

*Bulletin* of the  
University of Minnesota Hospitals  
and  
Minnesota Medical Foundation



# Intramedullary Nailing

BULLETIN OF THE  
UNIVERSITY OF MINNESOTA HOSPITALS  
and  
MINNESOTA MEDICAL FOUNDATION

Volume XXIII

Friday, April 18, 1952

Number 23

INDEX

	<u>PAGE</u>
I. THE TREATMENT OF FRACTURES OF THE SHAFT OF THE FEMUR BY INTRAMEDULLARY NAILING . . . . .	445 - 451
LEONARD F. PELTIER, M. D., Clinical Instructor, Division of Orthopedic Surgery,  University of Minnesota Medical School	
II. MEDICAL SCHOOL NEWS . . . . .	452 - 453
III. WEEKLY CALENDAR OF EVENTS . . . . .	454 - 459

---

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

Editor

Robert B. Howard, M.D.

Associate Editors

Wallace D. Armstrong, M. D.  
Erling S. Platou, M.D.  
Howard L. Horns, M.D.

Craig Borden, M.D.  
Richard L. Varco, M.D.  
W. Lane 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  
O. H. Wangenstein, President, The Minnesota Medical Foundation  
Wesley W. Spink, Secretary-Treasurer, The Minnesota Medical Foundation

The Bulletin is sent to members of the Minnesota Medical Foundation.  
Annual membership fee - \$10.00.

Address communications to: Staff Bulletin, 3330 Powell Hall, University  
of Minnesota, Minneapolis 14, Minn.

# I. THE TREATMENT OF FRACTURES OF THE SHAFT OF THE FEMUR BY INTRAMEDULLARY NAILING

Leonard F. Peltier, M.D.

## INTRODUCTION

The treatment of fractures of the femur by means of intramedullary nails was one of the major advances in surgical technique to come out of World War II. This procedure, perfected by Kuntscher<sup>4</sup> in 1940, was subjected to an intensive trial in the treatment of fracture casualties. As a result, the indications and limitations of the method were speedily established. Several monographs published shortly after the war's end made this experience available to American surgeons<sup>2, 7, 14</sup>. In 1945, Time magazine<sup>16</sup> reported on the use of intramedullary nails in American prisoners of war and reproduced an x-ray of a nailed femur fracture. It was not until 1947 that the first report of intramedullary nailing for femur fractures appeared in an American medical journal<sup>6</sup>.

Kuntscher had developed an idea, which had been current surgical coin for many years, to the point where other surgeons were willing to adopt and apply his technique. For this reason he must be given full credit for introducing the method. Watson-Jones<sup>17</sup> has suggested that this distinction belongs to Hey-Groves who reported three cases of femur fractures treated with intramedullary nails in 1918<sup>3</sup>. However, as early as 1886, Birch<sup>1</sup> described the use of intramedullary ivory pegs in the management of difficult fractures of the femur and reported that Vollmann had performed similar operations. Kuntscher considered his method to be a direct outgrowth of the technique devised by Smith-Petersen<sup>13</sup> for fixing fractures of the neck of the femur with trifin nails.

When intramedullary nailing is performed in a properly selected fracture of the femur it provides immobilization

of the fragments in an exact anatomical reduction. The fixation is sufficient to allow free movement of the hip and knee joints, and may permit immediate ambulation with weight-bearing. Muscle atrophy and joint stiffness are minimized. The period of hospitalization can be greatly reduced and the period of partial disability is shortened.

## INDICATIONS FOR INTRAMEDULLARY NAILING IN FEMUR FRACTURES

Transverse fractures of the middle third of the shaft of the femur are best suited for treatment by intramedullary nailing. The transverse character of the fracture allows impaction of the fragment upon weight bearing, and rotation and slipping are prevented. Comminuted and spiral fractures of the femur can be treated by nailing, but early weight bearing cannot be allowed because of the unstable nature of the fixation. Fractures above the lesser trochanter and in the lower third of the shaft of the femur are not suitable for intramedullary nailing since a fragment of considerable length is required to obtain satisfactory fixation.

In compound fractures of the femur, intramedullary nailing can be used safely subject to the same restrictions that apply to any other form of internal fixation. In patients with multiple fractures, including one of the femur, intramedullary nailing of this major fracture may allow a more simple solution of the other fracture problems. Intramedullary nailing combined with bone grafting may be used in some cases of non-union in fractures of the femur. By allowing mobilization of the joints, the salvage of the extremity may be begun immediately.

Pathological fractures of the shaft of the femur are frequently subtrochanteric in location and transverse in character. In such cases, intramedullary nailing, with the possibilities of rapid ambulation and rehabilitation, is especially indicated. Precautions should be observed to avoid spreading live tumor cells

down the medullary cavity of the distal fragment<sup>9</sup>. The operation is best combined with a local resection of the bone lesion if possible. If irradiation is indicated, it should be carried out pre-operatively when possible as its administration after the nail is in place is complicated by the presence of the radio-opaque foreign body in the area to be treated<sup>11</sup>.

#### The Choice of Nail Design:

A variety of intramedullary nails have been designed for use in the femur. There are solid rods<sup>12</sup>, long triffin nails<sup>5</sup>, and solid rectangular nails<sup>15</sup>. The nail developed by Kuntscher himself is of a hollow, "clover-leaf" design. These have the greatest mechanical efficiency because of their girder-like construction. It is interesting to note that his original nail, soon abandoned, was a triffin type. We prefer the hollow "clover-leaf" nail because there is less displacement of tissue per unit length and the pressure arising in the medullary cavity during insertion is only half as great as with the solid nails. These factors may be of importance in minimizing the danger of fat embolism<sup>8</sup>.

#### The Choice of Operative Technique:

Intramedullary nails are driven into the medullary canal through a small incision above the greater trochanter. The fragments can be reduced under x-ray control without exposing the fracture, and the nail driven into place. This closed method of nailing minimizes the danger of infecting the fracture and was hailed by most European surgeons as one of the great advantages of the method. To obtain an accurate end-to-end reduction of the fracture requires cumbersome apparatus and considerable exposure of the patient and the operating room personnel to irradiation. The task may be prolonged and is impossible in some cases. In the open method, the fracture is exposed and the nailing carried out under direct vision. This does not require as great an exposure as for a bone plating and can be carried

out expeditiously without x-ray control. Unless there is no displacement of the fragments we prefer to use the open technique for intramedullary nailing.

When operative intervention can be carried out immediately after injury, intramedullary nailing can probably be safely performed. However, it is usually advisable to delay operation for three to seven days until the patient has recovered from the initial reaction to his injury. During this period the fracture should be treated by traction in a splint.

#### Complications of Intramedullary Nailing:

In addition to the many complications which can accompany the internal fixation of femur fractures by any method, there are certain complications which are inherent in the use of intramedullary nails. These are (1) the possibility of an increased danger of serious fat embolism (2) bursa formation and irritation over the proximal end of the nail and (3) the necessity of removing the nail after healing of the fracture.

The complete disruption of the fatty marrow in the shaft of the femur coupled with the high intramedullary pressures arising during the insertion of an intramedullary nail can be expected to result regularly in the production of fat embolism. In most cases the degree of fat embolization produced is not evident clinically and is of no importance. However, when associated with a poor general condition of the patient or a prolonged and traumatic operative procedure, fatal fat embolism may occur. In reporting a patient who succumbed to fat embolism following intramedullary nailing for a fracture dislocation of the femur, we were able to find 16 other such fatalities<sup>10</sup>. The incidence of such tragedies may be reduced by performing the operation in an expeditious and gentle manner, by selecting a nail whose design permits its insertion with the least increase in the intramedullary pressure; i.e. the hollow "clover-leaf" type, and by spacing the hammer blows during insertion to allow the pressure build-up to bleed off

between blows.

The presence of the upper end of the nail projecting above the greater trochanter under the gluteal bonnet commonly causes some irritation to the patient. This usually consists of a snapping sensation when the hip is sharply flexed. There is only rarely a limitation of abduction. The amount of irritation can be reduced by driving the nail well down to the level of the trochanter. This makes its extraction more difficult. The nails are extracted in the younger patients after the fracture has healed. The nails are allowed to remain in place in patients with pathological fractures and in those in the older age groups. The reasons for removing the nails at all are largely based upon the fear that during the thirty or forty years of life expectancy some complications due to the

continuing presence of the nail might arise. The operation to remove the nail is very simple, requires only a short period of hospitalization, and is associated with no disability.

Experience with Intramedullary Nailing for Femur Fractures:

The first intramedullary nailing done in this hospital was performed in November 1948. Since that time 19 patients with fractures of the femur have been treated here by this method. Although this series is not great, it represents the wide range of circumstances in which intramedullary nailing can be used effectively.

We have treated 8 patients, ranging in age from 16 to 65 years, for simple fractures of the femur (Table I), None

TABLE I

PATIENTS WITH SIMPLE FRACTURES OF THE FEMUR TREATED BY INTRAMEDULLARY NAILING

Case	Age	Sex	Type of Fracture	Treatment	Disability	Complications
1	20	F	transverse fracture middle third	immediate nailing	none	nail not driven in far enough
2	16	M	transverse fracture middle third	nailed after 8 days	none	none
3	22	M	transverse fracture junction of middle and lower third	nailed after 4 days	none	none
4	41	M	transverse subtrochanteric	nailed after 7 days	none	none
5	65	M	transverse subtrochanteric	nailed immediately	none	auricular fibrillation and heart failure
6	56	F	transverse subtrochanteric	nailed after 7 days	none	none
7	38	M	transverse fracture middle third	nailed after 4 days	none	none
8	23	F	transverse fracture middle third	nailed after 4 days	none	none

of these patients have any residual disabilities or deformities associated with their fractures. The average duration of hospital stay in this group of patients was 23 days; the shortest, 7 days. At the time of discharge from the hospital, all of the patients were ambulatory and bearing weight upon the injured extremity with the protection of crutches.

We have treated three patients with compound fractures (Table II). Two of these were debrided initially and treated in traction. Intramedullary nailing was performed as a secondary procedure after wound healing was secure. A patient with a fresh gunshot wound of the femur was treated by debridement and nailing 8 hours after injury. There was severe comminution of the shaft with shortening of almost 2 inches. Primary healing followed operation. A graft from the tibia was placed across the fracture 5 weeks after injury in order to replace the bone lost at debridement and to speed healing of the fracture. Rapid healing has resulted. The remainder of the patients in Table II represent the variety of problems which can complicate femur fractures. In each case, the use of an intramedullary nail provided a satisfactory solution and speeded rehabilitation.

Our experience with the treatment of non-union and pathological fractures of the femur by intramedullary nailing (Table III) although not extensive, convincingly demonstrates the value of this method in treating selected cases.

We have had 5 complications following intramedullary nailing. Two of these were due to errors in technique. In Case #1 the nail was not driven far enough into the distal fragment at the initial operation. It was necessary to return the patient to the operating room the following day and drive the nail into the proper distance. In Case #18, although reduction was performed under direct vision, postoperative x-rays showed that the nail had not entered the distal fragment. A second operation was necessary.

Fat embolism complicated the postoperative course of 2 patients. In one (Case #14)<sup>10</sup> fat embolism was sufficient to cause death on the fourth postoperative day. This patient had a fracture of the femur with a dislocation of the hip on the same side. Reduction of the dislocation was accomplished by manipulation and was followed by nailing of the fracture. The first sign of fat embolism appeared on the second postoperative day. In Case #16 the patient had clinical signs of fat embolism after operation but these did not persist and he had an otherwise uneventful course.

A patient with a simple fracture of the femur (Case #5) had an episode of auricular fibrillation and heart failure following operation. This prolonged the hospitalization period.

The use of intramedullary nailing in plastic operations upon the femur, especially leg shortening for the equalization of leg lengths, should be noted. By providing stable internal fixation, this method permits osteotomy without requiring prolonged immobilization of the patient. Several such procedures have been performed successfully at other hospitals by members of our staff.

#### CONCLUSIONS

Our experience with the use of intramedullary nailing in the treatment of fractures of the femur has shown that this method works ideally in selected simple fractures of the middle third. In patients with complicated problems associated with femur fracture intramedullary nailing can aid in supplying a satisfactory solution. The use of intramedullary nailing is beset by some complications, most of which can be avoided by exercising caution.

TABLE II

COMPOUND AND COMPLICATED FRACTURES OF THE FEMUR TREATED WITH INTRAMEDULLARY NAILS

Case	Age	Sex	Type of Fracture	Treatment	Disability	Complications
9	18	M	compound comminuted fracture, middle third	skeletal traction nailed after 6 weeks	knee motion 180° - 135°	none
10	33	F	gunshot wound with comminuted fracture middle third	nailed 8 hours after injury, bone graft in 6 weeks	knee motion 180° - 135°, peroneal weakness, 1½" shortening	none
11	50	M	compound fracture of middle third, fracture of tibial plateau	debridement and traction, nailing and fixation of tibial fracture after 12 days	none	none
12	77	F	subtrochanteric fracture in leg with amputation below knee, diabetes	immediate nailing	none, now uses prosthesis	none
13	38	M	transverse fractures of middle and lower thirds, fracture opposite tibia	nailed after 7 days, tibia plated after 4 weeks	draining sinus over tibial fracture	none
14	30	M	fracture dislocation of femur	reduction of dislocation and nailing after 36 hours		dead of fat embolism 4 days post-op.
15	43	M	comminuted fracture middle third in paraplegic	nailed after 10 days		none

TABLE III

PATIENTS WITH PATHOLOGICAL FRACTURES AND WITH NON-UNION OF FRACTURES OF THE FEMUR  
TREATED BY INTRAMEDULLARY NAILING

Case	Age	Sex	Type of Fracture	Treatment	Disability	Complications
16	36	M	transverse subtrochanteric fracture with non-union	treated initially with small plate, nailing and bone graft after 9 mos.	still under treatment	moderate fat embolization
17	31	M	non-union subtrochanteric fracture of 9 yrs. standing, repeated operations, infection	nailing	fracture still not healed after 2 yrs. good joint motion, patient bearing weight	none
18	58	F	pathological fracture of middle third, secondary to uterine Ca. previous bilat. subtrochanteric fractures healed in traction	nailing and irradiation	patient able to be up in chair	misdirected nail
19	52	M	fracture of middle third without displacement secondary to myeloma	closed nailing	patient active and ambulatory 30 mos. post-operative	none



REFERENCES

1. Bircher, H.  
Eine neue Methode unmittelbarer Retention bei Fracturen der Röhrenknochen.  
Verhandl. d. deutsch Gesellsch f. chir.; 15:130-139, 1886.
2. Bohler, Lorenz  
Technik der Knochenbruchbehandlung im Frieden und im Krieg,  
Vol. III; Wilhelm Maudrich, Vienna, 1944.
3. Hey-Groves, E. W.  
Ununited Fractures, with Special Reference to Gunshot Injuries and the Use of Bone Grafting.  
Brit. J. Surg.; 6:203-247, 1918-1919.
4. Küntscher, Gerhard  
Die Marknagelung von Knochenbrüchen klinischer teil.  
Klin. Wchnschr.; 19:833-835, 1940.
5. Lottes, J. Otto  
Treatment of Fractures of the Femur with a Heavy, Large Cored, Three-Flanged Medullary Nail.  
Surg.; 29:868-884, 1951.
6. MacAusland, W. Russell  
Medullary Nailing of Fractures of the Long Bones.  
Surg., Gynec. & Obst.; 84:85-89, 1947.
7. Moeys, E. J.  
Osteosynthesis With a Long Intramedullary Pin (Küntscher's Method).  
Doctor's Thesis, Kemink en zoon, N. V. Utrecht, 1948.
8. Peltier, Leonard F.  
Nail Design; An Important Safety Factor in Intramedullary Nailing.  
Surg.; 28:744-748, 1950.
9. Peltier, Leonard F.  
Theoretical Hazards in the Treatment of Pathologic Fractures by the Küntscher Intramedullary Nail.  
Surg.; 29:466-472, 1951.
10. Peltier, Leonard F.  
Fat Embolism Following Intramedullary Nailing; Report of a Fatality.  
Surg. (In Press).
11. Peltier, Leonard F. and Nice, Charles M. Jr.  
Irradiation of Bone Lesions in the Presence of Metallic Intramedullary Fixation.  
Radiology; 56:248-250, 1951.
12. Rocher, Christian  
L'Enclouage centro-medullaire des os longs.  
La Presse Med.; 1:94-95, 1945.
13. Smith-Peterson, M. N., Cave, Edwin F. and Vangorder, Geo. W.  
Intracapsular Fractures of the Neck of the Femur: treatment by internal fixation.  
Arch. Surg.; 23:715-759, 1931.
14. Soeur, R.  
L'Osteosynthese au Clou.  
Editions acta med. Belg. Bruxelles, 1946.
15. Street, Dana M., Hansen, Harvey H. and Brewer, Bruce J.  
The Medullary Nail: presentation of a new type and report of a case.  
Arch. Surg. 55:423-432, 1947.
16. Time (Weekly Magazine - Medicine)  
March 12, 1945.
17. Watson-Jones, Reginald  
Medullary Nailing of Fractures after Fifty Years.  
J. Bone & Joint Surg.; 31-B:694-729, 1950.

## II. MEDICAL SCHOOL NEWS

### Coming Events

- April 18 Duluth Clinic Lectureship; "Newer Concepts of Fetal Circulation," Dr. S.R.M. Reynolds, Carnegie Laboratory, Baltimore, Maryland; Owre Amphitheater; 8:00 p.m.
- April 21-23 Continuation Course in Pediatrics for Specialists
- April 21 Clarence M. Jackson Lecture; "Changing Concepts of Respiratory Diseases," Dr. John M. Adams, Professor of Pediatrics, University of California Medical School, Los Angeles; Museum of Natural History Auditorium; 8:15 p.m.
- May 12-14 Continuation Course in Eye, Ear, Nose, and Throat for General Physicians
- May 15-17 Continuation Course in Allergy and Hematology for General Physicians
- May 20 Minnesota Pathological Society Meeting; "Crime and the Doctor," Dr. C. Keith Simpson, Reader in Forensic Medicine, Supervisor of Medico-Legal Post-Mortems, and Home Office Pathologist, Guy's Hospital, University of London, London, England; Owre Amphitheater; 8:00 p.m.

\* \* \*

### Dr. Adams To Deliver Jackson Lecture

Dr. John M. Adams, Professor of Pediatrics, University of California, Los Angeles, who was formerly Associate Professor of Pediatrics at the University of Minnesota Medical School, will deliver the Annual Clarence M. Jackson Lecture sponsored by the Phi Beta Pi Fraternity. He will speak on the subject, "Changing Concepts of Respiratory Diseases," in the Museum of Natural History Auditorium at 8:15 p.m. on Monday, April 21. Friends, colleagues, and former students of Dr. Adams anticipate with pleasure his return to our campus. Dr. Adams will also participate in a continuation course on Pediatrics for Pediatricians which will be held at the Center for Continuation Study on April 21-23.

\* \* \*

### Dr. Bell Honored by Cancer Society

On Wednesday, April 9, Dr. E. T. Bell, Professor Emeritus of Pathology, was awarded the 1952 medal for outstanding service in cancer control by the Minnesota Section of the American Cancer Society. This award was made by Dr. C. G. Uhley, Crookston, President of the Minnesota section of the cancer society in recognition of Dr. Bell's outstanding contributions to the study of cancer and other tumors as well as to various other phases of pathology.

\* \* \*

### Science Writers Visit University Hospitals

A group of the nation's leading science reporters visited the Medical School and the University Hospitals on April 4 and 5 under the sponsorship of the American Cancer Society. A cancer research forum was presented by several members of our faculty.

MEDICAL SCHOOL NEWS - (Continued)

Dr. Owen H. Wangensteen, Professor and Chairman, Department of Surgery, emphasized the necessity of early diagnosis of cancer if satisfactory cure rates are to be obtained. Dr. F. John Lewis described for the group the "second look" procedure in which a second operation is done about six months after the original operation for cancer in order to remove any further metastases. Dr. Leo G. Rigler, Professor and Head, Department of Radiology and Physical Medicine, discussed the importance of mass x-ray programs in the detection of pulmonary carcinoma. The use of radio-active compounds as aids in the diagnosis of brain tumors was discussed by Dr. William T. Peyton, Director of the Division of Neurosurgery. Dr. John L. McKelvey, Professor and Head, Department of Obstetrics and Gynecology, pointed out the more hopeful outlook for patients with malignant tumors of the female generative tract as compared with twenty years ago. This improvement has been due to earlier diagnosis and to better surgical and irradiation techniques. The operation of the Cancer Detection Center was described by Dr. T. Brannon Hubbard, Jr., Director of the Center. Various phases of research in the field of cancer were discussed by Dr. J. T. King, Professor of Physiology, Dr. John J. Bittner, Professor of Cancer Biology, Dr. C. R. Hitchcock, Dr. John Bensted, and Dr. Robert A. Huseby.

\* \* \*

Medical Six O'Clock

An annual event of outstanding interest to students, faculty, alumni, and friends of the Medical School will be held on Thursday, May 15. The Medical Six O'Clock Club Dinner will be presented on that date under the auspices of the Medical Inter-Fraternity Council at 6:30 p.m. in Coffman Memorial Union. This event, reinstated two years ago after a lapse of several years, has proved to be an interesting and entertaining means of bringing together students and faculty. We have been informed that Dr. Malcolm A. McCannel has consented to serve as master of ceremonies. We need no further assurance that this will prove to be a most stimulating and entertaining evening. Information concerning tickets can be obtained from the Medical School office or members of the Inter-Fraternity Council.

\* \* \*

Faculty News

Dr. Leo G. Rigler, Professor and Head, Department of Radiology and Physical Medicine, has recently visited several medical centers in Connecticut. On April 9 he discussed "Hepatography: Roentgen Studies of the Structures of the Liver" for the Yale Medical Society at New Haven. On April 10 he spoke on "The Roentgen Diagnosis of Pleural Diseases" at the Waterbury Hospital in Waterbury, and that evening he addressed the staff of the Veterans Administration Hospital in Newington on "The Possibilities and Limitations of Roentgen Diagnosis." On the following day he presented the subject, "The Biography and Early Diagnosis of Cancer of the Lung," to a meeting of the Connecticut Valley Radiological Society in Hartford.

Dr. James Rogers Fox of the Student Health Service and the School of Public Health, has been granted a leave of absence to accept a visiting staff appointment in Internal Medicine at the University of Edinburgh as Senior Physician to the Health Service and Physician to the Royal Infirmary. While in Scotland he will participate in the British National Health Service Plan. In addition he plans to visit several other leading medical schools in Europe, and he will also have the opportunity of observing industrial medicine in the British Isles. He expects to return to the United States in July. In Britain he will take over the current position of Dr. R. E. Verney who in turn will visit the United States during the same period.

III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL  
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

April 21 - 26, 1952

Monday, April 21

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.
- 11:30 - Physical Medicine Seminar; Testing; Ruth Ann Hamilton; 132 Chemical Engineering Bldg.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 12:30 - Physiology Seminar; Acetate Metabolism of the Mammary Gland; Wm. E. Peterson; 214 Millard Hall.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.
- 4:00 - Seminar on Fluid and Electrolyte Balance; 102 Institute of Anatomy.
- 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.
- \* 8:15 p.m. Annual Clarence M. Jackson Lecture; Changing Concepts of Respiratory Diseases; John M. Adams, M.D., Professor of Pediatrics, University of California Medical School; Museum of Natural History Auditorium.

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.

Ancker Hospital

- 8:30 - 10:00 Chest Disease Conference.
- 1:00 - 2:00 Medical Grand Rounds.

Monday, April 21 (Cont.)

Veterans Administration Hospital

- 8:00 - 9:00 Neuroradiology Conference; B. J. O'Loughlin, R. C. Gray; 2nd Floor Annex.  
9:00 - G. I. Rounds; R. V. Ebert, J. A. Wilson, Norman Shrifter; Bldg. I.  
11:30 - X-ray Conference; B. J. O'Loughlin; Conference Room, Bldg. I.  
2:00 - Psychosomatic Rounds; Bldg. 5.  
3:30 - Psychosomatic Rounds; C. K. Aldrich; Bldg. I.

Tuesday, April 22

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.  
4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.  
4:30 - 5:30 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 Ogden; Eustis Amphitheater, U. H.

Ancker Hospital

- 8:30 - 9:30 Medical-Roentgenology 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.  
12:30 - EKG Conference; Boyd Thomes and Staff; 302 Harrington Hall.

Veterans Administration Hospital

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

Tuesday, April 22 (Cont.)

Veterans Administration Hospital (Cont.)

- 10:30 - Surgery Tumor Conference; L. J. Hay, B. J. O'Loughlin; 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 Clinical Pathological Conference; Conference Room, Bldg. I.

Wednesday, April 23

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; Norman Jacob and L. G. Rigler; Todd Amphitheater, U. H.
- 11:00 - 12:00 Pathology-Medicine-Surgery Conference; Leukemia RE; Pneumonia; Lucille Heisig; O. H. Wangensteen, C. J. Watson and Staff; Todd Amphitheater, U. H.
- 12:30 - 1:30 Permeability and Metabolism Seminar; Nathan Lifson; 129 Millard Hall.
- 1:30 - Conference on Circulatory and Renal System 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.

Ancker Hospital

- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium.
- 2:00 - 4:00 Medical Ward Rounds.
- 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; Recent Experience in Cardiac Surgery; Ivan Baronofsky; 4th Floor Annex.
- 1:30 - Pediatric Rounds; E. J. Huenekens and Robert Ulstrom; 4th Floor.

Wednesday, April 23 (Cont.)

Minneapolis General Hospital (Cont.)

- 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, April 24

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; Action of Hyperglycemic Factor and Epinephrine; Fred G. Bock; 214 Millard Hall.
- 1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
- 3:30 - Medicine-Pediatric Infectious Disease Conference; Heart Hospital Auditorium.
- 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.
- 5:00 - 6:00 Radiology Seminar; Familial Aspects of Spondylolisthesis; Gerald Hassett and Dan Fink; 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.
- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
- 11:00 - Surgery Roentgen Conference; B. J. O'Loughlin; Conference Room, Bldg. I.

Friday, April 25

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; Deterioration of the Bedfast Patient; Frederic J. Kottke; 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.  
4:00 - 5:00 Dermatology Seminar; W-321, 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, April 26

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



Saturday, April 26 (Cont.)

Medical School and University Hospitals (Cont.)

- 9:15 - 10:00 Surgery-Roentgenology Conference; L. G. Rigler, J. Friedman, Owen H. Wangenstein and Staff; Todd Amphitheater, U. H.
- 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; Studies of Hepatic Alkaline Phosphatase, W. Lane Williams; Some Historical Aspects of Cancer, Albina Yakaitis; 226 Institute of Anatomy.

Ancker Hospital

- 8:30 - 9:30 Surgery Conference; Auditorium.

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.

---

\* 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.