendicitis at University of Minnesota Hospitals.

<u>Type of Appendicitis</u>	<u>1920 - 1929</u>		<u>1932 - 1935</u>		<u>1935 - 1939</u>	
	<u>Cases</u>	<u>Mortality</u>	<u>Cases</u>	<u>Mortality</u>	<u>Cases</u>	<u>Mortality</u>
Acute uncomplicated and interval	411	0.48%	343	0.29%	1,107	0.54%
Perforative						
I - with localization	268	5.6%	107	3.7%	139	2.9%
II - with general peritonitis	21	38.0%	68	33.8%	68	19.1%
Total	700	3.4%	518	5.6%	1,313	1.75%

In the acute uncomplicated and interval cases, as previously noted, there were six deaths, all in adults, with an average age of 35 years. Two were males and four females. The causes of death were:

Paralytic ileus without peritonitis	1
Acute right heart failure (cause?)	1
Cyclopropane death	1
Bronchopneumonia and heart failure	1
Hyperpyrexia -- hypothalamic cyst	1
Portal vein thrombosis and uremia	<u>1</u>
Total	6

Number of autopsies - 6 (All)

The admission findings are presented in:

Table VI

Statistics on Patients with Appendicitis with Extra-appendical Extension

	<u>Group I</u>	<u>Group II</u>
	Appendicitis with extra-appendical extension, i.e., abscess or local peritonitis.	Appendicitis with Generalized Peritonitis.
1. <u>Number of Cases</u>	139	68
Proportion of perforated group	67.2%	32.8%
Proportion of total group	10.6%	5.2%
Number of males	86	45
Number of females	53	23
Number of adults	70	28
Number of children	69	40
Mean age of adults	47 years	33.2 years
Mean age of children	10.4 years	8.9 years
Mean age of total	28.8 years	18.9 years
2. <u>Number with history of one previous attack</u>	40	17
Proportion of each group	28.8%	25%
Number with history of more than one previous attack	16	10
Proportion of each group	11.5%	14.7%

Table VI (Cont.)

	<u>Group I</u>	<u>Group II</u>
3. <u>Use of cathartic or enema</u>		
Cathartic (one)	25	18
Cathartic (two or more)	<u>13</u>	<u>3</u>
Total	38 (27.3%)	21 (30.9%)
Enema (one)	9	3
Enema (two or more)	<u>3</u>	<u>3</u>
Total	12 (8.6%)	6 (8.8%)
Cathartic and enema	5 (3.6%)	0
Total having cathartic and/or enema	<hr/> 55 (39.6%)	<hr/> 27 (39.7%)
4. <u>Duration of symptoms before admission</u>		
Mean	5.87 days	2.98 days
Maximum	90 days	35 days
Minimum	6 hours	12 hours
5. <u>Symptoms</u>		
Pain	100. %	100. %
Nausea	91.4%	91.2%
Vomiting	79.2%	82.4%
Anorexia	88.5%	80.9%
Chills	15.8%	8.8%
Diarrhea	20.8%	19.1%
Cessation of pain	5.1%	7.1%
6. <u>Signs</u>		
Tenderness	99.4%	100.0%
Spasm	91.4%	95.6%
Rebound tenderness	81.4%	92.7%
Abdominal mass	41.0%	10.3%
Rectal mass	22.3%	7.4%
Rectal tenderness	82.8%	85.3%
Distention	9.4%	19.1%
7. <u>Average admission accessory findings</u>		
Temperature	101.05 degrees	101.67 degrees
Pulse	106	116
Leukocyte count	17,800	18,500
Polymorphonuclears	83.4%	87.0%

Table VI (Cont.)

	<u>Group I</u>	<u>Group II</u>
8. <u>Associated disease</u>		
Upper respiratory infection	6	3
Cardiac disease	4	3
Diabetes mellitus	3	-
Scarlet fever	2	1
Syphilis	2	1
Epilepsy	2	-
Aortic aneurysm	1	-
Pulmonary tuberculosis	1	-
Pin worms	1	-
Pneumonia	1	-
Hyperthyroidism	1	-
Peptic ulcer	1	-
Cystitis	1	-
Osteomyelitis	1	-
Pernicious anemia	1	-
Epidemic parotitis	1	1
Mastoiditis	1	-
Otitis media	1	2
Impetigo	-	1
	<hr/>	<hr/>
Total	31 (22.3%)	12 (17.7%)

Only the aortic aneurysm was considered a contributing factor in mortality of series.

Two cardiacs and one parotitis were associated with a fatal peritonitis. None of importance in fatal outcomes.

Table VI (Cont.)

9. <u>Treatment and outcome</u>	<u>Group I</u>				<u>Group II</u>			
	<u>Number of Cases</u>	<u>% of group I</u>	<u>Number of deaths</u>	<u>Mortality %</u>	<u>Number of cases</u>	<u>% of group II</u>	<u>Number of deaths</u>	<u>Mortality %</u>
a. Immediate appendectomy, with drainage at time	10	7.2	0	0	4	4.9	2	50.0
b. Immediate appendectomy, without drainage	13	9.4	2	15.4	2	2.9	0	0
c. Conservative without drainage	100	71.9	1	1.0	52	76.5	10	19.2
d. Conservative with drainage of abdominal abscesses	14	10.1	1	7.1	7	10.3	1	14.3
e. Conservative with proctotomy	1	0.7	1	0	3	4.4	0	0
f. Conservative with colpotomy	1	0.7	0	0	0	0	0	0
Total	139	100.0	4	2.88	68	100.0	13	19.1

Of the ten patients treated by appendectomy with immediate drainage, two subsequently developed abdominal masses necessitating drainage by the abdominal route. Two conservatively treated cases were given paroral sulfanilamide solution.

Of the two patients that died following appendectomy with immediate drainage, both developed inflammatory masses subsequent to appendectomy, one of which was drained through the abdomen, the other by colpotomy. Four conservatively treated cases were given sulfanilamide; one died.

10. Return for appendectomy after conservative treatment

Number dismissed after conservative treatment	114	51
Number returned for appendectomy	102 (89.5%)	42 (82.3%)
Number failing to return for appendectomy	12 (10.5%)	9 (17.7%)
Mortality of interval appendectomy	0	0

Table VI (Cont.)

	<u>Group I</u>	<u>Group II</u>
11. <u>Complications</u>		
Abscess	106	43
Wound infection	10	1
Mechanical bowel obstruction	4	0
Paralytic ileus	3	9
Fecal fistula	1	1
Perforation of bowel	0	3
Generalized peritonitis	2	-
Pneumonia	2	5
Empyema	-	3
Pyelophlebitis	-	2
Cellulitis of abdominal wall	1	-
Evisceration	1	1
Thrombophlebitis	1	-
Tracheitis (requiring tracheotomy)	-	1
Rectovaginal fistula	-	1
Septicemia	-	1
Liver abscess	-	1
Lung abscess	-	1
Ileocolic fistula	-	1
Enteritis	-	1
Pleural effusion	-	1
Total number of cases complicated	115 (82.8%)	55 (80.9%)
Number of cases with more than one complication	13 (9.4%)	16 (23.6%)

Seven of the wound infections followed appendectomy without drainage; three followed appendectomy with drainage (one of these eviscerated). Of those developing mechanical bowel obstruction, two had latent periods of eight and eighteen months.

The wound infection followed appendectomy without drainage; the evisceration followed appendectomy with drainage.

Table VI (Cont.)

	<u>Group I</u>	<u>Group II</u>
12. <u>Abscesses</u>		
Number of cases which developed abscesses	106 (76.3%)	43 (63.3%)
Number of cases which developed more than one abscess	4	5
Location of abscesses		
Right lower quadrant	89	24
Polvic	12	18
Left lower quadrant	5	2
Right upper quadrant	2	2
Subphrenic	<u>2</u>	<u>2</u>
Total	110	48

If a mass was palpable both by abdomen and by rectum, the location was classified as lower quadrant.

13. Days in the hospital
(excluding return for appendectomy)

Mean	17.7	23.1
Maximum	83	113
Minimum	3	1

14. Bacteriology

Number of cases in which bacteriology was recorded (usually mixed infection)	25	16
Peritoneal culture at operation or autopsy		
<u>B. coli</u>	12	5
<u>Streptococcus</u>		
Hemolytic	2	
Non-hemolytic	1	
<u>Staphylococcus</u>	2	3
Sterile	3	
Culture of abscess or wound		
<u>B. coli</u>	10	6
<u>Streptococcus</u>		
Hemolytic	3	3
Non-hemolytic	2	
<u>Staphylococcus</u>	1	4
<u>Spore formers</u>	1	
<u>Aerogenes</u>		2

Table VI (Cont.)

	<u>Group I</u>	<u>Group II</u>
15. <u>Mortality</u>		
Deaths	4	13
Proportion of patients in the group	2.88%	19.1%
Proportion of the perforated cases	1.93%	6.29%
Number of adults	4	6
Number of children	-	7
Number of males	2	8
Number of females	2	5
Average age of adults	40 years	37.6 years
Average age of children	-	10.0 years
Average age of entire group	40 years	17.4 years
Number of autopsies	4 (100%)	13 (100%)
Causes of death		
Generalized peritonitis	2	7
Paralytic ileus	-	2
Septicemia	-	1
Cellulitis of abdominal wall (gas bacillus infection)	1	-
Pneumonia	1	-
Contributing factors:		Contributing factors:
Evisceration		Perforation of bowel
Perforation of bowel		Pneumonia
Paralytic ileus		Evisceration
Mechanical bowel obstruction		Empyema
Hydrothorax		Lung abscess
Pneumonia		Liver abscess
Aortic aneurysm		Thrombophlebitis
		Hydrothorax

Investigation of the Causes of Delay in Cases Arriving with Appendicitis with Extra-appendical Extension

Inasmuch as the primary controllable cause of perforation is delay in coming for treatment, we have undertaken a study of the causes of delay in all cases considered to have perforation on arrival. In the past five months 15 such cases have been admitted to the service and all have been investigated.

In each case a mimeographed questionnaire sheet was filled out by a member of the staff.

1. In this group the average time until the family physician was first called was 42 hours. The causes of delay have been listed:

Patient thought attack was
"just another stomach ache" . . . 9 cases

Patient feared the doctor
bill 6 cases

Patient or family mistrusted
doctors in general 2 cases

Family was confused by pre-
sence of epidemic of
"stomach flu" 2 cases

Patient was "not sick
enough" 1 case

Physician refused to make a
15-mile call at night 1 case

Patient refused to mention
complaint because of wedding
in family 1 case

2. In 9 instances the family physician made the diagnosis on his first visit; in 3 instances he took up to 24 hours to make the diagnosis; and twice he missed the diagnosis by trying to treat his patients by telephone. In one case the diagnosis was missed entirely in a patient who had had a gastric resection less than three weeks previously.

3. The physician's advice was followed in all but one instance.

4. There was a definite history of subsidence of pain in some cases:

Definite history of subsidence
of pain 7 cases

Patient deluded into sense
of security by subsidence of
pain 5 cases

Mean time of subsidence of
pain 35 hours

5. The expense of the trip did not cause delay in any case.

6. Procurement of county papers caused delay in only one case - for three hours.

7. The mean distance travelled to the hospital was 86 miles:

Mean distance 86 miles
Maximum distance 165 miles
Minimum distance 6 miles

All patients came by automobile.

8. Cathartics or enemas were used in 8 cases; one of these was by order of the family physician; and one case was given two doses of castor oil in our own out-patient clinic, in preparation for a KUB study.

9. The mean time until arrival at the hospital was 77 hours.

It may be concluded that the steps necessary to prevent these tragedies must include education of the people at large, of physicians, including our own staff. That considerable progress in these respects has been made since 1920-1929 is indicated in Table V. The proportion of perforated cases has decreased from 41% to 15.8% since that time.

The relation of Site of Perforation to the Development of Generalized Peritonitis

Gatch, Gery, and Ballenger state that general peritonitis in cases of appendicitis results from overwhelming the peritoneal defenses:

1. "When a fecalith, impacted at the ceco-appendical junction causes perforation by pressure necrosis. In this event the bowel contents may be poured directly into the peritoneal cavity.

2. "When there is a rupture of peritoneal adhesions around a tense abscess."

In order to test this theory, the records of all cases dying with appendical peritonitis from 1930 to July, 1939, were searched to determine if evidence of leakage of cecal content could be found. The group includes 20 cases of

generalized peritonitis dying under conservative management and 2 cases of generalized peritonitis found at operation. No cases of abscess are included. The following data were obtained:

Cases in which relation of perforation to obstruction is definitely stated 0

Cases in which fecal content is definitely stated to have escaped into the peritoneal cavity - in this case through a perforated necrotic area in the upper part of the cecum 1

Cases in which the perforation was distal to a sharp kink - the obstructing mechanism 1

Cases in which perforation was at the tip of the appendix and therefore presumably distal to the site of obstruction 3

Cases in which fecaliths could be palpated proximal to the perforation, suggesting that the obstruction was also proximal 3

Cases in which the perforation was at the base, with fecaliths lying beside the appendix, as Gatch et al 3

Cases in which no statement is made enabling one to guess at the relation of the perforation to the obstruction 7

Cases in which the tissues were too necrotic to allow conclusions 5

In no instance, therefore, was the appendical wall proved to be necrotic proximal to the obstructing mechanism. In no instance also was there evidence that cecal content could escape through the appendical perforation into the peritoneal cavity. It is possible, however, that the ball-valve action of an impacted fecalith may allow such escape through a strictured area of the appendix, around a fecalith, and through a site of perforation.

References

1. Barnes, J. P.
Appendectomy Mortality
Texas State J. Med., 34:360, 1938.
2. Barrow, W. and Ochsner, A.
Treatment of Appendical Peritonitis
J.A.M.A. 115:1246-1250, 1940.
3. Bower, J. O.
Acute Appendicitis in Philadelphia;
Report of Progress Made in the
Campaign for its Reduction
J.A.M.A. 102:813, 1934.
4. Bowers, W. F.
Appendicitis
Arch. Surg. 39:362-422, 1939.
5. Corry, D. C. and Brew, A. C.
Postoperative Treatment of Appendicular Peritonitis with Sulfanilamide and its Derivatives
Brit. M.J., 2:561-565 (Sept), 1936.
6. Dennis, C., Buirge, Ray E., Varco, R. L., Wangenstein, O. H.
Studies in the Etiology of Acute Appendicitis: An Inquiry into the Factors Involved in the Development of Acute Appendicitis following Experimental Obstruction of the Appendical Lumen of the Rabbit
Arch. Surg., 40:929, 1940.
7. Finney, J. M. T.
Appendicitis
S.G. & O., 56:360, 1933.
8. Fredrichs, A. V.
Etiology and Pathology of Appendicitis
New Orleans M. and S.J., 87:20-24, 1934.
9. Haggard, W. P. and Kirtley, J. A.
Treatment of Acute Spreading Peritonitis Following Ruptured Appendix
J.A.M.A. 114:1843-1846 (May) 1940.
10. Herrick, F. C.
Acute Appendicitis with Peritonitis
S.G. & O. 65:68-72, (July) 1937.

11. Horsley, J. S., Horsley, J. S. Jr.,
Horsley, Guy W.
Newer Methods of Treatment of
Appendicitis
J.A.M.A. 113:1288-1292 (Sept.) 1939.
12. Jackson, A. J.
Half Million Deaths from Appendicitis
Illinois M.J. 76:355-357 (Oct.) 1939.
13. King, H. J.
Acute Appendicitis
Am. J. Surg. 37:40-56 (July) 1937.
14. McClure, R. D. and Altemeuer, W. A.
Acute Perforated Appendicitis with
Peritonitis
Ann. Surg. 105:800-814 (May) 1937.
15. Maes, U. and McFetridge, C.
Mortality of Acute Appendicitis
N. Y. State J. of Med. 38:1205-1212
(Sept.) 1938.
16. Nassau, C. F.
Treatment of the Ruptured Appendix
S. Clin. North America, 17:1743-1751,
1937.
17. Ochsner, Alton
Conservative Treatment of Appendiceal
Peritonitis
New Orleans M. & S. Jr., 87:32
(July) 1934.
18. Radvin, I. S., Rhoads, J. E., and
Lockwood, J. S.
Use of Sulfanilamide in the Treatment
of Peritonitis Associated with
Appendicitis
Ann. Surg. 111:53-63 (Jan.) 1940.
19. Sperling, L. and Myrick, J. C.
Acute Appendicitis: Review of
518 Cases in the University of
Minnesota Hospitals from 1932-35
Surg. 1:255-264, 1937.
20. Stafford, E. S. and Sprong, D. H.
Mortality from Acute Appendicitis
in Johns Hopkins Hospital
J.A.M.A. 115:1242-1246, 1940.
21. Stanton, E. M.
Acute Appendicitis
S. G. & O. 59:738-744 (Nov.) 1934.
22. Tasche, L. M. and Spano, J. P.
Analysis of 700 Consecutive
Appendectomies
Ann. Surg. 94:899-909, 1931.
23. Wangensteen, O. H., Dennis, C.
Experimental Proof of the Obstruc-
tive Origin of Appendicitis in Man
Ann. Surg. 110:629, 1939.
24. Wangensteen, O. H.
Genesis of Appendicitis in the
Light of the Functional Behavior
of the Veriform Appendix
Proc. Institute of Med. of Chicago,
12:11, 1939.
25. Tolten, H. P.
Mortality Factors in Appendicitis
with Perforation
Ann. Surg. 106:1035-1045 (Dec.)
1937

V. GOSSIP

Last year a member of the Department of Speech of the Colorado State Teachers College sent a questionnaire to 500 individuals in 60 different occupations asking for their specific criticisms of speakers. When this report appeared, it was listed in the Staff Meeting Bulletin, Hospitals of the University of Minnesota. A request has been made to repeat the warnings, inasmuch as we are all trying to improve our speech habits. No attempt will be made to list the gripes in the order of frequency, except that the first ten will be included. Gripe Number 1 is against longwindedness. Many offend by going over the time limits, others by speaking a very short time and having nothing to say. Too much material may create this impression. Long, complicated, difficult sentences and many other similar habits cause loss of attention. Gripe Number 2 is on mumbling. After a time it ceases to be a matter of curiosity as to what the speaker is saying, and it becomes simply a problem of patience until the speech is over. Equally disconcerting are those who let their voices fall until the sounds become inaudible, as this is usually followed a few moments later by a few loud words and then another lapse. Some speakers never open their mouths. Gripe Number 3 concerns the hesitant in speech. The boys who use "oo," "ah," and "er." Also in this group are those who put in long pauses or silently consult their notes. Gripe Number 4 is for those who become upset when someone in the audience creates a disturbance. It is best to avoid irritation as a display of temper puts the audience on edge. If your audience is getting away from you, you had better try to get them back by being more interesting rather than try scolding them. Gripe Number 5 is about the speakers who get chummy with various people in the audience, often directing their remarks to them, calling them by their first names and through other devices making the rest of the audience feel like interlopers. Gripe Number 6 is about obvious lack of preparation. There are very few good impromptu speakers (probably none). Most speech is improved by using the extemporaneous method. In extemporaneous speech, the subject matter is well in hand before the introduction. After the speaker is introduced, he should proceed to give his thoughts on the subject "out of the moment." They have a special gripe about those who read their manuscripts, but that will come later. Gripe Number 7 is for those who mispronounce common words. If you are speaking about tuberculosis and do not know how to pronounce the word, it creates an unfavorable impression. The other evening I heard a mystic at the theatre put on his act. He persistently called "wish," "wush." As his stock in trade was to have their wishes come true, it became irritating before the curtain was drawn. Gripe Number 8 is unfamiliarity with facts. Persons who speak in round numbers seldom offend, as complicated number details cannot be followed. Listening to election returns the other evening was a good example of how difficult it is to follow numbers. Whenever lantern slides are used, the speaker should be very familiar with everything they contain. Gripe Number 9 is for those who read their papers. You can recall during the last few years that practically all of the outstanding presentations at these meetings were made by individuals who not only did not read their papers but did not even refer to their notes (and it wasn't memorized either). Gripe Number 10 is about those who take such a long time to stop after they say, "in conclusion." Superintendent Raymond Amberg has been my harshest critic in this regard. When I gave the address in Boston this fall at the banquet of the American Hospital Association, I looked up at him at his place at the Minnesota table on the balcony when I came to "in conclusion." He gave me a fishy stare, and down I came after a brief finale. Everything we do which distracts the audience from our presentation handicaps our message. Nothing helps quite so much in speech as thorough preparation and sincerity. Most of us are willing to forgive the minor faults if sufficient attention is paid to the major ones. One of our problems here is that we attempt to give too much material in a limited time. A very good way to overcome this difficulty is to boil down our message to such an extent that we do not create the impression of trying to give too much. Everyone offends in some way. Our objective should be to get our story over with the least distraction. It is practically impossible to please everyone, but this should not be used as an excuse for carelessness or indifference.....