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Benign Gastric Ulcer

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INDEX

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I. ROENTGENOLOGIC DIAGNOSIS OF BENIGN GASTRIC ULCER A PRELIMINARY REPORT OF 133 CASES

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H. O. Peterson, M.D.

The purpose of this paper is to present our experiences with regard to the differential diagnosis of benign and malignant gastric ulcers. This study was prompted by the growing impression among physicians, especially surgeons, that a differential diagnosis cannot be made. If this be true, the only logical treatment for gastric ulcer is surgical removal. It is not surprising therefore that some surgeons are now advocating gastrectomy for all gastric ulcers[21, 23]. This relieves the radiologist of trying to make a differential diagnosis, eliminates the internist from the therapy of gastric ulcers, and greatly simplifies the indications for surgery.

This trend of thought began in the late 1920's and early 1930's with the reports of Orator[10], Haudek[5], and Holmes and Hampton[7]. They all reported about 30% malignancy in prepyloric ulcers. Holmes and Hampton defined the prepyloric area as being the most distal 2.5 cm. of the stomach but not including the pylorus. Subsequent reports by other authors[2, 8, 14] have refuted these figures in regard to the prepyloric area, but continue to show an incidence ranging from 5% to 20% of malignancy in all gastric ulcers. Ulcers on the greater curvature were considered to be 100% malignant until proven otherwise. Recently, however, many benign ulcers have been found on the greater curvature.

Before proceeding to an analysis of our cases a few general remarks on the diagnosis of gastric ulcer are in order. The clinical diagnosis of gastric ulcer based on the history, physical findings, and laboratory evidence is usually not considered accurate enough without roentgen or gastrocopic confirmation. In specific cases gastroscopy or surgical exploration will demonstrate lesions not recognized roentgenologically. Everyone agrees, however, that the roentgen diagnosis of gastric ulcer is the most accurate method for routine use.

The clinical differential diagnosis of benign and malignant ulcers is of very little value in most cases. The age of the patient is usually of no value since most gastric ulcers occur in patients over 40 years of age. Hypo or hyperchlorhydria is also of little help in any specific instance since a large percentage of the cases with benign gastric ulcer have low acid or an achlorhydria.

Roentgenologically there are several findings which indicate that the ulcer is benign. These are: the projection of the ulcer crater outside of the lumen of the stomach; edema around the ulcer which usually has a different appearance from the neoplastic margin around a carcinomatous ulcer; radiation of mucosal folds toward the ulcer often extending to the very margin of the crater; and an incisura opposite the crater.

There are other roentgenological findings which have been considered as indicating malignancy in a gastric ulcer. The "meniscus sign" of Carman belongs in this group and is quite accurate when correctly interpreted. The basis of this sign is the fact that the ulceration is within the lumen of the stomach having developed in the center of a mass of carcinomatous tissue located preferably on the greater or lessor curvature of the stomach. Other roentgen findings which have been discribed as indicating malignancy are not accurate. The size of the ulcer has no relationship to the presence or absence of malignancy. The location of the ulcer is also not significant. Even greater curvature ulcers are no more often malignant than benign[2]. The incidence of greater curvature ulcers, however, is very small as indicated by Jordan's statistics; five greater curvature ulcers - two of which were bengin - in 600 cases[16]. The shape of the crater is also of very little significance since many benign ulcers have a ragged appearance and some carcinomas are smooth.

With this brief introduction, we can proceed to the responsibilities of the radiologist in the differential diagnosis of benign and malignant gastric ulcer. All of the cases in which an ulcer is demonstrated can be separated into one of three groups:

1. Definite carcinomas.
2. Definite benign ulcers.
3. Indeterminate.

(1) The definite carcinomas do not resemble benign ulcers and present no problem as to diagnosis or mode of treatment.

(2) The definite benign ulcers make up the largest number of cases. These can be treated in any manner decided upon by internist or surgeon depending on the features of each individual case. We do not believe they should all be resected solely because of the fear of malignancy. In this regard it should be said that there is no generally accepted evidence as yet that a benign gastric ulcer is a precursor of carcinoma[6, 11]. However, if one chooses to treat a gastric ulcer medically, frequent follow-up roentgen studies should be done. The first follow-up examination should be made two to three weeks after treatment is started, and the second examination three to five weeks later. In most cases benign ulcers will be healed, or almost healed, in six to eight weeks and will show marked improvement in three weeks. If at the end of six to eight weeks the ulcer is not improving surgery is most likely indicated as the treatment of choice. Often, however, even in such cases there may be reasons for not wishing to do a gastrectomy. If the ulcer is typically benign roentgenologically, medical treatment can be pursued still farther without undue fear of malignancy. In other words, the treatment can be based on the clinical picture rather than the danger of carcinoma. At no time, however, should the case be dismissed from frequent check-ups until the ulcer has either healed satisfactorily or has been removed.

(3) The indeterminate group is a relatively small group in which the roentgen findings are not characteristic for either a benign or a malignant ulcer. In fact, in some of these cases one can not be sure an ulcer is present radiographically, but the operative specimen reveals the presence of the crater. The difficulty in the roentgen diagnosis lies in the fact that the gross anatomy of the lesion cannot be clearly understood. Most of these prove to be benign but surgery is the preferable treatment for all of them.

The cases presented in this paper were selected by the following criteria.

1 - only those cases were used in which a definite ulcer crater can be demonstrated on the x-ray films or by pathological examination.

2 - no cases of pyloric ulcer are included.

3 - to avoid omitting any cases found to be malignant after surgery, the final list was checked against the pathology department records for gastric malignancy during the period covered.

4 - using these criteria 133 consecutive cases of gastric ulcer were examined over approximately eleven years at Miller Hospital, St. Paul and Interstate Clinic, Red Wing.

Distribution by Sex

Males	96
Females	37
	133

Males: Females: :2.6:1

Distribution by Age

Decade	3	4	5	6	7	8	9	Unknown	Total
Cases	5	15	25	41	28	10	3	6	133

Distribution by Size

Centimeters	<1	1-2	2-3	3-4	4-5	>5	Total
Cases	48	60	15	7	1	2	133

Distribution by Location

Location	Pre-pyloric	Lesser Curv	Greater Curv	Total
Cases	43	88	2	133

Breakdown of Total Cases

OPERATED CASES	26
CASES WITH <1 YR. FOLLOW	40
CASES WITH >1 YR. FOLLOW	67
TOTAL CASES	133

OPERATIONS AND AUTOPSIES (26)

Gastric Resections (19)

Pre Op. X-ray Dx			Post Op. Path Dx			
BGU	12		Cancer	2	BGU	10
Ca or Prob Ca	7		Cancer	0	BGU	7

Gastroenterostomies (4)

Cases	FOLLOW UP	
	Before Surg.	After Surg.
1	1 mo.	1 mo.
1	<1 mo.	5 yrs.
1	4 yrs.	3 yrs.
1	<1 mo.	7 yrs.

Close Perforation (1)

Cases	FOLLOW UP	
	Before Surg.	After Surg.
1	2.5 yrs.	3.5 yrs.

Post Mortems (2)

Cases	X-ray Dx	Path Dx	Cause of Death
1	BGU	Cancer	hem. from gast. Ca.
1	Cancer	BGU	Broncopneumonia gangrene L. lung

CASES WITH LESS THAN ONE YEAR FOLLOW-UP (40)

Healed by x-ray exam	15
Not healed	8
Improved	9
No follow-up	6
Dead	2*

* 1 ht. disease and 1 hem. from BGU

CASES WITH MORE THAN ONE YEAR
FOLLOW-UP (67)

Years	Well	Not well	Dead	Total
1-2	11		1	12
2-3	9		1	10
3-4	6		1	7
4-5	9		1	10
5-6	8	2	1	11
6-7	4	1		5
7-8	1		1	2
8-9	4		1	5
9-10	1			1
10	4			4
TOTAL	57	3	7	67

Deaths (13)

Unrelated to gastric ulcer		7
Related to gastric ulcer		6
Post op. gastrectomy	2	
Post op. repair fistula	1	
Obstruction after 5 yrs.	1	
Hemorrhage (Ca)	1	
Hemorrhage (No Ca)	1	

It is recognized that a clinical study of this type is not as accurate as a group of histologically proven cases. However, this is a more accurate representation of gastric ulcers as seen in the general population than is an operated group. Consequently a study of this type is of value and will become more valuable as the duration of the follow-up period increases. We hope to expand this series as well as to continue to follow the old cases for many more years.

In November 1950, Dr. Hebbel[6] presented to this group a paper on superficial carcinoma of the stomach. Eleven cases were included in the report and in eight of these the malignant cells were confined to the mucosa. There was extension to the submucosa in three. Nine of the eleven cases had

ulcers, but two showed instead small elevated patches in the mucosa about one centimeter in diameter and one to three millimeters thick, without ulceration. These cases afford extremely interesting evidence from which one can speculate on the evolution of carcinoma of the stomach as well as the possible relationship between benign ulcer and cancer. Of particular interest to us at this time, however, are the roentgen findings with reference to the differential diagnosis of benign gastric ulcer.

We have recently reviewed the films on seven of the eight cases which had been originally studied at the University Hospitals. Six of these show an ulcer crater which roentgenologically is typically benign. The gross specimens were all fairly similar usually consisting of a zone of thin appearing mucosa with ulceration in the center. Microscopically the malignant cells are found only around the ulcers and no tumor cells are present in the base of the ulcers. In one case the ulcer which was demonstrated roentgenologically was benign microscopically and the superficial carcinoma found in the specimen surrounded another shallow ulcer which was not demonstrated by the roentgen examination.

Dr. Hebbel found on reviewing the charts that some of these cases had long clinical histories as well as roentgen evidence of the ulcer having been present for periods of up to three years prior to surgery. In spite of this long history the tumor cells were still limited to the mucosa or at most the submucosa. There were no metastases to regional lymph nodes and no case has died of carcinoma. Two patients are well nine years post operatively. One patient died of a post operative coronary thrombosis.

One of the cases in our present series from the Interstate Clinic in Red Wing has been reviewed by Doctor Ikeda and Doctor Hebbel and it belongs in this classification of superficial carcinoma of the stomach. Roentgenologically these ulcers can not be distinguished from benign gastric ulcer. It is our impression that this type of superficial carcinoma will account for most of the errors in the roentgen diagnosis of benign gastric ulcer. Fortunately these cases are quite rare; and, in some instances at least, remain superficial for long periods of time. Therefore, a delay of a few months after the ulcer is diagnosed before removing the stomach should not jeopardize the patient's chance for survival.

Conclusions:

1. Gastric ulcers can be diagnosed roentgenologically as being benign 97% of the time in selected cases.

2. The number of cases in which the diagnosis is in doubt is very small in comparison to the total number of gastric ulcers.

3. The chief source of error will occur in the cases having the superficial type of carcinoma with ulceration. Not over 2% of ulcers will be of this type but they cannot be distinguished from benign ulcer.

4. Prepyloric ulcers are no more likely to be malignant than an ulcer in any other location in the stomach.

5. Greater curvature ulcers are comparatively rare but are benign histologically if they appear benign roentgenologically.

6. The size of a gastric ulcer has no relationship to the incidence of malignancy.

7. The age of the patient and the presence or absence of free HCL is of no help in the differential diagnosis of the individual case of gastric ulcer.

8. In our present state of experience it is imperative that all gastric ulcers be observed and followed very closely roentgenologically if they are to be

treated medically. Ulcers which do not heal in three or four months of good medical management usually should be resected.

9. It does not appear justifiable to remove all gastric ulcers solely because of the erroneous impression that malignancy cannot be excluded roentgenologically.

10. There are many legitimate indications (clinical, psychological, economical, etc.) for resection of benign gastric ulcers, but the decision should be based on factors other than the fear that all gastric ulcers may be malignant.

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Present status of the peptic ulcer problem.
JAMA 138: 805-807, Nov. 13, 1948.

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Cancer 3: 515-552, May, 1950.

II. MEDICAL SCHOOL NEWS

Coming Events

Jan. 28 - Feb. 9	Continuation Course in Clinical Neurology for General Physicians and Specialists
Jan. 30	J. B. Johnston Lecture; "On the Nature of Pain," Dr. Harold G. Wolff, Professor of Medicine and Associate Professor of Psychiatry, Cornell University Medical College, New York; Museum of Natural History Auditorium; 8:00 p.m.
Feb. 14-16	Continuation Course in Therapy of Cardiovascular Diseases for General Physicians
Feb. 19	Minnesota Pathological Society Meeting; "Physiological and Therapeutic Significance of Levo-Arterenol -- The Principal Hormone of the Adrenal Medulla," Dr. M. L. Tainter, Director, Sterling Winthrop Research Institute, Renssellaer, New York; Owre Amphitheater.
Feb. 25-27	Continuation Course in Clinical Dietetics for Clinical Dietitians

* * *

Distinguished Visitor

On Wednesday, January 16, Dr. Paul Owren, Professor of Medicine, University of Oslo Medical School, Oslo, Norway, gave a special lecture entitled, "Clinical Aspects of Blood Coagulation," in Todd Amphitheater. Dr. Owren also spoke informally at the regular Wednesday noon conference of the Department of Medicine on "Pathogenesis of Macrocytic Anemia."

Faculty News

Dr. A. B. Baker, Director of the Division of Neurology, is visiting Texas under the sponsorship of the Phi Chi Medical Fraternity Chapters at Southwestern Medical School of the University of Texas in Dallas, Baylor University Medical School in Houston, and the Medical Branch of the University of Texas in Galveston. Each of these various Phi Chi Chapters cooperate in bringing a distinguished speaker to the state. Dr. Baker presented a discussion of "Serious Complications of Poliomyelitis and Their Management" in Dallas on January 14.

Dr. Wesley W. Spink spoke on the subject, "Observations on Medicine in Europe," at the annual staff meeting of St. Luke's Hospital in Duluth on January 17. His talk was illustrated with several of the excellent photographs which he took last summer.

New Minnesota Medical Foundation Members

Samuel Blank, M.D., Waterbury, Conn.
E. A. Addington, M.D., Seattle, Wash.
Juan Solari, M.D., Lima, Peru
C. G. Sheppard, M.D., Hutchinson
J. A. Anderson, M.D., San Francisco
Earl C. Henrikson, M.D., Minneapolis
E. A. Larson, M.D., Bellingham, Wash.
Mrs. Dorothy L. Cowan, Los Angeles
Mr. Victor F. Rotering, Minneapolis
Mr. W. L. Robertson, Fergus Falls
Mr. G. H. Boone, Britton, S. Dak.
Mr. Emil Hanson, Lake Lillian

III. UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

January 28 - February 2, 1952

Monday, January 28

Medical School and University Hospitals

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; W-612, U. H.

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

11:30 - Tumor Conference; Doctors Kremen, Moore, and Stenstrom, Todd Amphitheater, U. H.

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

12:30 - Physiology Seminar: **Dietary Factors** Influencing Common Causes of Death in C_3H Mice; Y. Chiung Puh-Lee; 214 Millard Hall.

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

4:00 - Pediatric Seminar; Pulmonary Hemosiderosis; Frances Schaar; Sixth Floor West, U. H.

4:30 - 5:30 Dermatological Seminar; M-346, U. H.

4:30 - Public Health Seminar; 15 Owre Hall.

5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Minneapolis General Hospital

7:30 - Fracture Grand Rounds; Dr. Zierold, Sta. A.

10:30 - 12:00 Tuberculosis and Contagion Rounds; Thomas Lowry; Station M.

11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.

12:30 - Surgery Grand Rounds; Dr. Zierold, Sta. A.

1:00 - X-ray Conference; Classroom, 4th Floor.

1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.

Veterans Administration Hospital

9:00 - G. I. Rounds; R. V. Ebert, J. A. Wilson, Norman Shrifter; Bldg. I.

Monday, January 28 (Cont.)

Veterans Administration Hospital (Cont.)

11:30 - X-ray Conference; Conference Room; Bldg. I.

2:00 - Psychosomatic Rounds; Bldg. 5.

3:30 - Psychosomatic Rounds; Bldg. 1, C. K. Aldrich.

Tuesday, January 29

Medical School and University Hospitals

8:30 - Conference on Diet Endocrines and Cancer; M. B. Visscher; 116 Millard Hall.

9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, I. McQuarrie and Staff; Eustis Amphitheater, U. H.

9:00 - 12:00 Cardiovascular Rounds; Station 30, U. H.

12:00 - 1:30 Selected Topics, Permeability and Metabolism; Nathan Lifson; 129 Millard Hall.

12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 I. A.

3:15 - 4:20 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U.H.

4:00 - Pediatric Seminar; The Problem of Reading and Writing Disabilities in Children; H. O. Reynolds; Sixth Floor West, U. H.

4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.

4:30 - Clinical-Medical-Pathological Conference; Todd Amphitheater, U. H.

5:00 - 6:00 X-ray Conference; Presentation of Cases by Ancker Hospital Staff; Drs. Aurelius, D. Peterson, and Odgen; Eustis Amphitheater, U. H.

Ancker Hospital

8:00 - 9:00 Fracture Conference; Auditorium.

1:00 - 2:30 X-ray Surgery Conference; Auditorium.

Minneapolis General Hospital

8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.

10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station F.

11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.

Veterans Administration Hospital

7:30 - Anesthesiology Conference; Conference Room, Bldg. I.

Tuesday, January 29 (Cont.)

Veterans Administration Hospital (Cont.)

8:30 - Infectious Disease Rounds; Dr. Hall.

8:45 - Surgery Journal Club; Conference Room, Bldg. I.

9:00 - Liver Rounds; Drs. Nesbitt and MacDonald.

9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.

10:30 - Surgery Tumor Conference; Conference Room, Bldg. I.

1:00 - Surgery Chest Conference; T. Kinsella and Wm. Tucker; Conference Room, Bldg. I.

2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.

3:30 - 4:20 Autopsy Conference; E. T. Bell and Donald Gleason; Conference Room, Bldg. I.

Wednesday, January 30

Medical School and University Hospitals

8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-109, U. H.

8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Allen Judd and L. G. Rigler; Todd Amphitheater, U. H.

11:00 - 12:00 Pathology-Medicine-Surgery Conference; Medicine Case; O. H. Wangensteen, C. J. Watson and Staff; Todd Amphitheater, U. H.

12:30 - 1:20 Radio-Isotope Seminar; 12 Owre Hall.

1:30 - Conference on Circulatory and Renal Systems Problems; M. B. Visscher; 116 Millard Hall.

5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater, U. H.

5:00 - 6:00 Vascular Conference; Todd Amphitheater, U. H.

5:00 - 7:00 Dermatology Clinical Seminar; Dining Room, U. H.

7:00 - 8:00 Dermatology Journal Club; Dining Room, U. H.

8:00 - 10:00 Dermatological-Pathology Conference; Review of Histopathology Section; R. Goltz; Todd Amphitheater, U. H.

* 8:00 p.m. J. B. Johnston Lecture; "On the Nature of Pain"; Dr. Harold G. Wolff, Professor of Medicine and Associate Professor of Psychiatry, Cornell University Medical College, New York; Museum of Natural History Auditorium.

Wednesday, January 30 (Cont.)

Ancker Hospital

8:30 - 9:30 Clinico-Pathological Conference; Auditorium.

3:30 - 4:30 Journal Club; Surgery Office.

Minneapolis General Hospital

8:00 - Pediatric Allergy Rounds; Lloyd Nelson; 4th Floor.

10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.

11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.

12:30 - Pediatric Staff Meeting; The Pan-American Pediatric Congress; E. J. Huenekens; 4th Floor Annex.

12:30 - EKG Conference; Boyd Thomes and Staff; 302 Harrington Hall.

1:30 - Pediatric Rounds; E. J. Huenekens and Robert Ulstrom; 4th Floor.

2:00 - 4:00 Infectious Disease Rounds; 8th Floor.

4:00 - 5:00 Infectious Disease Conference; Classroom, 8th Floor.

Veterans Administration Hospital

8:30 - 10:00 Orthopedic X-ray Conference; Conference Room, Bldg. I.

8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker,

7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, January 31

Medical School and University Hospitals

8:00 - 9:00 Vascular Rounds; Davitt Felder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Heart Hospital Amphitheater.

9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

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

12:30 - Physiological Chemistry Seminar; Adrenal Steroid Synthesis; W. F. McGuckin; 214 Millard Hall.

1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theater.

4:00 - 5:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.

4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.

Thursday, January 31 (Cont.)

Medical School and University Hospitals (Cont.)

5:00 - 6:00 X-ray Seminar; Measurements of the Hilum; B. J. O'Loughlin and Richard Tucker; Eustis Amphitheater, U. H.

7:30 - 9:30 Pediatric Cardiology Conference and Journal Club; Review of Current Literature 1st hour and Review of Patients 2nd hour; 206 Temporary West Hospital.

Minneapolis General Hospital

8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.

8:30 - Neurology Rounds; William Heilig; 4th Floor.

11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.

1:00 - Fracture-X-ray Conference; Dr. Zierold; Classroom.

Veterans Administration Hospital

8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.

9:15 - Surgery Grand Rounds; Conference Room, Bldg. I.

11:00 - Surgery Roentgen Conference; Conference Room, Bldg. I.

Friday, February 1

Medical School and University Hospitals

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

10:30 - 11:50 Medicine Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.

10:30 - 11:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.

11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Cortisone and ACTH in Experimental and Human Brucellosis; Robert Abernathy, Wesley W. Spink, and Wendell H. Hall; Powell Hall Amphitheater.

1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.

2:00 - 3:00 Dermatology and Syphilology Conference; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.

3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.

3:30 - 4:30 Advanced Neurophysiology Seminar; E. Gellhorn; 111 Owre Hall.

Friday, February 1 (Cont.)

Medical School and University Hospitals (Cont.)

4:00 - 5:00 Dermatology Seminar; W-312, U. H.

5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

Ancker Hospital

1:00 - 3:00 Pathology-Surgery Conference; Auditorium.

Minneapolis General Hospital

11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.

11:00 - Pediatric-Surgery Conference; Dr. Wyatt, Forrest Adams; Classroom, Sta. I.

12:00 - Surgery-Pathology Conference; Dr. Zierold, Dr. Coe; Classroom.

1:00 - 3:00 Clinical Medical Conference; Thomas Lowry; Classroom, Station M.

1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.

Veterans Administration Hospital

10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.

1:00 - Microscopic-Pathology Conference; E. T. Bell; Conference Room, Bldg. I.

1:30 - Chest Conference; Wm. Tucker and J. A. Meyers; Ward 62, Day Room.

3:00 - Renal Pathology; E. T. Bell; Conference Room, Bldg. I.

Saturday, February 2

Medical School and University Hospitals

7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.

9:00 - 10:30 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater, U. H.

9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; Heart Hospital Amphi--theater.

10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.

10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.

11:30 - Anatomy Seminar; Histopathologic Findings in Experimental Renal Damage; Dennis J. Kane; Some Contributions of Electron Microscopy to the Histology of the Nervous System; Richard H Condie; 226 Institute of Anatomy.

Saturday, February 2 (Cont.)

Minneapolis General Hospital

8:00 - Pediatric Rounds; George Lund; 5th Floor.

11:00 - 12:00 Medical-X-ray Conference; O. Lipschultz, Thomas Lowry, and Staff; Main Classroom.

11:00 - Pediatric Clinic; C. D. May and Floyd Denny; Classroom, 4th Floor.

Veterans Administration Hospital

8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.

8:30 - Hematology Rounds; P. Hagen and E. F. Englund.

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* Indicates special meeting. All other meetings occur regularly each week at the same time on the same day. Meeting place may vary from week to week for some conferences.