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



Retinal Detachment

BULLETIN OF THE
UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

Volume XXIV

Friday, April 10, 1953

Number 24

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

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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
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I. RETINAL DETACHMENT

Melvin J. Kirkeeng, M. D.

INTRODUCTION

A detached retina is an ocular finding of serious import; it can represent the final phase of many pathological processes, any combination of which may be present in the observed eye.¹ Prior to the published work of Gonin,¹ only thirty years ago, people afflicted with this ocular catastrophe were, almost without exception, doomed to blindness in the involved eye. Since his time, there have been dramatic advances in treatment which have salvaged many of these eyes otherwise lost. Nevertheless, retinal detachment still remains as one of our most serious ocular problems; in spite of volumes of work and research we are still forced to speak to our patients in terms of "about 50% mechanical cure". Depending upon the type of detachment, any single case may have a prognosis varying from 100% mechanical cure, down to 0%.^{2,3} There are many factors which affect this prognosis; these will be mentioned later. The purpose of this paper is to present the results of our treatment of retinal detachments and to review with the staff the newer concepts of pathogenesis, diagnosis, and treatment, with special emphasis on present day surgical technique. To this end we have analyzed all the cases of retinal detachment operated upon at the University of Minnesota Hospitals in the last ten years and at the Veterans Hospital in the last five years. We wish also to show a movie of a typical surgical procedure employed in the treatment of these cases.

Retinal detachments are usually divided into three groups:

1. those detachments as seen in acute exudative chorioretinitis or in toxemia of pregnancy--these are characterized by having no retinal break and usually heal without operation.

2. those detachments secondary to choroidal tumor in which the retina is

elevated by a new growth and which, of course, requires enucleation.

3. the serous or idiopathic type of retinal detachment.⁴ In this group the retina develops a break in its continuity which allows an aqueous-like fluid to seep through behind it, peeling it free from its choroidal attachments, such as wall paper might be loosened by a water bubble behind it. It is to this third group that we will confine our attention.

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS

Embryologically the retina is formed by an invagination of the optic vesicle to form a double layered cup in the 10mm. embryo.⁵ As the eye develops, these two layers become differentiated into the components which go to form the adult retina. The outer layer remains one cell thick and becomes the layer of pigment epithelium; the inner layer undergoes a complicated process of differentiation to form the remaining nine layers of the retina.⁶ These two layers are firmly attached to each other only at their periphery and at the optic disk; elsewhere the attachments are quite filmy so that a cleavage plane exists here. It is in this potential space between the pigment epithelium layer and the layer of the rods and cones that a retinal separation occurs in cases of serous retinal detachment. The term retinal detachment is then a misnomer; a better name would be retinal splitting or separation; usage, however, demands that the old expression be maintained.⁷

In order that a serous retinal detachment may occur, there probably must be a break in the continuity of the retina.⁸ We treat cases in which no such break can be found, but it is probable that we are unable to see the defect. It might lie behind a retinal fold or anterior to our limits of observation via the ophthalmoscope. Probably, again, a break in the retina is not enough to cause a detachment of the retina; there must also be present some changes in the vitreous conducive to detachment. These changes as usually seen are:

a. degeneration of the vitreous with resultant strands and floaters--the so-called "fluid vitreous"--which can enter a retinal tear and dissect up the retina from its bed.

b. a retraction of the vitreous body from the retina with replacement by an aqueous type of fluid which again can cause detachment.

c. a condensation in an otherwise normal looking vitreous of bands or strands which are attached at their extremities to the retina and which in their healing and shrinkage will pull on the retina causing a tear and subsequent detachment.¹⁹

Following a detachment, the retina will remain viable for many months because its vessels separate with it; however, the outermost layers, normally depending upon the choroidal circulation for their blood supply, will eventually become degenerative and cystic and, of course, non functioning. Thus, although there are cases on record of successful mechanical reattachment of the retina after a period of one or even two years, many people place the time limit for satisfactory functional result at about six months.¹⁰

The basic considerations in the treatment of retinal detachment are simple: first, get the retina back into its original position, and second, "glue" it there. This first step is attempted by strict bed rest with immobilization of the head so that the detachment is dependent; in favorable cases the retina will settle down to its original position. If this does not happen an attempt is made to encourage positioning of the retina by draining the subretinal fluid at the time of operation and even, in some selected cases, by injecting air or saline into the vitreous in the hope that the increased intraocular pressure will force the retina into place.

The gluing of the retina is then attempted by provoking with diathermy focal areas of chorioretinitis around the retinal tear and in the area of detachment; when these areas heal the re-

sultant scar formation will include the retina and so bind it firmly against the choroid.

PATHOLOGICAL CONSIDERATIONS

As mentioned before retinal detachment represents the tragic conclusion of any one of several pathological processes. It will be noted that these findings which caused or predisposed to retinal detachment are themselves related to the two basic etiological considerations mentioned earlier--a break in the retina, and changes in the vitreous.

1. Age incidence: the maximum age incidence for this disease is between 50-60.¹¹ This is the age group in which degenerative changes in the eye are most marked; some feel that there is a definite correlation between the two factors. Vogt believes that cystic degeneration of the retina is the most important single factor in retinal separation. He points out that this condition is found most commonly in the above age group and that its anatomical location in the superior temporal quadrant at the equator coincides exactly with the location of most cases of retinal detachment.¹² Retinal detachment occurs in both eyes in 20% of all cases, according to Shipman, which further suggests the basic pathology as being one of degeneration.¹³

2. Refractive error: 13.7% of the general population in the United States at age 50 are myopes. This percentage increases to 19.1% by the age of 60.¹⁴ However, we find that 40%-60% of all cases of retinal detachment occur in myopia. It is believed that the higher the degree of myopia, the more significant is the probability of detachment.¹⁵ In high myopes, we find an elongation of the globe with stretching of the retina and subsequent cystic degeneration. Degenerative changes in the vitreous are not uncommon. As would be expected, detachment occurs earlier in this group of patients, the average peak being between the years 46-50.

3. Aphakia: at least 10% of all cases of retinal detachment occur in

aphakics; this high incidence is ascribed to the disturbance of, or loss of, the vitreous incident to the removal of the lens. Bagley reports that in his series of cases over one-half of the detachments in aphakics occurred six months or more after surgery.²⁵ He felt that this time interval represents the period required for degenerative changes to take place in the vitreous. Discussion of congenital cataracts in young patients, especially if it involves deep cuts into the vitreous, results in a detached retina in 10% of these cases.¹⁶ Shapland reported on 44 cases of congenital cataract which had been operated upon; after a period of 24 years, 33 of this group of 44 patients had developed a retinal detachment.¹⁷

4. Trauma: trauma is assuming a role of less importance as re-evaluations are being made, it being felt that in many cases the traumatic incident represents the last straw in the inevitable detachment of the retina. Repeated trauma, however, to the head or eye, may cause atrophy or cystic degeneration of the retina with subsequent retinal detachment.

5. Vitreous hemorrhage and intra-ocular foreign body: vitreous hemorrhage, occurring in an otherwise healthy eye, may absorb without incident, leaving the eye with a clear media or perhaps with only a few vitreous floaters to testify to the incident. If the eye is influenced by a pathological process in the body, such as tuberculosis or diabetes, or by any local pathological process such as an intra-ocular foreign body, the vitreous hemorrhage might well heal with the formation of strands or fibrous bands which in their contraction will tear the retina and pull it from its normal position.

DIAGNOSIS

In the full blown type of retinal detachment, which we seem to have referred here to the University Hospital, there is little difficulty in diagnosis. In the infancy of detachment, however, it may be quite difficult, requiring the accumulation of information from as

many sources as are available.

History: the first symptom of a detachment may be the sudden appearance of flashes of light. These flashes indicate the existence of localized traction on the retina and precede or accompany the formation of a retinal break. The flashes are usually in that quadrant of the visual field corresponding to the area of retinal pathology; this has some localizing value then, but is not always reliable. The patient will commonly notice at this same time a shower of vitreous floaters or black dots which are caused by hemorrhage, usually originating at the site of the retinal break. These vitreous hemorrhages are seldom massive; occasionally, however, they may be extensive enough to cloud the vitreous to such an extent that the retina cannot be seen; diagnosis must then wait upon absorption of the hemorrhage.

The actual retinal detachment may follow immediately after this retinal break, or it may be delayed for months or even years. When a fairly large detachment is formed the patient notes the appearance of a grey veil or cloud in that sector of the field corresponding to the detached area. The patient also notes that the vision is better upon awakening in the morning, and that when he arises and moves about, the cloud appears and his visual acuity diminishes.

There is no pain associated with detachment of the retina.

Findings: the intra-ocular pressure is usually normal or slightly low. When elevated, one must consider an associated glaucoma, either as a complication, or as a primary condition. Choroidal tumor causing a detachment might cause an increase in intra-ocular pressure and will be remarked upon later.

Slit lamp examination may reveal signs of anterior uveitis, which is fairly common. There may be atrophy of the pigment layer of the iris with a scattering of pigment on the lens, the cornea, or in the aqueous. The vitreous, as examined with the Hruby lens, almost

always reveals signs of degeneration and frequently of detachment.

Inspection of the visual fields will show defects corresponding to the detached area in all cases except those in which the detachment is very small or is anterior to the equator.

Fundus examination is the most important procedure in the diagnosis. Indeed, the statement is often made that "treatment is performed with the ophthalmoscope". By ordinary methods with direct ophthalmoscopy, the fundus can be examined as far anteriorly as the equator. The retina, however, extends about 4 mm anterior to this line, so that almost 1/3 of the total surface of the retina cannot be brought under direct inspection. This may explain these cases in which we are unable to locate the tear. Special techniques involving indirect ophthalmoscopy and the indentation of the sclera assist in the examination of these otherwise inaccessible areas.^{18,19}

A detached retina generally appears as a translucent grey veil, making the choroidal pattern fuzzy; on this veil are seen the retinal vessels which appear blue-black, especially if the retina be considerably elevated. The retina commonly forms numerous folds which may move about freely with the movement of the globe. Occasionally it takes on the appearance of "sand dunes" or "crinkled paper". If, however, it is smooth or flat, the diagnosis is more difficult. One must then observe the retinal vessels closely to see if they cast a shadow on the underlying choroid; or perhaps the haze of the choroidal pattern can be seen only by indirect illumination. The finding of a retinal break will clinch the diagnosis, although it must be remembered that tears of the retina in otherwise healthy eyes may heal with no further complication.

If the macula is detached, the area appears edematous while its yellow color becomes more marked; a correlated finding is the marked reduction in visual acuity.

Macular cysts are similar in appearance to macular holes. The differential

diagnosis is quite difficult and also quite important, since the treatment of the hole will result in poor central vision, whereas the treatment of a cyst is expectant.²⁰

The differential diagnosis between a serous retinal detachment and a detachment secondary to a choroidal tumor should be mentioned. In most cases the diagnosis can be made without great difficulty, as a solid choroidal mass can be seen under the detached retina. Many tumors, however, are associated with a serous detachment, i.e. the subretinal fluid formed as a result of the irritation of the tumor accumulates about it and floats the retina free of the mass and so disguises it. In these situations other findings must be noted:

1. There is rarely a break in the retina; if retinal folds are present, they move slowly as though the fluid behind them were viscid.
2. The detachment is often adherent to the most prominent portion of the tumor. This area may be pigmented or even show some areas of hemorrhage, and may simulate an area of old chorioretinitis.
3. Transscleral illumination will often reveal the shadow of the tumor--or of a collection of blood--or of a benign choroidal melanoma--as viewed through the pupil.
4. If the tumor is in the superior portion of the fundus, serous fluid originating around it may sink into the lower half causing a double type of detachment connected by an area of flat detachment. Transillumination will reveal a translucent detachment below and a dark detachment above. Further, as the patient is put on bed rest, the lower detachment will be found to disappear as the fluid migrates away from it, whereas the superior detachment will be largely unchanged.
5. The vitreous in these cases is commonly normal on examination.
6. General examination may disclose

metastases elsewhere.

7. Being a space occupying lesion, the tumor causing the detachment may also cause an increased intra-ocular tension which, as mentioned before, is typically normal or low.

8. The retinal detachment will not settle down on bed rest.

PRESENT DAY METHODS OF TREATMENT

Although the prognosis must always be guarded, surgery is the only hope for these patients. Some people feel that everyone has the right of "his day in court" and will operate on any person who, knowing the probabilities, will agree to surgery.

Bed rest is the first step in treatment. The eye is atropinized and pin holes or an occlusive binocular dressing is applied. The posture in bed is such as to allow the detached area to be most dependent. The fundus is examined at frequent intervals to ascertain if the hoped-for flattening of the retina is taking place. If this does occur the possibility of a successful outcome is enhanced. Where there is no such change, one must consider the probabilities that the subretinal fluid is viscid, or that the retina is being held up by vitreous attachments, or that a subretinal tumor is elevating the retina.

Certainly by the end of one week the maximum benefits of bed rest have been obtained; surgical attack is next planned. By means of a diathermy apparatus, focal areas of chorioretinitis are made around the retinal break and in the detached area. If the retina is in sufficient proximity to these inflammatory areas, it will become involved in the ensuing fibrinous reaction and so become scarred down against the choroid. This explains, then, our concern over the position of the retina relative to the choroid. Many surgeons feel that the sealing of the retinal tear will cure the detachment, the remaining elevation becoming re-attached as the subretinal fluid is absorbed; others, however, feel that a barrage of cautery in the entire detached

area is an added increment to a cure.²¹ If the break cannot be found, we feel that the attack via the barrage method is indicated, in the hope that the shot-gun pattern will seal the retinal defect.

After the cautery procedure, an effort is made to drain any subretinal fluid by means of small perforations through the sclera into the subretinal space. This will facilitate the approximation of the retina to the choroid.

It is occasionally beneficial, especially in aphakic eyes, to inject saline or air into the vitreous, increasing the intra-ocular pressure and thus forcing the retina back into place. Since the vitreous in most of these patients is not normal, it is not considered particularly "daring" to indulge in such a procedure.²²

Finally, in those cases in which it is obvious that, because of vitreous attachments and retinal shrinkage, the retina cannot fall back into place, the "mountain is brought to Mohammed" and the eye ball is shortened to accommodate its inner coat. This is accomplished by the technique of scleral resection in which a wedge, usually 2-3 mm in width, running parallel to the equator and just behind it, and extending through one or two quadrants as indicated, is excised. When the defect in the sclera is closed, the choroid is buckled inwards, effecting a contact with the elevated retina. Such surgery is quite heroic and reserved for selected cases only.^{23,24}

RESULTS

We have collected 66 cases of retinal detachment both from the University Hospital and the Veterans Hospital. This group represents the total number of detachment cases drawn from all the eye patients seen in these two hospitals in a period totaling fifteen years. Retinal detachment, then, is not a commonplace disease.

Of these 66 patients, 15 were not operated upon, either because of a hopeless prognosis or because the patient

declined surgery.

the detachment prevented from extending.

Under the heading of successful cases we included those cases in which either the field or the acuity, or both, had been improved (I); and those in which the field had been maintained (M) and

For purposes of comparison we used the figures presented by Bagley in 1948 in reporting on his series of 304 cases.²⁵

	<u>Our Cases</u>				<u>Bagley (304 Cases)</u>	
	I	+ M	= S		Mechanical Success	
Successful Cases	26/51	6/51	= 62.7%		44%	
Refraction:						
Unknown	9/16	1/16	= 10/16	Myopia	1-3 D	56%
Myopia	6/15	1/15	= 7/15	Myopia	4-10D	44%
Emmetropia or hyperopia	10/17	4/17	= 14/17	Myopia	over 10 D	26%
Phakia vs.	24/42	6/42	= 71.4%	Phakia		51%
Aphakia	2/9	0	= 22.2%	Aphakia		35%
Vitreous Loss:						
With loss	1/3	0	= 1/3	With loss		16.7%
Without loss	1/7	0	= 1/7	Without loss		37.5%
Retinal Tears:					<u>Phakia</u>	<u>Aphakia</u>
Seen	13/31	6/31	= 61.3%	Seen	51 %	61 %
Not seen	12/20	1/20	= 65 %	Not seen	40 %	23/5%
Position of Retina After Operation:					<u>Phakia</u>	<u>Aphakia</u>
Unknown	1/7	2/7	= 3/7			
Flatter	24/33	3/33	= 81.8%	Flatter	60.8%	43.2%
No change	0/8	0/8	= 0 %	No change	29.2%	6.3%
Second Operation	4/15	0	= 4/15		<u>Phakia</u>	<u>Aphakia</u>
				First oper.	41. %	25.4%
				Second oper.	26.4%	18.2%
				Third oper.	33.3%	0
				Fourth oper.	20. %	0
				Fifth oper.	100. %	0
					(1 case)	
Sub Retinal Fluid:						
Obtained	21/38	2/38	= 60.5%	No influence		
Not obtained	5/13	4/13	= 69.2%	on results		

It is believed that our results, in spite of the fact that we are dealing with cases somewhat less favorable than average, compare with those presented in the current literature. The series is

small and of no great statistical value, but it gives us an idea of how the cases are adding up. We were interested especially in the results of surgery relative to the finding of the retinal

tears. Our results suggest the possibility that the barrage method is effective in sealing these unseen retinal breaks, so that the results approach those obtained when retinal breaks are visualized.

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II. MEDICAL SCHOOL NEWS

Coming Events

- April 16-18 Continuation Course in Gynecology for Specialists
April 27-29 Continuation Course in Gastroenterology for General Physicians
April 28 Clarence M. Jackson Lecture; "Gastro-Intestinal Symptoms with Particular Reference to Motor Disturbance"; Dr. Chester M. Jones, Boston; Owre Amphitheater; 8:00 p.m.
April 29 Family Doctors' Day; Heart Hospital Theater; 1:30-5:30 p.m.
April 30 Medical Six O'Clock Club Dinner; Coffman Memorial Union Main Ballroom; 6:30 p.m.
May 4 Seminar on History of Medicine; "The History of Colon Surgery"; Dr. William C. Bernstein, Minneapolis; Todd Amphitheater; 7:45 p.m.
May 7 E. Starr Judd Lectureship; "The Endocrinology of Mammary Cancer"; Dr. Charles B. Huggins, Chicago; Owre Amphitheater; 8:15 p.m.
May 7-9 Continuation Course in Surgery for General Physicians
May 11-13 Continuation Course in Arthritis and Allergy for General Physicians
May 13 Symposium on Antibiotics; Sir Alexander Fleming, London; Owre Amphitheater; 2:00 p.m.
May 14 Duluth Clinic Lectureship; Sir Alexander Fleming, London.

* * *

Continuation and Extension Courses

A continuation course in Gynecology for Specialists in that field will be presented by the University of Minnesota on April 16 to 18. The two-and-a-half day session will be held at the Center for Continuation Study on the University Campus. Discussions of gynecologic malignancy, culdoscopy as a diagnostic tool, and certain aspects of the infertility problem will be featured. Dr. Arthur Hertig, Shattuck Professor of Pathology at Harvard Medical School, will participate in the course as a member of its faculty. The course will be presented under the direction of Dr. John L. McKelvey, Professor and Head, Department of Obstetrics and Gynecology, and the remainder of the faculty will include clinical and full-time members of the staff of the University of Minnesota Medical School.

The Extension Division will present a short course in Introduction to Anatomy and Medical Terminology for medical record librarians, hospital personnel, and physicians' secretaries. This course will be held in Powell Hall Amphitheater beginning Friday evening, April 10, at 7:30 p.m. It will consist of seven sessions of approximately two hours each which will be given on consecutive Friday evenings. The anatomy lectures will be given by Samuel Cornwell, Instructor in Anatomy, and those on medical terminology by Dr. Stewart Thomson, Associate Professor and Assistant Director, School of Public Health.

* * *

Faculty News

Dr. A. B. Baker, Professor, Department of Psychiatry and Neurology, and Director, Division of Neurology, and Dr. Fae Y. Tichy, Assistant Professor, Division of Neurology, attended the meetings of the American Academy of Neurology in Chicago from April 6 to 11. Both participated in the review courses in neurology given by the Academy.

(Continued on next page)

Dr. Donald W. Hastings, Professor and Head, Department of Psychiatry and Neurology, attended the recent meeting of the Air Force Scientific Advisory Board at Montgomery, Alabama.

Dr. C. Knight Aldrich, Associate Professor, Department of Psychiatry and Neurology, addressed the Forum of the Minnesota Welfare Conference on "Casework Responsibility in Administering Tangible Services" on March 24. He will also speak at a luncheon meeting of the Nebraska State Welfare Conference on "Parent-child Relationship in the Genesis of Adolescent Delinquency" on April 16.

The Department of Psychiatry and Neurology Announces the following promotions: Dr. Frank Kiesler, Assistant Professor, has been made Chief of the Psychiatric Out-Patient Department; Dr. Harold Berris has been promoted to the rank of Instructor in Neurology; and Dr. Mary Teberg will become a Clinical Instructor in Psychiatry on April 16. Warm congratulations are extended to Doctors Kiesler, Berris, and Teberg on these well-deserved promotions.

A rather heavy speaking schedule will take Dr. Ralph T. Knight, Professor and Director, Division of Anesthesiology, into the Southwest. On March 29 he was the guest speaker for the Missouri Society of Anesthesiologists in Kansas City. On the following day he participated in a conference of University Anesthesiologists of the Mid-West. He addressed the Annual Conference of Anesthesiology at Los Angeles on April 9 and will participate in the program of the Arizona Society of Anesthesiologists at Tucson on April 20.

The Medical School was well represented at the recent meeting of the American Association of Anatomists at Columbus, Ohio, by Doctors E. A. Boyden, Olof Larsell, Lemen J. Wells, Berry Campbell, J. Francis Hartmann, Mr. Dennis Kane, Mr. Sam Cornwall, and Mrs. Maria Ryzen, all of whom either presented or introduced scientific papers.

Dr. Jerome T. Syverton, Professor and Head, Department of Bacteriology and Immunology, lectured at the Buffalo Academy of Medicine on March 4. He and Dr. W. F. Scherer attended the meeting of the Tissue Culture Association on March 24 at Columbus, Ohio. The Department of Bacteriology and Immunology has had several recent distinguished visitors: Dr. G. C. Brown, Associate Professor, Department of Epidemiology, University of Michigan, Ann Arbor; Dr. H. A. Wenner, Department of Research Medicine, University of Kansas Medical Center, Kansas City; and Dr. J. Fox, Professor of Epidemiology, Department of Tropical Medicine and Public Health, Tulane University, New Orleans.

Dr. John L. McKelvey, Professor and Head, Department of Obstetrics and Gynecology, discussed "Adenocarcinoma of the Endometrium" at the University of Indiana on March 4. Dr. Abraham Stone, Associate Professor of Clinical Medicine at the New York University was a recent visitor to the Department of Obstetrics and Gynecology. His visit was in connection with the program of the Hennepin County League for Planned Parenthood.

News of two former members of our resident staff in Urology has been received by Dr. C. D. Creevy. Dr. Milton Reiser is now in Taegu, Korea, with the Army, and Dr. Ronald Krumbach is on active duty in Wichita Falls, Texas, with the Air Force.

* * *

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

April 13 - 18, 1953

Monday, April 13

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 - 12:30 Physical Medicine Seminar; Evaluation of Kinesiology of Occupational Therapy; Ruby Overmann; 132 Chemical Engineering Bldg.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 12:30 - 1:30 Physiology Seminar; 214 Millard Hall.
- 12:30 - Physiological Chemistry Seminar; 214 Millard Hall.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen A. B. Baker and Staff; U. H.
- 4:00 - Pediatric Seminar; Growth Hormone; Richard B. Raile; Sixth Floor West, U. H.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 4:30 - Public Health Seminar; 15 Owre Hall.
- 4:30 - 6:00 Physiology 114A and Cancer Biology 140 -- Research Conference on Cancer, Nutrition, and Endocrinology; Drs. Visscher, Bittner, and King; 129 Millard Hall.
- 5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Ancker Hospital

- 8:30 - 10:00 Tuberculosis and Chest Conference; Auditorium.
- 2:00 - 3:00 Surgery Journal Club; Classroom.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Eldon Berglund; Newborn Nursery, Station C.
- 10:30 - 12:00 Tuberculosis and Contagion Rounds; Thomas Lowry; Station M.
- 11:00 - Pediatric Rounds; Erling Platou; Station K.
- 12:30 - Surgery Grand Rounds; Dr. Zierold; Sta. A.
- 1:00 - X-ray Conference; Classroom, 4th Floor.

Monday, April 13 (Cont.)

Minneapolis General Hospital (Cont.)

2:00 - Pediatric Rounds; Robert A. Ulstrom; Stations I and J.

Veterans Administration Hospital

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

1:30 - Cardiac Rounds; Drs. Ebert and Berman, and Richards.

4:00 - Cardiac Conference; Drs. Ebert, Berman, and Simonson.

Tuesday, April 14

Medical School and University Hospitals

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.

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

12:30 - 1:30 Physiology 114D -- Current Literature Seminar; 129 Millard Hall.

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.

4:30 - ECG Reading Conference; James C. Dahl et al; Staff Room, Heart Hospital.

5:00 - 6:00 X-ray Conference; Presentation of Cases by University Hospitals Staff; Eustis Amphitheater, U. H.

Ancker Hospital

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

9:00 - 10:00 Medical X-ray Conference; Auditorium.

Minneapolis General Hospital

10:00 - Pediatric Rounds; Spencer F. Brown; Stations I and J.

10:00 - Cardiac Rounds; Paul F. Dwan; Classroom, Sta. I.

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

12:30 - Grand Rounds; Fractures; Sta. A; Willard White, et al.

12:30 - Neuroroentgenology Conference; O. Lipschultz, J. C. Michael and Staff.

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

1:00 - Tumor Clinic; Drs. Eder, Cal, and Lipschultz.

1:00 - Neurology Grand Rounds; J. C. Michael and Staff.

Veterans Administration Hospital

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

8:30 - Surgery Staff Seminar; Conference Room, Bldg. I.

Tuesday, April 14 (Cont.)

Veterans Administration Hospital (Cont.)

- 9:30 - Infectious Disease Rounds; Drs. Hall and Zimmeman.
- 9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.
- 10:30 - Surgery-Tumor Conference; L. J. Hay, J. Jorgens; Conference Room, Bldg. I.
- 1:00 - Review of Pathology, Pulmonary Tuberculosis; Conference Room, Bldg. I.
- 1:30 - Combined Medical-Surgical Chest Conference; Conference Room, Bldg. I.
- 2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.

Wednesday, April 15

Medical School and University Hospitals

- 8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Paul Lober and L. G. Rigler; Todd Amphitheater, U. H.
- 11:00 - 12:00 Pathology-Medicine-Surgery Conference; Pediatrics Case; O. H. Wangenstein, C. J. Watson and Staffs; Todd Amphitheater, U. H.
- 12:30 - 1:20 Radio-Isotope Seminar; 12 Owre Hall.
- 1:30 - 3:00 Physiology 114B -- Circulatory and Renal System Problems Seminar; Dr. M. B. Visscher, et al; 214 Millard Hall.
- 4:00 - 5:30 Physiology 114C -- Permeability and Metabolism Seminar; Nathan Lifson; 214 Millard Hall.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater.
- 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.
- 12:30 - 1:30 Medical Journal Club; Library.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Max Seham; Stations I and J.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.
- 11:00 - Pediatric Seminar; Arnold Anderson; Classroom, Station I.
- 11:00 - Pediatric Rounds; Erling S. Platou; Station K.
- 12:00 - Surgery-Physiology Conference; Drs. Zierold and Brown; Classroom.
- 12:15 - Pediatrics Staff Meeting; Classroom, Station I.
- 1:30 - Visiting Pediatric Staff Case Presentation; Station I. Classroom.

Wednesday, April 15 (Cont.)

Veterans Administration Hospital

- 8:30 - 10:00 Orthopedic X-ray Conference; E. T. Evans and Staff; Conference Room; Bldg. I.
8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker.
9:00 - Gastro-Intestinal Rounds; Drs. Wilson, Nesbitt, Zieve, Hay and Goodnow.
7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, April 16

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.
1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
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.
4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
5:00 - 6:00 Radiology Seminar; Presentation of Cases from Miller Hospital; Drs. H. O. Peterson and Corrigan; 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.

Ancker Hospital

- 8:00 - 10:00 Medical Grand Rounds; Auditorium.

Minneapolis General Hospital

- 9:30 - Neurology Rounds; Heinz Bruhl; Station I.
10:00 - Pediatric Rounds; Spencer F. Brown; Station K.
10:00 - Psychiatry Grand Rounds; J. C. Michael and Staff; Sta. H.
11:30 - 12:30 Clinical Pathological Conference; John I. Coe; Classroom.
1:00 - Fracture - X-ray Conference; Dr. Zierold; Classroom.
1:00 - House Staff Conference; Station I.
2:00 - 4:00 Infectious Disease Rounds; Classroom.
4:00 - 5:00 Infectious Disease Conference; Wesley W. Spink; Classroom.

Veterans Administration Hospital

- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.

Thursday, April 16 (Cont.)

Veterans Administration Hospital (Cont.)

- 8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.
- 11:00 - Surgery-Roentgen Conference; J. Jorgens; Conference Room, Bldg. I.
- 1:00 - Metabolic Disease Conference; Drs. Flink, Heller, and Jacobson.

Friday, April 17

Medical School and University Hospitals

- 8:00 - 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 - 1:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Culdoscopy; David I. Seibel; Powell Hall Amphitheater.
- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
- 3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.
- 4:00 - 5:00 Physiology 124 -- Seminar in Neurophysiology; Ernst Gelhorn; 113 Owre Hall.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 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

- 9:30 - Pediatric Rounds; Wallace Lueck; Station J.
- 10:30 - Pediatric Surgery Conference; Oswald Wyatt; Tague Chisholm; Station I, Classroom.
- 12:00 - Surgery-Pathology Conference; Dr. Zierold, Dr. Coe; Classroom.
- 1:00 - 3:00 Clinical Medical Conference; Thomas Lowry; Classroom, Station M.
- 1:15 - X-ray Conference; Oscar Lipschultz; Classroom, Main Bldg.
- 2:00 - Pediatric Rounds; Robert Ulstrom; Stations I and J.

Veterans Administration Hospital

- 10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.
- 1:00 - Pathology Slide Conference; E. T. Bell and D. F. Gleason; Conference Room, Bldg. I.
- 2:00 - Autopsy Conference; E. T. Bell and Donald Gleason; Conference Room, Bldg. I.

Saturday, April 18

Medical School and University Hospitals

- 7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.
- 9:00 - 10:00 Infertility Conference; Louis L. Friedman, David I. Seibel, and Obstetrics Staff; Center for Continuation Study.
- 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.
- 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 Experimental Hepatic Necrosis Based on Deficient Diets; John Shefeland; 226 Institute of Anatomy.

Ancker Hospital

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

Minneapolis General Hospital

- 8:00 - Urology Staff Conference; T. H. Sweetser; Main Classroom.
- 11:00 - 12:00 Medical - X-ray Conference; O. Lipschultz, Thomas Lowry, and Staff; Main Classroom.

Veterans Administration Hospital

- 8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.
- 8:30 - 11:15 Hematology Rounds; Drs. Goldish and Bolin.
- 11:15 - 12:00 Morphology Dr. Aufderheide, Conference Room.