

*L. E. ...*

Staff Meeting Bulletin  
Hospitals of the . . .  
University of Minnesota

Subphrenic Abscess

STAFF MEETING BULLETIN  
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during the school year, October to May, inclusive.

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William A. O'Brien, M.D.

I. LAST WEEK

Date: February 11, 1937

Place: Nurses' Hall,  
Recreation Room

Time: 12:15 to 1:15

Program: Movie: Yesterday, Today,  
and Tomorrow.

Abstract: Digitalis

Present: 151

Discussion: C. J. Watson  
P. Hallock  
E. B. Fischer  
S. B. Sweetser  
Herman Jensen

II. MOVIE

Title: Stranger Than Fiction - #24

Released by: Universal Film Ex-  
change

III. ABSTRACTSUBPHRENIC ABSCESS

C. J. Lind

Definition

Subphrenic abscess or subdiaphragmatic abscess is generally considered as a collection of purulent material between the diaphragm and the transverse colon and transverse mesocolon, complicating a primary infection somewhere else in the body, usually within the abdomen.

History

First description was by Barlow of England in 1845. A later classical description of its clinical picture was by von Leyden of Germany in 1880, who called

it "pyopneumothorax subphrenicus." They described what is now regarded as the late clinical picture. In 1898, Martinet in France and, in 1908, Bernard in England demonstrated the various subphrenic spaces and the pathways of infection.

The first operation was done by von Volkmann in 1879. Trendelenberg in 1883 published a method of transpleural approach still widely used. Clairmont emphasized the extraperitoneal abdominal approach in 1926. Nather and Ochsner developed a one stage retroperitoneal operation in 1922-1923.

The clinical entity of nonsuppurative subphrenic peritonitis was presented by Neuhof in 1912. Good reviews are by Fifield and Love, 1926; by Elkin, 1931; by Beye, 1932; and by Ochsner and Graves, 1933. This latter paper summarizes the work to that year, tabulating 3,332 collected cases and 50 personal cases and presents accepted methods of treatment.

Subphrenic Anatomy

It is necessary to know the anatomy of the subphrenic spaces for better understanding of development of this condition and its treatment. The subphrenic space is generally considered to be bounded above by the diaphragm and below by the transverse colon and mesocolon. This space is roughly divided by the liver into suprahepatic and infrahepatic spaces. These in turn are divided into left and right spaces. The coronary ligament, which is the reflection of the peritoneum from the under-surface of the diaphragm to the superior surface of the liver and the falciform ligament, the lower free edge of which extends to the umbilicus, divide the suprahepatic surface into left and right.

On the superior surface, there are 3 intraperitoneal and 1 retroperitoneal spaces. The extraperitoneal space is within the coronary ligament. On the right side, the right lateral ligament, which is the prolongation to the right of the coronary ligament, divides the area into 2 spaces, a large anterior one

called the right anterior superior, and a relatively small posterior one called the right posterior superior space. The left lateral ligament running along the posterior border of the left hepatic lobe separates the superior from the inferior surface of the liver. Hence, on the left, there is only one space, the left superior.

In the infrahepatic region, there are 3 intraperitoneal spaces, which are divided into left and right portions by the round ligament and the ligament of the ductus venosus. To the right is the large right inferior space. To the left are 2 spaces, separated by the stomach and the gastrohepatic omentum, the anterior being the left anterior inferior space, and the posterior being the left posterior inferior space or the lesser peritoneal sac.

#### Localization

The most frequently involved space is the right posterior superior, probably because the most frequent cause of subphrenic abscess is suppurative appendicitis as the inflammatory exudate extends upward from the right iliac fossa along the paracolic groove. In 1517 cases from the literature, 28.8% localized here. In Ochsner and Grave's series of 50 cases, 60% were here. In addition to abscesses in the subphrenic spaces, retroperitoneal abscesses frequently dissect upward between the diaphragm and the peritoneum and form retroperitoneal abscesses: 14.4% in the collected series were of this type. Ochsner and Graves found the second most common type in the right inferior space, 14%. Abscess in both right posterior superior and right inferior is not uncommon. Intraperitoneal abscess is approximately eight times more common than retroperitoneal.

Janz (1933) considers as true subphrenic abscess only those which are remote from the primary cause, and that local abscesses in disease of the liver, gallbladder, stomach and duodenum are part of the primary condition. He also denies the value of classification as intra- or extraperitoneal, and says that it is clinically impossible to make a

differentiation. However, Harttung says that this is a valuable point as far as surgical approach is concerned and also as far as prognosis is concerned, since intraperitoneal abscesses usually are more safely encapsulated.

#### Localization of Subphrenic Abscess (Ochsner and Graves)

| <u>Location</u>          | <u>Collected Series</u><br>(1,517) | <u>Own Series</u><br>(50 cases) |
|--------------------------|------------------------------------|---------------------------------|
| Right superior posterior | 28.8%                              | 60%                             |
| Left inferior anterior   | 20.0                               | 8                               |
| Retroperitoneal          | 14.4                               | 8                               |
| Right superior anterior  | 12.6                               | 8                               |
| Right inferior           | 8.9                                | 14                              |

#### Etiology

Subphrenic abscess is always considered a complication of preexisting suppuration or infection in the body. The primary infection is proved to be intraabdominal in approximately 90% of the cases.

The precursor of subphrenic abscess is subphrenic infection. These two must be differentiated. The incidence of subphrenic infection has been estimated at about 1.5% after appendicitis, and approximately 30% of these infections go on to form a subphrenic abscess.

Lockwood states that approximately two-thirds arise from soiling from a viscus within the abdomen, before or after operation, one-sixth from extension of adjacent abscess (e.g. perinephritic abscess), and one-sixth from distant foci of infection.

Ochsner and Graves have tabulated the causes:

Etiology of Subphrenic Abscess  
(Ochsner and Graves)

| <u>Source</u>           | <u>Collected Series</u><br>(3,322 cases) | <u>Own Series</u><br>(50 cases) |
|-------------------------|--|---------------------------------|
| Appendix                | 30.7%                                    | 26%                             |
| Stomach and duodenum    | 29.0                                     | 28                              |
| Liver and bile passages | 12.0                                     | 18                              |
| Metastatic or primary   | 3.4                                      | 6                               |

The incidence following acute appendicitis in 11,017 cases was 1.1% (Ochsner and Graves). Janz, in 2,452 appendectomies, had 5 cases (0.25%). Nather states that the incidence is 0.5 to 3.0% or more. The diagnosis is probably not always made. Incidence is increased in perforated appendicitis, in high lying and in retrocecal appendices (Lewis and Prior).

Some of the listed causes are empyema thoracis, pancreatitis, kidney infection, pericarditis, mediastinitis, liver and spleen abscess, malaria, thrombophlebitis, osteomyelitis, pelvic inflammatory disease, pyemia, amoebic dysentery, carcinoma of the esophagus with perforation, rupture of intraabdominal viscus, and tuberculosis.

About 10% are of unknown etiology. There is disagreement as to whether these are hematogenous (furunculosis, etc.) or from unrecognized sources (e.g. undiagnosed appendicitis). Janz considers the hematogenous theory of origin untenable.

The generally accepted causes and their relative frequency are:

|  |      |
|--|------|
| 1. Appendicitis                        | 30+  |
| 2. Perforation of stomach or duodenum  | 30-  |
| 3. Disease of liver and biliary system | 15 % |

Method of Development

There is considerable dispute among writers as to the path the organisms take to produce the infection.

Ochsner and Graves list possibilities:

1. Local invasion from immediate vicinity.
2. Peritoneal exudate from distant parts draining through peritoneum.
3. Retroperitoneal phlegmon.
4. Retroperitoneal lymphangitis (Munro).
5. Lymphangitis of lymph vessels and by deep epigastric artery (Barnard).
6. Rupture of liver abscess, usually after suppurative portal thrombophlebitis.

Generally regarded as due to direct extension, although many feel it is primarily lymphatic. Truesdale attempts to prove this latter in his paper.

Some consider that the route taken can be determined by the location of the abscess. If a direct extension, it is intraperitoneal; if it follows cellular tissue infection, it is retroperitoneal; if through lymphatics, it can be either intra- or retroperitoneal. The abscesses generally develop on the side of the primary lesion, they are uncommon on the left side (41:1) and are extremely rare on the side opposite the primary lesion.

One difficulty in determining the cause or the route taken is the usually long interval between primary conditions and the diagnosis of subphrenic abscess, usually 7 to 14 days, may be months, and Janz reports a case of 7 years' interval (empyema thoracis).

Overholt and Donchess consider 3 main factors in intraperitoneal spread:

1. Peritoneal reflections and attachments.
2. Position of the patient.
3. Respiratory movements.

In general, right lower quadrant infection spreads upward lateral to the cecum and ascending colon, as does pelvic infection. The infection once it has reached the infrahepatic space passes over or under to the posterior superior space. Infection from the stomach passes to the left, either posterior or anterior to the gastrohepatic omentum. This

type of direct spread explains why there are more subphrenic abscesses on the right, since more causes of the condition are on the right side, which is also shorter and more direct than the left side. It is unusual to have a subphrenic abscess complicating an empyema, although the converse is not true. These authors conclude that about 90% of subphrenic abscesses are the result of a direct spread of infection within the abdominal cavity.

Overholt and Donchess also stress the influence of the ribs and diaphragm. They have published experimental work showing that in quiet respiration there is a negative pressure in the upper abdomen and a positive pressure in the lower abdomen, and hence there is a sucking effect.

Most writers agree that subphrenic abscess generally arises from a direct spread of infection in the abdominal cavity.

Bacteriology

The bacterial flora of subphrenic abscess is usually assumed to be that of the primary cause. Appendicitis usually produces colon bacillus infection.

|                               |      |       |      |          |
|-------------------------------|------|-------|------|----------|
| Responsible<br>Microorganisms | Bar- | Whip- | Beye | Ochsner  |
|                               | nard | ple   |      | & Graves |

|                |       |       |     |     |
|----------------|-------|-------|-----|-----|
| B. Coli        | 25. % | 30.2% | 15% | 40% |
| Streptococcus  | 8.5   | 20.9  | 54  | 40  |
| Staphylococcus | ---   | ---   | --- | 20  |

Almost all organisms have been reported, including those of tuberculosis and actinomycosis (Graves and Ochsner).

Incidence

Probably no difference in negro and white races.  
More in males (about 2 to 1).

Age

Highest incidence 4th decade 32%  
70% between 9 to 40  
10% between 9 to 12  
Movius reports case in 7 year old boy.  
van der Meulen reports youngest in 1½ year old child.

Diagnosis

This is extremely variable as to difficulty or ease. Any or all of signs, symptoms, and findings may be present or absent. In general (Neuhof), if a patient has an antecedent suppurative intraperitoneal process and fails to improve as he normally should, and no focus can be found that accounts for this, subphrenic infection must be considered as a possible cause until ruled out. This, of course, means wound infection, pulmonary involvement, pyelitis, and peritonitis have been eliminated as causes. Once infection has been suspected, subphrenic abscess should be watched for.

The onset is variable:

1. Sudden - with symptoms simulating an acute intraabdominal suppuration. Usually with massive contamination of the peritoneal cavity (e.g. with perforated peptic ulcer).

2. Insidious - usually after obscure intraabdominal lesions - frequently not suspected and not diagnosed.

3. Septic post-laparotomy - in which septic symptoms continue post-operatively.

The interval from the primary lesion is usually 3 to 14 days, but may be months or years.

Symptoms

Vary with location and type of onset and duration. None pathognomonic, although usually signs of continued sepsis.

1. Upper abdominal discomfort or sense of pressure with or without pain.
2. Difficult breathing, especially on deep inspiration.
3. Referred pain to chest, shoulder or neck.
4. Hiccough.

### Signs

1. Limitation of respiratory movement (early and on affected side).
2. Edema of skin over involved region.
3. Tenderness and pain to fist percussion, may be only sign; location usually corresponds to that of the abscess.
4. Downward displacement of liver; with superior subphrenic abscess; liver palpable and increased dullness.
5. Palpable mass below costal margin if large collection.
6. Chest findings:
  - a. Elevated and diminished movement of diaphragm.
  - b. Decreased or absent breath sounds in lower chest.
  - c. Signs of fluid above diaphragm.

The classical findings of 3 zones on right side of breath sounds, tympany, and dullness represent a late stage with gas.

### X-ray

Most valuable factor in diagnosis, but variable, and must be correlated with findings.

1. Elevated and fixed diaphragm. (of basic importance).
2. Varying degrees of haziness of diaphragmatic shadow.
3. Costophrenic angle obscured.
4. Haziness of lung fields.
5. Displacement of heart away from involved side.
6. Gas bubble with fluid level under diaphragm - a late finding; Keen, 1916, 50%; Ochsner and Graves, 15%.

Different views should be taken. Antero-posterior upright and postero-anter-

ior left lateral decubitus. Thus, the abscess is better defined. If gas is present, views may be taken in different positions to outline the cavity. (James T. Case in Christopher's Surgery 1936, and Sewall.)

Contrast media have been employed:

Thorotrast and sodium tetraiodophenolphthalein have been injected into the subphrenic abscess.

Pneumothorax and pneumoperitoneum also employed to outline the abscess.

### Aspiration

Generally condemned today, although sometimes done at the time of operation with immediate surgical intervention after abscess found. Aspiration of right superior posterior abscesses done without contamination by going under 12th rib, upward and forward, with continuous aspiration.

Diagnosis is frequently made more difficult by the pleural reaction (transudate or exudate) above the diaphragm, which is a frequent complication of subphrenic abscess.

The diagnosis is tentative and worthy of exploratory confirmation if

- a. Abscess is suspected in view of sepsis without cause with elevated diaphragm with haziness of lung field shadow (Overholt and Donchess); or,
- b. Persisting tenderness and continued signs of infection. (Ochsner and Graves).

### Differential Diagnosis

1. General peritonitis with apparent localizing signs usually has different clinical course and abdominal signs.

2. Liver abscess, single or multiple, usually has a severe clinical course,

with or without jaundice. Here, the liver edge is generally more definitely palpable, the diaphragm is not as markedly elevated, lung reaction is less pronounced, and gas bubble is rare.

3. Perinephritic abscess, single or multiple, usually is similar in edema and tenderness at costovertebral angle. However, the diaphragm is less changed and there is less pleural reaction.

4. Thoracic empyema (especially encysted diaphragmatic type). The lung base and diaphragm are obscured in x-ray pictures; it has a dissimilar history and clinical course. Absolute differentiation by aspirating, injecting air, and checking x-ray.

5. Collapse of lung, whether post-operative unilateral lower lobe or massive. Also has elevated diaphragm and obscured lung base, but the heart is drawn toward the affected side, and there is no usual fluid level.

6. Postoperative pulmonary changes. Usually disappear within 10 days. Muller, Overholt and Pendergass found postoperatively in laparotomy:

- a. Elevated diaphragm.
- b. Fixed diaphragm.
- c. Varying degrees of atelectasis of lower lobes.
- d. Air accumulation under diaphragm.

### Complications

Hertzler lists the progress of subphrenic abscess:

1. Absorption.
2. Extraperitoneal exit into hollow organ.
3. Reinfection of peritoneal cavity.
4. Surgical rupture.

Degree of complication varies with duration of undrained subphrenic abscess.

Practically always get an intrathoracic inflammatory reaction:

1. Simple serous effusion.
2. Bronchopleural fistula.

3. Lung abscess.
4. Pneumonitis.

Resolution is extremely rare.

### Complication Incidence (1,322 cases) (Ochsner and Graves)

| <u>Complication</u>        | <u>Cases</u> | <u>%</u> |
|----------------------------|--------------|----------|
| Pleurisy                   | 371          | 29       |
| Perforation                | 381          | 29       |
| Empyema                    | 232          | 27       |
| Bronchopleural fistulae    | 135          | 10       |
| Pericarditis               | 50           | 5.3      |
| Perforation into intestine | 51           | 3.8      |
| Perforation to outside     | 28           | 2.3      |

### Prophylaxis

There is no definite prophylaxis. Janz feels that immediate appendectomy with drainage in all appendicitis cases lowers the incidence. Many other surgeons disagree.

Delario, Jones and McClure (Lewis-System of Surgery), Overholt, and Donchess stress the value of Fowler's position. Homaris disagrees with this as do many present day surgeons.

### Treatment

All writers agree that treatment for subphrenic infection is conservative, and for subphrenic abscess is incision and drainage as soon as diagnosed. Only active measures can decrease sepsis and extension.

The choice of method is limited to procedures producing drainage, although phrenectomy has been proposed. There are 3 main operative methods:

1. Two stage transpleural. This is the most used, at least up to very recent times. It was described by Trendelenberg in 1883.

1st stage: Resect segments of one or two ribs (8th or 9th) in midaxillary line, usually under local anesthesia. Remove corresponding intercostal vessels,



nerve and muscle (eliminates later hemorrhage and pain). Anchor parietal pleura to diaphragmatic pleura all around circumference of incision. Pack loosely and close.

2nd stage: 24 to 48 hours later. Reopen and remove pack. Cauterize through adjacent pleura and diaphragm. Insert finger, break down ramification, and drain widely.

2. Extraperitoneal or extrapleural. Incise below costal margin and slide finger extraperitoneally up under ribs until abscess is reached. One may sometimes approach below line of pleural reflection through costophrenic sinus and thus enter the cavity.

3. Retroperitoneal. Method of Ochsner and Nather. Part of 12th rib is excised, and approach is made retroperitoneally beneath the costophrenic angle of the pleura, which does not go below the 12th rib.

This type of operation is generally considered by the various authors to carry the lowest mortality. It is done in one stage and there is little chance to contaminate the uninvolved part of the pleural or peritoneal cavities.

The principles that should be regarded as most important in this operation are to choose the most direct route and to avoid contamination. The choice of the most direct route depends upon the localization of the abscess. An extraperitoneal type of operation has the least chance of contamination. Hence, many recent authors criticize the old transpleural operation. Mortality tables support this criticism.

In particular, the general opinion is that subphrenic abscess of the right posterior superior space, alone, or combined with right inferior abscess, should be drained retroperitoneally. Abscess of other spaces should be drained extraperitoneally beneath the costal margin.

The postoperative treatment in general is that of any abscess; however, many authors irrigate and also employ a gentle suction in the hope of decreasing

the cavity size and speeding up its healing.

Barnard in reviewing his avoidable mortality states that one-half were due to failure to recognize the subphrenic abscess and one-half in not localizing it.

### Results

Prognosis rests upon:

1. Time from onset to treatment.
2. Presence of complications.
3. Type of treatment.

The longer the abscess is present before being drained, the more extensive and dangerous is the sepsis. Furthermore with passage of time, incidence of complications increases, and as complications become more frequent, the mortality rises rapidly in operated as well as nonoperated cases.

Mortality rate (Ochsner and Graves):

|                            | <u>Cases</u> | <u>Mortality</u> |
|----------------------------|--------------|------------------|
| Total no. of cases         | 2,765        | 56.0%            |
| Total not operated         | 1,072        | 91               |
| Total operated             | 1,693        | 34               |
| Personal cases operated    | 50           | 32               |
| Transpleural approach      |              |                  |
| Collected series           | 305          | 39               |
| Personal series            | 16           | 50               |
| Transperitoneal approach   |              |                  |
| Collected series           | 307          | 35.5             |
| Personal series            | 12           | 41.6             |
| Operated retroperitoneally |              |                  |
| Collected series           | 189          | 21.2             |
| Personal series            | 22           | 13.6             |

The mortality is greatest in non-operated cases, being about 90%. It is lowest in those operated early with no contamination, about 15 to 20%.

### Summary

1. Subphrenic abscess, a complication of infection elsewhere in the body, is a collection of purulent material between the diaphragm and the transverse colon

and transverse mesocolon.

2. History is reviewed.
3. The subphrenic spaces are described.
4. About 30% of the cases involve the right posterior superior subphrenic space. They are usually intraperitoneal and on the right side.
5. Subphrenic abscess is derived from non-suppurative subphrenic infection, about 30% of which go on to subphrenic abscess. The sources are general appendicitis 30%, perforating lesion of stomach and duodenum 30%, and diseases of the liver and biliary passages about 15%. The remaining cases are caused by a multitude of primary lesions, generally intraabdominal.
6. It is generally considered that subphrenic abscess develops as a direct extension of purulent material. Anatomical and physiological factors in development are considered.
7. The bacteriology is generally that of the primary lesion.
8. Incidence is not related to race, is seen about twice as frequently in males, and has the greatest frequency in the fourth decade.
9. The diagnosis is often extremely difficult. The onset may be sudden, insidious, or postoperative. The outstanding sign probably is local tenderness. X-ray is important in the diagnosis. The most valuable finding is an elevated and fixed diaphragm. Diagnostic aspiration is condemned.
10. Differential diagnosis is necessary to rule out generalized peritonitis with local signs, liver abscess, perinephritic abscess, thoracic empyema, collapse of lung, and the usual postoperative pulmonary changes.
11. Complications are usually pulmonary in nature. As the abscess progresses, it may involve local structures, and usually generalized septic complications.
12. There is no definite prophylaxis.
13. The treatment for subphrenic infection is conservative; for subphrenic abscess is incision and drainage as soon as diagnosed. The usual types of operative approach are described and the advantages of the extraperitoneal emphasized.
14. Results are noted. Mortality about 90% in unoperated subphrenic abscess; about 35% in all cases operated; about 35 to 40% in those with transperitoneal operations; and about 15 to 20% in those with extraperitoneal operation.

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#### IV. CASE REPORTS

1. , 65 years of age.  
Admitted 10-22-36;  
Discharged 11-17-36.

##### History (through interpreter)

Presenting complaint was pain in right flank of 3 weeks' duration. Had been ill since 10-3-36. At this time, he had a "cold and sore throat," went to bed and stayed there up to the time of admission. Three days later, had chills and fever; no definite pain. One week later, developed a pustular eruption over face, neck and shoulders. Pain developed in abdomen and in right flank and became very severe, especially on deep respiration. Details of history unobtainable.

About 2 years before admission, had a history of midepigastric crampy pain following meals; none lately (?); no idiosyncrasy toward fats. Cardio-respiratory, genitourinary, and remaining gastro-intestinal tract were negative.

##### Physical examination

White male, about 65 years of age, acutely ill, lying on left side with evidence of being in pain. A pyoderma was noted over face, neck and shoulders. Tenderness on right side of abdomen. Epigastric swelling noted, which was soft and tympanitic. Liver border palpable low in abdomen, and liver dullness obliterated. Evidence of fluid in right chest with impaired resonance about level of 5th rib. Rectal examination, negative.

##### Laboratory

Urine - 3+ albumin. Blood - hemoglobin 61%, white blood cells 11,200, with 75% pmn's and 25% lymphocytes. X-ray examination - 10-22 - showed massive subphrenic abscess, right, with gas formation; pleural effusion partly encapsulated, right, with interlobar extension; liver was pushed posteriorly and downward by the abscess; diaphragm was elevated, distorting the anatomy of the chest, with heart displaced to left.

##### Clinical impression

Massive subphrenic abscess on right with secondary change. Epigastric swelling, evidently due to pointing of abscess in that region.

Operation

10-23-36. Abscess drained surgically. Transverse incision made over prominent area. 1900 c.c. foul pus evacuated. Bacteriological study showed presence of E. coli, nonhemolytic streptococcus, and staphylococcus. Catheter and drains placed in cavity. On this day, icterus index was 14, and van den Bergh prompt direct.

Clinical course

Repeated aspiration of right pleural cavity brought forth a straw colored, slightly turbid fluid which was repeatedly negative on culture. Accidental pneumothorax in this region was followed by marked clinical improvement. This abated postoperatively.

Studies for amebae and for tubercle bacilli were negative.

Skin lesions were interpreted as dermatitis medicamentosa (iodide eruption) after dermatological consultation.

Healing

X-ray studies revealed gradual disappearance of findings first noted. On 11-11-36, gastro-intestinal study showed a peculiar tract leading from duodenum, lower than the site of most duodenal ulcers, and might possibly represent an internal biliary fistula with perforation.

Follow-up

Patient has been followed up to date in the Out-Patient Department. He still has a catheter leading into the subphrenic cavity and receives irrigations. However, both subjectively and objectively, he seems in excellent condition, and the cavity is becoming smaller.

Final impression

This patient probably had a perforated duodenal ulcer or internal biliary fistula with subphrenic abscess, right, and secondary pleural effusion, right.

2. \_\_\_\_\_ - 23 years of age.  
Admitted 11-20-36.

History

Admitted with symptoms and findings of

acute appendicitis. He had had one previous admission 9-18-36 to 10-29-36, at which time he recovered under conservative treatment from an attack of acute appendicitis. At that time, he had a history of pain in the abdomen, immediately above the umbilicus. He had a few chills. No vomiting until the day of admission. Felt best on left side with hip flexed. Examination revealed a rigidity and rebound tenderness of the entire abdomen without masses. Rectal examination was negative. Laboratory: findings were essentially negative except that the white blood count was only 7,400, with 79% pmn's. The impression was perforated appendicitis with generalized peritonitis. The treatment was conservative, nasal suction, hot packs, and sedatives.

Course

10-10-36 - A mass was noted in rectum; this became smaller and firmer up to time of discharge.

10-18-36 - Icterus index, 20; van den Bergh prompt direct.

Patient was discharged and instructed to return for interval appendectomy in 6 weeks.

Final diagnosis

Acute appendicitis, with generalized peritonitis; appendiceal abscess; and pylephlebitis.

Thirty hours before the second admission (11-20-36), developed crampy right lower quadrant pains, nausea and vomiting. These continued up to the time of admission.

Physical examination

Had definite tenderness and rigidity in right lower quadrant, no mass. Had rebound tenderness in right lower quadrant and left lower quadrant, not referred.

Laboratory

Blood - hemoglobin 71%, white blood cells 10,000, with 65% pmn's.

Clinical impression

Acute recurrent appendicitis.

Operation

It was decided to perform an immediate appendectomy. The structures in the right lower quadrant were found to be densely adherent, the cecum, the terminal ileum, the omentum, and the abdominal wall being fused. The inflammatory mass in which the appendix was located was excised with difficulty. The incision was drained.

Postoperative course

For the first five days, the patient seemed to be holding his own clinically. His temperature varied from 98 to 101.8°. However, on the 5th postoperative day (11-24-36), he had a sudden fever (103°) and pain over the right shoulder.

Sepsis

12-9-36 - Septic temperature continued. Wound well healed. Rectal examination, negative. Chest, negative. Urine, negative. Blood - white blood count 23,500. Continuous pain in right shoulder.

Abscess

12-14-36 - Medical consultation: pain in right chest, worse with breathing, splinting of right diaphragm. Malnourished, pale, questionable icterus, spiking fever. Right rectus moderately rigid, especially in right upper quadrant; no rebound tenderness; moderate tenderness anteriorly just above superior margin of liver in mid-clavicular line. Dulness over right lung base, absent breath sounds. X-ray shows mild elevation of diaphragm, no fluid or parenchymal involvement. Diagnosis: probable subphrenic abscess from (1) extension along lateral gutter, or (2) hepatic abscess secondary to pylephlebitis.

12-15-36 - X-ray revealed subphrenic abscess, right anterior superior space explored extraperitoneally below costal margin, without finding pus.

12-22- to 12-24-36 - Thorotrast given to determine condition of liver and to rule out hepatic abscess - essentially negative.

Pus

12-28-36 - Aspirated in 8th intercostal interspace, midaxillary line - foul thick greenish-yellow mucoid pus found.

1-3-37 - Up to this date, aspirated repeatedly, 100 to 250 c.c. each time, at same site. On this date, the abscess was drained through the 8th interspace in the midaxillary line. The abscess was found adherent to the parietal peritoneum, and 500 c.c. pus drained.

Drainage

2-2-37 - Following this operation, much pus continued to drain, even after gentle suction was discontinued. Patient experienced relief from pain immediately postoperatively, but his general clinical course was retrograde. His septic condition recurred more intensely. There was no extension of the process. No amebae had been isolated from the pus, but he was given a therapeutic test of yatren and emetine, without improvement.

2-15-37 - Patient now emaciated, with early contractures of lower extremities. Also evidence of a toxic psychosis. Put in extension to prevent further deformity.

2-15-37 - Patient obviously near exitus at this time. Temperature has been spiking.

Through the illness the patient had all possible supportive treatment, including repeated transfusions.

Laboratory

Urinalysis consistently negative. Blood - white blood count (11-20) 10,000; (12-9) 23,400; (1-10) 13,400; (1-19) 14,000; (1-26) 13,000; (2-6) 35,000 with 91% pmn's. Icterus index: (12-4) 10; (12-15) 5; (12-30) 18; (1-7-37) 15; (1-8) 13; (1-21) 18; (2-13) 21.1. Urine urobilinogen: (12-11, 12-36) urobilinogen 11.6 mgs. Chest drainage (1-15-37) - bile pigment present. Bacteriological: Blood culture (12-21-36 and 2-11-37) sterile; chest fluid - repeatedly sterile up to 1-11-37 - Friedlander bacillus; nose and throat (1-17-37) - non-virulent diphtheria bacilli.

Final Clinical Impression

Patient had an acute recurrent appendicitis complicated by right subphrenic

abscess. The pleural effusion reported is a customary finding in subphrenic abscess.

## V. GOSSIP

The Mid-Western Radiological Conference held at Rochester, February 12 and 13, was a great success. More than 250 radiologists came to the meeting which is said to have been the largest single gathering at Rochester in which the clinic put on the entire program.....Anna, the tall, dark, quiet girl at the Baltimore Lunch, died last month. Known to most of our graduates who ate there at various times, it will come as a surprise to many to know that she was part owner of the business.....

...Every physician who can possibly do so is leaving the state as rapidly as possible. The reason is not the threat of excessive taxation but rather the old vacation urge which takes them to Florida, Texas and Mexico.....Last week's meeting with an attendance of 151 reached a new high over the gall-bladder meeting which was 147.....

..Last week's Post-Graduate Institute in Internal Medicine showed very definitely that the internists have come into their own. They have left the days of differential diagnosis of Osler and are definitely becoming practical pharmacologists. One has only to glance at our medical journals to note the change. Former Minnesota Cardiologist Morris H. Nathanson, now a very distinguished cardiac consultant in Los Angeles, has a pharmacological article in last week's issue of the Journal of the American Medical Association.....The Minnesota State Medical Association will meet in St. Paul May 3, 4, and 5, in what is expected to be the largest gathering of medical men ever brought to the Twin Cities by a state medical meeting.....The Women's Field Army, organized by the American Society for the Control of Cancer, will start its membership drive the week before Easter. It is an organization composed entirely of women, for the sole purpose of promoting public education in cancer.

It is the first time that a group which should be interested in public health has taken its own problem as its health objective.....The Minnesota State Dental Association is conducting its annual meeting in Minneapolis next week. Contrary to the medical custom of meeting in the warmer months, they meet at the best time of the year as far as convention interest is concerned. It simplifies the problem of entertainment as most of the delegates would rather go to the meetings than wander off the reservation.....Horned rabbits have become the object of great interest by cancer investigators, as the horns are virus papillomas and have unusual growth possibilities. In a recent issue of the Chicago Tribune our own Bacteriologist Robert "Bob" Green came in for unusual space and comment for his investigations in this disease.....

.....The staff meetings have been so well prepared that we are getting rather careless about expressing our appreciation for the work involved. Dr. Crago, who made last week's contribution on digitalis, and Dr. Lind, who made today's, are both thanked at this time. Until you have done one of these things, you do not realize the time and effort involved. Wading through the literature and selecting the proper references is an art, and our men seem to have it. ....The first issue of "Surgery" is off the press. The list of contributors from Minnesota is interesting. It is to be recalled that this is a magazine published by Mosby under the editorial direction of Dr. O. H. Wangenstein and Dr. Alton Oschner of Tulane. The form is very attractive and the cover is striking. It promises to be a very successful magazine.....

.....The Hammond electric organ in the Center for Continuation Study, has been a magnet for music lovers and musicians in attendance at the various graduate courses. The endless variety of combinations intrigues everyone and the result has been that occasionally one of the boys has been late for school. Not to be outdone, there is a concert grand Steinway near the fireplace for those who still prefer that type of music.... Another unique feature is the tunnel connections between the Center Building and other central campus locations.

Adios.