

101105

Bulletin of the



University of Minnesota Hospitals
and
Minnesota Medical Foundation



Treatment of Perforated
Peptic Ulcer

BULLETIN OF THE
UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

Volume XXI

Friday, October 21, 1949

Number 4

INDEX

	<u>PAGE</u>
I. TREATMENT OF PERFORATED PEPTIC ULCER	52 - 57
Analysis of Fifty Operated Cases at University of Min- nesota Hospitals.	
ROBERT N. HAMMERSTROM, M.D., Medical Fellow in Depart- ment of Surgery, University of Minnesota Hospitals.	
II. MEDICAL SCHOOL NEWS	58
III. CALENDAR OF EVENTS	59 - 62

Published weekly during the school year, October to June, inclusive.

Editor

George N. Aagaard, M.D.

Associate Editors

Wallace D. Armstrong, M.D.
Erling S. Platou, M.D.
Myron M. Weaver, M.D.

Craig Borden, M.D.
Richard L. Varco, M.D.
W. Iane Williams, M.D.

James L. Morrill, President, University of Minnesota
Harold S. Diehl, Dean, The Medical School, University of Minnesota
Ray M. Amberg, Director, University of Minnesota Hospitals
Erling S. Platou, President, The Minnesota Medical Foundation

Address communications to: Staff Bulletin, 332M University of Minnesota
Hospitals, Minneapolis 14, Minn.

I. TREATMENT OF PERFORATED PEPTIC ULCER

Analysis of Fifty Operated
Cases at University of Min-
nesota Hospitals

Robert N. Hammerstrom

For several centuries physicians and surgeons have sought to effectively treat the common condition of ulceration of the gastro-intestinal tract. In this, as well as many other clinics, considerable time and effort has been applied to the solution of the peptic ulcer problem, and notable progress is being made.

Perhaps the most disastrous complication, in the light of mortality figures, that can beset the patient with peptic ulcer is that of perforation. One of the earliest descriptions of a perforated ulcer was made in 1670, at which time a member of the royal family in France had a perforated gastric ulcer which was proven at autopsy. Shipley and Walker²¹ go on to describe other events of historical interest. In 1747, Hamburger reported the first case of perforated duodenal ulcer which was diagnosed and also proven at post-mortem examination. The first case in the United States was reported by O'Hara in 1875 at a Philadelphia Pathological Society meeting. The first operation on a patient with this condition was performed in 1880 by Mikulicz but not reported until 1897. That patient died three hours post-operatively in shock. Heussner, in Germany, in 1892, reported the first successful operation for a perforated ulcer, using a simple closure with suture. In the United States, Wier performed the first successful operation in 1896. As early as 1892 non-operative therapy was reported as successful by Hall, who recorded six cases of spontaneous cure without operation. Subsequently, surgeons sought means of improving techniques. Braun, in 1897, advocated the use of gastroenterostomy with closure of the perforation. A longitudinal excision of the ulcer with transverse closure was advocated by Dowden in 1909. Gastric resection was proposed for perforated ulcer by Von

Haberer in 1919. As late as 1937 Judin, in Moscow, still supported gastrectomy at time of perforation.¹⁶ As is well known the most common of present day methods, and that employed here, is the Roscoe Graham type of closure utilizing an omental flap.¹²

Thus we see that it has long been an accepted surgical principle, and one adhered to at this institution, that early surgical intervention and closure of such perforations constitutes the best therapy for this complication. However, there has recently been a challenge to this principle by advocates of a conservative, non-operative type of treatment. Several months ago we were privileged to hear a presentation of this type of work by Mr. Hermon Taylor, Surgeon at the London Hospital. This served as a stimulus to review results of our recent experience with the operative type of treatment at this hospital.

Results

This survey covers 50 cases of perforated peptic ulcer treated operatively at the University of Minnesota Hospitals during the period of 8 years from July, 1941, through July, 1949.

Of these 50 patients, 47 were males and 3 were females.

Their ages ranged from 26 years to 83 years, the average age at time of perforation being 53 years.

Three patients had had no known ulcer symptoms, the others having had symptoms or known ulcers for a matter of 10 days up to 35 years.

Factors which might possibly have precipitated the perforation were sought for, and it is of interest to note that no apparent cause could be elicited in 70 per cent of the cases. Six cases occurred following strenuous exercise such as "working in the field", "pulling weeds", "deer hunting", "piling lumber", and "digging a ditch". There was no obvious correlation to time of day, and only one instance was found where perforation occurred immediately after eating.

In one instance ulcer symptoms appeared one week following a rib fracture, and two weeks later the perforation occurred. It is interesting to speculate, on the basis of experimental work done here by Friesen, et al¹¹, on the relationship of fat embolism to gastrointestinal ulceration, as to whether or not fat embolism might have been responsible for this ulcer.

Two perforations occurred following the ingestion of alcoholic beverages; one followed self-induced regurgitation in a patient with symptoms of cardio-spasm, and one appeared half an hour after incarceration of a hernia.

Two patients perforated subsequent to radiological examination of the upper gastrointestinal tract, and one perforated following a gastric analysis.

Five patients had had a definite previous perforation and two more had had a possible previous perforation.

History of one or more gastrointestinal bleeding episodes was obtained from nine patients.

It has long been a dictum that the sooner after perforation the closure was effected, the better the prognosis. Time intervals between perforation and surgery in these cases ranged from three and one-half hours to sixty hours. The average time elapsed was about 14 hours. It must be remembered, however, that the majority of patients at this hospital must come from varying distances out in the state and that there is a necessary delay at times in transportation.

Radiological studies of the abdomen were made in all but one case previous to surgery. Free intraperitoneal gas was demonstrated in 70 per cent of cases. No gas was seen in 28 per cent. One patient, whose perforation occurred following a gastrointestinal series, showed no free gas initially after onset of symptoms, but later in the day revealed free barium in the peritoneal cavity.

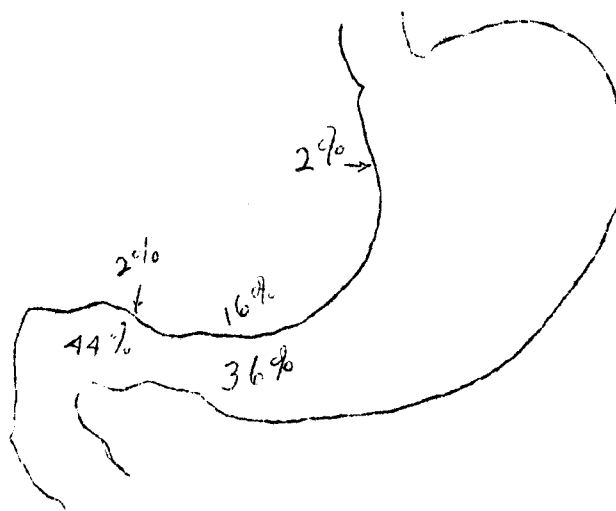
The estimated sizes of perforations varied from two millimeters to two and

a half centimeters and "big enough to admit a finger". The perforation was found to be already sealed off with omentum in two instances.

Peritoneal contents as described varied from nothing to gross contamination with food particles. Relationship to meals has been thought to have an important bearing on prognosis on the basis of experimental work done here in 1937.² A series of animals were prepared by making one centimeter long, unsutured incisions in the stomach. Animals incised when the stomach contained food had an 86 per cent mortality. Of those incised with empty stomachs, only 6.8 per cent died. In the one patient whose death was directly attributable to perforation, mashed potatoes were found in the peritoneal cavity; and he died of multiple abdominal abscesses.

As commonly reported in other sources, the most frequent site of perforation was the anterior portion of the first part of the duodenum. (See Figure I). Forty-four per cent of perforations occurred here. The region of the pylorus and the pre-pyloric area was the next most common location with 36 per cent. Several (16 per cent) occurred on the prepyloric, lesser curvature, one was "supraduodenal perforating into the lesser omentum", and one occurred an inch and a half below the esophagus on the lesser curvature.

Figure I
Location of Perforation



Post-operative complications developed as shown in the subsequent table. (Table I). Recovery was uneventful in two-thirds of the cases.

Table I

Post-operative Complications

No complications	33	Cases
Wound infection	3	"
Urinary tract infection	3	"
Wound breakdown	2	"
Abscesses		
Abdominal	2	"
Sub-hepatic	1	"
Sub-phrenic	1	"
Atelectasis	2	"
Evisceration	1	"
Urinary calculi	1	"
Prostatism	1	"
Pulmonary congestion	1	"
Cardiac irregularity	1	"
Pancreatic-like discharge	1	"

Infections have long been recognized as the decisive factors in recovery from perforations, and have accounted for the majority of fatalities in the reported series in the literature. The suppression of peritonitis, abscesses, and pulmonary infection has been greatly augmented in recent years by intensive use of the chemotherapeutic and antibiotic agents. An example of this is given by Trieger²⁵ who reports a mortality of 33 per cent for 73 cases from 1930-1944, and no deaths in 17 cases from 1944 to 1946. Shipley and Walker²¹ indicate similar results. Their mortality for 138 cases from 1935-1946 was 20 per cent. However, the mortality for cases occurring in the last three years of that period was only 7.5 per cent.

It is interesting to note the trend in chemotherapeutic and antibiotic therapy recorded in this series. In 1941 we were using sulfathiazole locally in the peritoneal cavity and systemically. By December, 1942, sulfanilamide was being used locally and sulfadiazine systemically. By August, 1944, sulfanilamide and penicillin were used locally and sulfadiazine systemically, as well as penicillin in 10,000 U doses. Following

that the dosage of penicillin was raised to 15,000, then to 20,000; and by June, 1946, we were utilizing the present day dosage of 100,000 U every three hours. By early 1947 both penicillin and streptomycin were being used both locally and systemically.

Morbidity following surgical repair of perforation in an uncomplicated case has been rather short, the usual case being discharged from the hospital on the fifth or sixth day. Length of hospital stay in this series ranged from five to fifty-one days, the average being 12 days. The length of hospital stay in Taylor's series of non-operated cases was stated to be "two to four weeks".²²

It is customary at this clinic to recommend subtotal gastric resection after an interval of six weeks to two months to all patients experiencing perforation of an ulcer. Of forty-six surviving patients seventeen have returned for subsequent gastrectomy. One of these had had an interval vagotomy done elsewhere with no beneficial results.

There were four fatalities in this series of cases, giving an over-all mortality of 8 per cent. Perhaps only one of these may be considered directly attributable to perforation. That patient was a 66-year old male who had had a perforation of the anterior wall of the stomach closed here seven months previously. He was on the waiting list for gastric resection when he returned in November, 1941, with a second perforation on the lesser curvature, with an interval of 13 hours elapsing between perforation and surgery. Gross contamination of the peritoneal cavity with mashed potatoes was found, and the patient expired ten days post-operatively with multiple abdominal abscesses.

The second fatality was in a 71-year old male admitted in July, 1943, seven hours after perforation. He was operated and was apparently doing well on his first post-operative day except for some mental confusion. He was left alone for a brief period of time and jumped from a fourth floor window to his death.

The third death occurred in August, 1944. This patient was a 54-year old male who came in with severe, uncontrollable bleeding, and a hemoglobin of five grams. Because no progress was being made by transfusion and supportive therapy, gastrectomy was planned. An unsuspected perforation as well as active bleeding from the ulcer was found at surgery. The resection was performed satisfactorily, but the patient expired on his seventh post-operative day. At postmortem examination, he was found to have Laennec's Cirrhosis, Splenomegally, peritonitis, and pneumonia.

The most recent fatality was in June, 1946, in a 66-year old female who came in also with severe bleeding (hemoglobin 3.5 gms.). She was the patient on whom the barium studies were done and barium demonstrated in the peritoneal cavity later in the day. Her demise occurred on the third post-operative day with autopsy findings of pulmonary congestion and atelectasis.

The last seventeen cases recorded have been done without fatality. This represents admittedly a small series of cases. If the last three fatal cases can be excluded as dying of causes not directly attributable to perforation, the mortality rate drops to 2 per cent. In either event our results compare favorably with others reported as will be shown.

Discussion

It is readily apparent that the results of treatment of perforated peptic ulcer leave much to be desired. The following table of mortality rates (See Table II) from operative treatment emphasizes the need for improvement. Obviously, many of these under present day conditions would be much better, and a trend toward lowered mortality and morbidity is seen. However, one notes that deaths range from a low of about 1 per cent to as much as 33 per cent in various series. Taylor noted this disparaging situation and, remembering the frequent findings of a sterile peritoneal cavity and an omentally sealed perforation, he decided to attempt conservative therapy. The non-operative treatment consists of the following essen-

tials:

1. Effective gastric decompression.
2. Adequate replacement of fluids and electrolytes.
3. Intensive chemotherapeutic and antibiotic therapy.
4. Adequate sedation and analgesics.
5. Routine ulcer healing regime.

Operative treatment here is the same except that the closure of the defect is accomplished surgically instead of by natural defense mechanisms.

Table II

Table of Operative Mortalities

<u>Investigator</u>	<u>Year re-</u> <u>ported</u>	<u>No. of</u> <u>Cases</u>	<u>% Mor-</u> <u>tality</u>
Judin ¹⁶ (gastric resection)	1937	418	12.8
DeBaKey ⁸ (collected)	1940	15,340	23.4
Cohn ⁷	1941	300	15.0
Berson ³	1942	151	15.2
Donald & Barkett ⁹	1942	116	18.5
O'Donoghue & Jacobs ¹⁸	1942	200	24.5
Paletta & Hill ¹⁹	1943	83	16.9
Timoney ²⁴	1943	246	19.5
Black & Blackford ⁵	1945	93	12.0
Graham & Tovee ¹³	1945	111	6.3
Baritell ¹¹	1946	88	1.1
Graham ¹⁴	1946	125	6.4
Taylor ²²	1946	77	14.0
Estes & Bennett ¹⁰	1947	80	8.7
Hirschfield & Homer ¹⁵ (collected)	1947	2,231	17.4
Thompson & Prout ²³	1947	100	15.0
Trieger ²⁵	1947	90	32.9
Brown & Andrus ⁶	1948	42	4.8
Moore & Hendricks ¹⁷	1948	101	18.0
Shipley & Walker ²¹	1949	188	20.0

Taylor, as well as others, has reported enthusiastically on the improvement in mortality figures accompanying this change. The following table illustrates their results: (See Table III)

Table III

Non-operative Mortality Rates

<u>Investigator</u>	<u>Year re-ported</u>	<u>No. of Cases</u>	<u>% Mor-tality</u>
Taylor ²²	1946	28	14.3
Bingham ⁴ (includes Taylor's)	1948	62	11.3
Seeley ²⁰	1949	34	0.

It is indeed striking to note the results of Seeley's studies in Army hospitals with no mortality in 34 cases. One is puzzled, therefore, to read his conclusion in which he states: "This method of treatment should be used only where the patient can be closely observed, or where operative treatment is unobtain-

able." Seeley believes conservative management to have the following advantages:

1. It avoids wound infections, eviscerations, fistulas, and incisional hernias.
2. It allows time for observation where a question of differential diagnosis exists.
3. It is a good treatment for a patient who is a poor surgical risk.

In Taylor's series two cases were subsequently operated after institution of conservative management because of deterioration of the patient's condition under such a regime.

Bingham⁴ has set forth criteria for selection of type of therapy to be applied in cases of perforation. (Table IV).

Table IV

Criteria for Type of Management for Perforation

<u>Conservative</u>	<u>Surgical</u>
1. Less than 8 hrs. old.	1. More than 8 hrs. old.
2. More than 1 hr. since last meal.	2. Less than 1 hr. after last meal.
3. Duodenal rather than gastric.	3. Drank large amount of fluid just previous to perforation.
4. Small perforation.	4. Cases with pyloric stenosis or gastric dilatation.
5. Cases over 3 days old.	5. Where ulcer may be malignant.
6. Where differential diagnosis is uncertain.	6. Late cases where surgical drainage of abscess may be required.

Thus one is faced with two alternatives when confronted with a perforated ulcer. The decision as to whether surgical or conservative management is to be instituted must be made at once and intensive therapy begun immediately. The present day armamentarium of chemotherapeutic and antibiotic agents, improvements in anesthesia, improvements in surgical technique, and early diagnosis and treatment are definitely lowering mortality from perforated peptic ulcers. More experience must be accumulated before one method of therapy can be unequivocally stated to be superior to the other. It

would appear that prompt surgery remains the safest measure in treatment of most cases of perforated peptic ulcer.

References

1. Baritell, A. L.
Perforated Gastroduodenal Ulcers.
Surgery 21:24, '47.
2. Bergh, G. H., Bowers, W.F. and Wangenstein, O. H.
Perforation of the Gastrointestinal Tract; An Experimental Study of Factors Influencing the Development of

- Peritonitis.
Surgery, 2:196, '37.
3. Berson, H. L.
Acute Perforated Peptic Ulcers: An 18 Year Surgey.
Am.J.Surg.56:385-394 (May) '42.
 4. Bingham, D. C. L.
The Treatment of Acute Perforated Peptic Ulcer.
Can.M.Ass.J.58:1-5 (Jan.) '48.
 5. Black, B. M., and Blackford, R. E.
Perforated Peptic Ulcer: Review of 96 Cases.
Surg.Clin.N.Amer.25:918-928 (Aug.) '45.
 6. Brown, R.B., and Andrus, D.
Penicillin in the Post-Operative Treatment of Peptic Ulcer with Perforation and Appendicitis with Perforation.
Ann.Surg.,128:57, '48.
 7. Cohn, R. B.
Repeated Perforations of Peptic Ulcers.
Surgery 9:688-694 (May) '41.
 8. DeBakey, M.
Acute Perforated Gastroduodenal Ulceration: Statistical Analysis and Review of the Literature.
Surg.8:852-884, (Nov.) '40, and 1020-1076, (Dec.) '40.
 9. Donald, D. C. and Barkett, S. J.
Acute Perforated Ulcer Syndrome with Surgical Management; Report of 124 Surgical Cases.
Am.J.Surg.,56:406-413 (May) '42.
 - 10, Estes, W. L., Jr., and Bennet, B.A.Jr.
Acute Perforated Gastroduodenal Ulceration.
Ann.Surg.119:321, '47.
 11. Friesen, S. R., Merendion, K.A., Baronofsky, I.D., Mears, F.B. and Wangenstein, O.H.
The Relationship of Bone Trauma to the Development of Acute Gastroduodenal Lesions in Experimental Animals and in Man.
Surg. 24:134-159 (July) '48.
 12. Graham, R. R.
Technical Surgical Procedures for Gastric and Duodenal Ulcers.
S.G.& O. 66:269, '38.
 13. Graham, R. R. and Tovee, E. B.
Treatment of Perforated Duodenal Ulcers.
Surg. 17:704, '45.
 14. Graham, R. R.
Treatment of Acute Perforation of Duodenal Ulcer.
Am.J.Surg.,72:802-810 (Dec.) '46.
 15. Hirschfield, J. W., Abbott, Wm., and Smathers, H.
Use of Chemotherapy as a Possible Means of Reducing Mortality Rates in Perforated Peptic Ulcer.
Am.J.Surg.,74:54, (July) '47.
 16. Judin, S. S.
Partial Gastrectomy in Acute Perforated Peptic Ulcer.
S.G.& O. 64:63, '37.
 17. Moore, S. W. and Hendricks, R.
Late Results following Perforated Ulcer.
Surg. 23:442-449 (Mar.) '48.
 18. O'Donoghue, J. B. and Jacobs, M. B.
Acute Perforation of Gastric and Duodenal Ulcer: A Study of 200 Consecutive Cases.
Ill.M.J. 81:62-69 (Jan.) '42.
 19. Paletta, F. X. and Hill, W. R.
Acute Perforated Gastric and Duodenal Ulcers.
Surg. 14:32-37 (July) '43.
 20. Seeley, S. F., Hogan, E., Henry, J. R. and Bertram, H. F.
Non-operative Treatment of Perforated Duodenal Ulcer.
Bull.U.S. Army Med. Dept., 9:No.2, (Feb.) '49.
 21. Shipley, E.R. and Walker, J.H.
Perforated Gastric and Duodenal Ulcer: Analysis of 200 Consecutive Cases.
Am.J.Surg.,77:329, '49.
 22. Taylor, H.
Perforated Peptic Ulcer Treated Without Operation.
Lancet, 2:441-444 (Sept.28) '46.
 23. Thompson, H. L. and Prout, H.
Surgical Treatment of Peptic Ulcer.
Arch.Surg.,54:390, '47.
 24. Timoney, F. X.
Perforated Peptic Ulcer.
Ann.Surg.,117:710, '43.
 25. Trieger, P.
Acute Gastroduodenal Perforations.
Am.J.Surg., 74:459-461 (Oct.) '47.

* * *

II. MEDICAL SCHOOL NEWS

Coming Events

October 31-November 5 - Continuation Course in Pediatric Roentgenology for Pediatricians and Roentgenologists.

Monday, October 31, - 4:00 p.m. - Dr. Lawson Wilkins, Johns Hopkins University Medical School - "Abnormalities and Variations in Sexual Development and the Methods Used in Diagnosis," Medical Science Amphitheater.

Wednesday, November 2 - 8:15 p.m. - Rigler Lecture in Roentgenology - Dr. John Caffey, Columbia University Medical Center - "Some Normal Variations in the Growing Skeleton: Their Clinical Significance" - Museum of Natural History Auditorium.

November 10-12 - Continuation Course in Pediatric and Traumatic Surgery for General Physicians.

* * *

Faculty News

Department of Bacteriology- Dr. E. L. Schmidt, Instructor, came to Minnesota from Rutgers University, where he received his Ph.D. degree.

Dr. Hendrik DeKruif has recently been promoted to Assistant Professor in Bacteriology.

Dr. H. O. Halvorson, former Professor in the Department of Bacteriology, has now assumed the position as Head of the Department of Bacteriology at the University of Illinois.

Dr. William F. McLimans, former Assistant Professor of Bacteriology, is now with the U. S. Public Health Service at the Rocky Mountain Laboratory, Hamilton, Montana.

Department of Pediatrics- Dr. James Bosma, former Assistant Professor of Pediatrics, resigned in September to accept the position of Professor and

Head of the Department of Pediatrics at the University of Utah Medical School.

Department of Physiology- Dr. Nathan Lifson was promoted in June, 1949, to Professor of Physiology.

School of Nursing- Listed below are the names of Instructors in the School of Nursing who have recently joined our faculty. Miss Margaret F. Grainger takes over the responsibility for the ward administration program and came from Johns Hopkins University, where she was Assistant Director and Coordinator of medical and surgical nursing education.

Miss Helen Biske Linehan, Instructor in psychiatric nursing, has previously served as Senior Lieutenant in the Navy Nurse Corps.

Miss Donna Dailey is active at the Minneapolis General Hospital in a clinical pediatric nursing program and comes to us from the University of Chicago, where she recently received a certificate for a program of pediatric nursing.

Miss Eugenia Taylor, Instructor in the new Home Management and Practical Nursing Program offered through the School of Agriculture, received her B.S. degree in nursing education at the University of Minnesota.

Miss Amelia Smelko, Instructor in the advanced clinical operating room nursing program, previously was head nurse in the operating room at Michael Reese Hospital, Chicago.

Cancer Coordinators Meeting

Cancer Coordinators from most of the medical schools in the United States and Canada are meeting on our Medical School campus October 21 and 22. Representatives from the various medical schools will discuss problems related to medical education in various aspects of cancer. Dr. Arnold Kremen, Cancer Coordinator from the University of Minnesota, is in charge of arrangements for the meeting.

III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS

October 23 - October 29, 1949

No. 262

Sunday, October 23

9:00 - 10:00 Surgery Grand Rounds; Station 22, U. H.

10:30 - 11:00 Subject to be announced; Rm. M-109, U. H.

Monday, October 24

8:00 - Fracture Rounds; A. A. Zierold and Staff; Ward A, Minneapolis General Hospital.

9:00 - 9:50 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.

9:00 - 10:50 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff; M-109, U. H.

10:00 - 12:00 Neurology Rounds; A. B. Baker and Staff; Station 50, U. H.

11:00 - 11:50 Physical Medicine Seminar; Electrodiagnosis; G. Keith Stillwell; E-101, U. H.

11:00 - 11:50 Roentgenology-Medicine Conference; Veterans Hospital.

11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Eustis Amphitheater, U. H.

12:00 - 1:00 Physiology Seminar; Pulmonary Vascular Resistance; M. B. Visscher; 214 M. H.

12:15 - 1:20 Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.

12:30 - 1:20 Pathology Seminar; Osteoid Osteoma; Dr. McDonald; 104 I. A.

12:30 - 1:30 Surgery Problem Case Conference; A. A. Zierold, C. Dennis and Staff; Small Classroom, Minneapolis General Hospital.

1:30 - 2:30 Surgery Grand Rounds; A. A. Zierold, C. Dennis and Staff; Minneapolis General Hospital.

1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U.H.

4:00 - Public Health Seminar; Subject to be announced; 113 Medical Sciences.

4:00 - Pediatric Seminar; Tetanus; A. Ellinger; 6th Fl. W., Child Psychiatry; U. H.

5:00 - 5:50 Clinical Medical Pathologic Conference; Todd Amphitheater, U. H.

5:00 - 6:00 Urology-Roentgenology Conference; D. Creevy, O. J. Baggenstoss and Staffs; M-109, U. H.

Tuesday, October 25

- 8:15 - 9:00 Roentgenology-Surgical-Pathology Conference; Craig Freeman and L. G. Rigler; M-109, U. H.
- 8:30 - 10:20 Surgery Conference; Small Conference Room, Bldg. I, Veterans Hospital.
- 9:00 - 9:50 Roentgenology Pediatric Conference; L. G. Rigler, I. McQuarrie and Staffs; Todd Amphitheater, U. H.
- 10:30 - 11:50 Surgical Pathological Conference; Lyle Hay and E. T. Bell; Veterans Hospital.
- 12:30 - Pediatric-Surgery Rounds; Sta. I, Minneapolis General Hospital; Drs. Stoesser, Wyatt, Chisholm, McNelson and Dennis.
- 12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 I. A.
- 1:00 - 2:30 X-ray Surgery Conference; Auditorium, Ancker Hospital.
- 2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III, Veterans Hospital.
- 3:15 - 4:20 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U. H.
- 3:30 - 4:20 Clinical Pathological Conference; Staff; Veterans Hospital.
- 4:00 - Medical-Surgical Conference; Coarctation; Drs. Borden-Jensen; Bldg. I, Main Conf. Room, Vet. Hosp.
- 4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.
- 4:00 - 5:00 Physiology-Surgery Conference, Eustis Amphitheater, U. H.
- 5:00 - 6:00 X-ray Conference; Presentation of Cases by Veterans Hospital Staff; Drs. Fink, O'Laughlin, et al; Todd Amphitheater, U. H.
- 8:00 - Minnesota Pathological Society; Experimental and Clinical Studies on Hypoglycemia; Irvine McQuarrie; MeS Amphitheater.

Wednesday, October 26

- 8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-515, U. H.
- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium, Ancker Hospital.
- 8:30 - 10:00 Orthopedic-Roentgenologic Conference; Edward T. Evans, Room 1AW, Veterans Hospital.
- 8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker; Veterans Hospital.
- 11:00 - 12:00 Pathology-Medicine-Surgery Conference; Medicine Case; O. H. Wangensteen, C. J. Watson, and Staffs; Todd Amphitheater, U. H.
- 12:00 - 1:00 Radio-Isotope Seminar; 113 Medical Science Bldg.
- 3:30 - 4:30 Journal Club; Surgery Office, Ancker Hospital.
- 4:00 - 5:00 Infectious Disease Rounds; Veterans Hospital, Conf. Room, Bldg. I.
- 5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy & Staff; E-101, U. H.

Thursday, October 27

- 8:30 - 10:20 Surgery Grand Rounds; Lyle Hay and Staff; Veterans Hospital.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-109, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:50 Surgery-Radiology Conference; Daniel Fink and Lyle Hay; Veterans Hospital.
- 11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Todd Amphitheater, U. H.
- 11:30 - 12:30 Clinical Pathology Conference; Steven Barron, C. Dennis, George Fahr, A. V. Stoesser and Staffs; Large Classroom, Minneapolis General Hospital.
- 12:00 - 1:00 Physiological Chemistry Seminar; Interpretation of Ultraviolet Absorption Spectra of Nucleic Acids; 214 M. H.
- 1:00 - 1:50 Fracture Conference; A. A. Zierold and Staff; Minneapolis General Hospital.
- 2:00 - 3:00 Errors Conference; A. A. Zierold, C. Dennis and Staff; Large Classroom, Minneapolis General Hospital.
- 4:15 - 5:00 Bacteriology and Immunology Seminar; Epidemiology of Histoplasmosis; F. J. Roth, 214 M. H.
- 4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.
- 5:00 - 6:00 X-ray Seminar; Review of Meeting of American Roentgen Ray Society; Todd Amphitheater, U. H.

Friday, October 28

- 8:30 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.
- 9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U.H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:20 Medicine Grand Rounds; Veterans Hospital.
- 10:30 - 11:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 11:00 - 12:00 Surgery-Pediatric Conference; C. Dennis, O. S. Wyatt, A. V. Stoesser and Staffs; Minneapolis General Hospital.
- 11:45 - 12:50 University of Minnesota Hospitals General Staff Meeting; The Nature of Bell's Palsy; Jerome Hilger; Powell Hall Amphitheater.
- 12:00 - 1:00 Surgery Clinical Pathological Conference; Clarence Dennis and Staff; Large Classroom, Minneapolis General Hospital.
- 1:00 - 1:50 Dermatology and Syphilology; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.
- 1:00 - 3:00 Pathology-Surgery Conference; Auditorium, Ancker Hospital.

- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson, and Staff; Todd Amphitheater, U. H.
- 3:00 - 4:00 Neuropathology Conference; F. Tichy; Todd Amphitheater, U. H.
- 4:00 - 5:00 Electrocardiographic Conference; George N. Aagaard; 106 Temp. Bldg., Hospital Court, U. H.
- 4:00 - 5:00 Clinical Pathological Conference; A. B. Baker; Todd Amphitheater, U.H.
- 5:00 - 6:00 Otolaryngology Seminar; Review of Current Literature; Dr. Younger; Todd Memorial Room, U. H.

Saturday, October 29

- 7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; M-109, U. H.
- 8:00 - 9:00 Pediatric Psychiatric Rounds; Reynold Jensen; 6th Floor, West Wing, U. H.
- 8:00 - 9:00 Surgery Literature Conference; Clarence Dennis and Staff; Small Classroom, Minneapolis General Hospital.
- 8:30 - 9:30 Surgery Conference; Auditorium Ancker Hospital.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; E-221, U. H.
- 9:00 - 10:30 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amph., U. H.
- 9:00 - 11:30 Surgery-Roentgenology Conference; Report on Cancer Detection Center; David State; Todd Amphitheater, U. H.
- 9:00 - 11:30 Psychiatry Conference; Treatment in Child Psychiatry, 104 I. A.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.
- 11:00 - 12:00 Anatomy Seminar; Frozen-dehydration of tissues; J. Francis Hartmann; Relation of the thyroid gland to carbohydrate metabolism; William T. McKenna.