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and
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Neck Dissection in Head and Neck Cancer

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UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

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

I. AN ANALYSIS OF 221 NECK DISSECTIONS PERFORMED FOR CANCERS OF THE HEAD AND NECK

T. H. Crawford Barclay
Leonard F. Peltier
Arnold J. Kremen

Introduction

This study was undertaken in an effort to answer questions arising in the University Hospitals' Tumor Clinic regarding the indications, the complications, and the results of neck dissections performed in the treatment of patients with cancer of the head and neck. A careful culling of all operations for such cancers carried out between January 1, 1935 and January 1, 1950, a period of 15 years, produced the records of 221 patients on whom formal neck dissections had been performed. The material to be presented in this report was obtained from a review of these patients. The diagnosis of cancer in all patients rests upon histologic examination of sections from the tumor and/or its lymph node metastases.

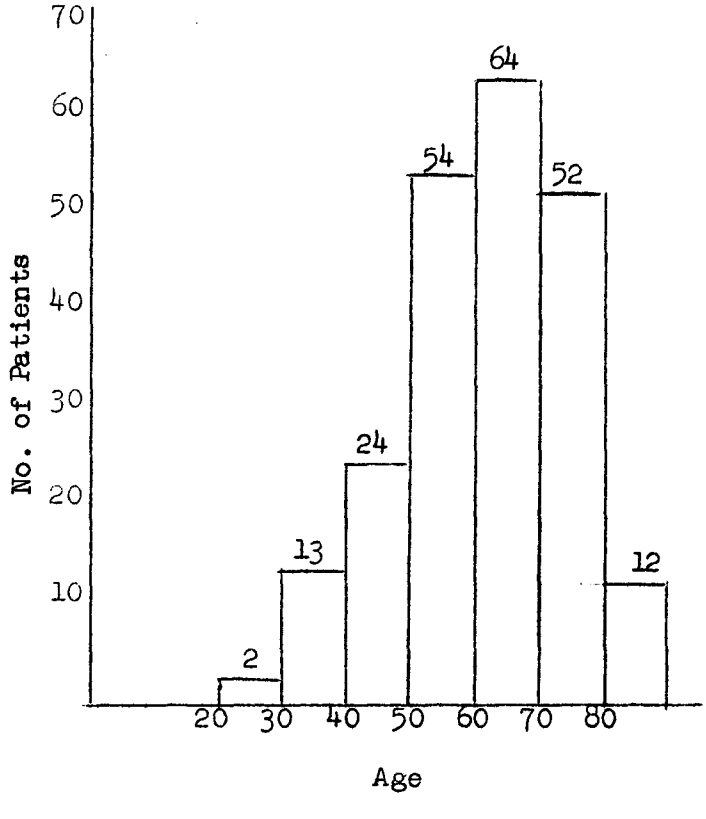
Three well defined, standardized operative procedures were performed on these patients: the Crile neck dissection, the suprahyoid neck dissection, and the supra-omohyoid neck dissection. The Crile neck dissection involves the excision of the sternocleidomastoid muscle and the internal jugular vein, together with all of the associated lymphatic tissue from the level of the clavicle to the base of the skull, including the contents of the submaxillary triangle. For the past several years we have regularly removed the posterior belly of the digastric muscle and the stylohyoid muscle as a part of this dissection. This allows easier access to the deep upper cervical nodes and produces no discernible disability. The suprahyoid neck dissection consists of the excision of the contents of the submaxillary triangle including the submaxillary gland. When a bilateral dissection is performed, the submental triangle is cleared also. The supraomohyoid neck dissection is similar to the Crile neck dissection except, that, inferiorly, the dissection begins where the omohyoid muscle crosses the belly of the sternocleidomastoid muscle and the internal jugular vein. The supraclavicular space is left untouched. This procedure has been abandoned at this clinic in favor of the more radical Crile neck dissection. Neck dissections were often performed simultaneously in various combinations; i.e., Crile neck dissection plus contra-lateral suprahyoid neck dissection, and bilateral suprahyoid neck dissection. Recently combined excisions of primary intraoral tumors with dissection of the cervical lymph nodes in continuity have been done when possible; i.e., hemiglossectomy and Crile neck dissection, hemimandibulectomy and Crile neck dissection.

Age

The ages of the patients undergoing neck dissections are shown in Table I. We do not believe that age is a decisive

Table I

AGE DISTRIBUTION OF PATIENTS UNDERGOING NECK DISSECTION



factor in electing surgical treatment of this type, but rather, are impressed by the equability with which aged patients pass through the operation and convalescent period.

Operative Mortality

The distribution of patients according to the primary tumor, the type of neck dissection, and the operative mortality can be seen in Table II. The composition of the miscellaneous group of tumors is indicated in Table III. All patients dying in the hospital or within 30 days postoperatively were considered to be operative fatalities. These deaths are listed in detail in Table IV. It should be noted that the immediate mortality following neck dissection, 3.1 per cent, compares favorably with the mortality rate following other more widely used surgical procedures for treating cancers. Improved anesthesia and antibacterial therapy may permit an even lower mortality rate.

Complications

The incidence and character of the postoperative complications of neck dissections are shown in Table V. Respiratory obstruction can be prevented by more careful anesthesia and by early tracheotomy. Tracheotomy should be performed preoperatively in those patients in whom procedures contributing to possible respiratory obstruction are con-

Table II

PATIENTS UNDERGOING NECK DISSECTION, ACCORDING TO PRIMARY TUMOR, TYPE OF NECK DISSECTION AND OPERATIVE MORTALITY

Primary Tumor	Crile Neck Dissection	Suprahyoid Neck Dissection	Supra-Omohyoid Neck Dissection	Total
Carcinoma of Lip	12	100	2*	113
Carcinoma of Alveolar Ridge	9**	9	2	21
Carcinoma of Tongue	20	4	1	25
Carcinoma of Skin	15	1	1	17
Carcinoma of Buccal Mucosa	10	8	0	18
Miscellaneous	18	7	2	27
Total	84	129	8	221
Operative Deaths	4	3	0	7
Mortality Rate	4.7%	2.3%	0%	3.1%

* One patient had suprahyoid dissection 6 months prior to supra-omohyoid neck dissection.

** This figure does not include one modified Crile neck dissection.

Table III

PRIMARY TUMORS OF THE MISCELLANEOUS GROUP

Adenocarcinomas of salivary glands	5
Adenocarcinoma of meibomian gland	1
Carcinoma of floor of mouth	5
Carcinoma of tonsil	3
Carcinoma of maxillary antrum	1
Adenocarcinoma of thyroid	4
Malignant melanoma	3
Carcinoma of nasal cavity	1
Carcinoma of hypopharynx	1
Adenocarcinoma of breast	1
Carcinoma, primary unknown	2
Total	27

- - -

Table IV

THE CAUSE OF DEATH IN THE OPERATIVE FATALITIES

Age	Date	Type of Neck Dissection	Cause of Death
80	1936	Suprahyoid	Cellulitis and wound infection
70	1937	Crile	Pulmonary edema
80	1938	Suprahyoid	Wound infection, pneumonia
68	1938	Crile	Auricular fibrillation, pneumonia
53	1938	Cuprahyoid	Anesthetic death; respiratory obstruction from aspirated mucous plug
65	1946	Crile	Cerebral thrombosis associated with hypotension resulting from carotid sinus stimulation
80	1949	Crile	Pulmonary embolus

Table V

POSTOPERATIVE COMPLICATIONS OF NECK DISSECTION

Pulmonary embolus	2
Pneumonia	3
Respiratory obstruction	2
Thoracic duct fistula	1
Cerebral thrombosis	1
Thrombophlebitis, axillary vein	1
Gastric dilatation	1
Heat stroke	1
Fistulae	4
Local wound infection	28

templated. Several days prior to performing a combined intraoral excision and neck dissection, tracheotomy and gastrostomy are carried out, providing an airway and an avenue for alimentation during the postoperative period. When a Crile neck dissection is performed upon the left side, it is our practice to identify and preserve the thoracic duct. If this structure is damaged, it can be ligated in the neck without complication. Transient hypotension, bradycardia, and vagotonia occasionally occur as the dissection is carried on in the region of the vagus nerve and the carotid sinus. Infiltration about these structures with 1 per cent procaine during the course of the dissection will prevent these distressing manifestations. It is interesting to note the paucity of serious pulmonary complications.

Local wound complications, i.e., failure of healing, wound breakdown, cellulitis, suppuration, or fistulae, are the most frequent complications of neck dissections, occurring to greater or lesser degree in 32, or 14.4 per cent, of our patients. Of these, 22 were mild in character and did not increase the postoperative morbidity; 8 were of moderate severity and include 4 fistulae; the 2 severe wound infections contributed directly to the deaths of the patients. Among patients receiving preoperative x-ray irradiation to the area of dissection, the incidence of local wound complications was much greater, occurring in 8 of 19 patients (42 per cent) treated in this fashion. When neck dissection was combined with excision of an intraoral tumor with continuity between the neck wound and the oral cavity, the incidence of wound complications was, surprisingly enough, not greatly increased, occurring in 5 of 30 such patients (17 per cent). All 4 of the orocutaneous fistulae closed spontaneously over a relatively short period, and all occurred in patients having combined procedures. In our experience orocutaneous fistulae will ordinarily close if treated expectantly, unless (1) there is a persistence of tumor in the local area, or (2) the region has been heavily irradiated.

Lymph Node Pathology

The incidence of positive nodes in the group of prophylactic neck dissections, and in the neck dissections performed for clinical involvement, is shown in Table VI. From this study, prophylactic neck dissection does not appear to be indicated routinely in patients with cancer of the lip. However, such operations show a higher yield of positive nodes in patients with other head and neck cancers; i.e., 4 positive dissections in 14 patients. From this it would appear that prophylactic neck dissections should be made a routine part of the treatment of the latter group. This is particularly true whenever combined procedures with excision of the tumor in continuity with its lymph drainage areas can be performed. Such operations fulfill the classical criteria of the ideal cancer operation. It is possible to apply this concept to the surgical management of cancers of the lower alveolar ridge, the floor of the mouth, the tongue and certain cutaneous areas about the face and neck. Clinical evidence of node involvement is a definite

Table VI

PATHOLOGY OF LYMPH NODES REMOVED AT OPERATION

Primary Tumor	Nodes Removed Prophylactically			Nodes Removed for Involvement		
	Total	Pos.	Neg.	Total	Pos.	Neg.
Lip	31	3	28	82	42	40
Alveolar Ridge	2	1	1	19	11	8
Tongue	4	1	3	21	15	6
Skin	3	1	2	14	12	2
Buccal Mucosa	1	0	1	17	13	4
Miscellaneous	4	1	3	23	20	3
Total	45	7	38	176	113	63

Table VII

5 YR. SURVIVALS OF PATIENTS HAVING NECK DISSECTIONS IN RELATION TO NODAL PATHOLOGY

Primary Tumor	No. of Patients Followed 5 Yrs. or More	Node Involvement	5 Yr. Survival	Total	Gross 5 Yr. Survival
Lip	104	pos. 39 neg. 65	pos. 18 (46.2%) neg. 43 (66.1%)	61	(58.6%)
Alveolar Ridge	13	pos. 9 neg. 4	pos. 3 (33.3%) neg. 2 (50.0%)	5	(38.4%)
Tongue	13	pos. 9 neg. 4	pos. 3 (33.3%) neg. 2 (50.0%)	5	(38.4%)
Skin	5	pos. 4 neg. 1	pos. 1 (25.0%) neg. 0	1	(20.0%)
Buccal Mucosa	12	pos. 10 neg. 2	pos. 1 (10.0%) neg. 0	1	(8.3%)
Miscellaneous	9	pos. 7 neg. 2	pos. 1 (14.3%) neg. 1 (50.0%)	2	(11.1%)
Total	156	pos. 78 neg. 78	pos. 27 (35.0%) neg. 48 (61.5%)	75	(48.0%)

indication for neck dissection as this furnishes the best chance for cure in these advanced cases. The irradiation of involved cervical nodes, while not uncommonly of benefit in temporarily arresting the progress of the disease, is rarely curative.

Survival

The survival of patients in this study has been calculated from the first day of treatment at this institution. In the entire group of 221 patients, 8 (3.9 per cent) have been lost to follow-up and are considered to be dead of their cancer. A follow-up period of five years or more was possible in 156 patients; i.e., those whose treatment was begun between 1935 and 1945. The incidence of 5 year survivals in these patients is shown in Table VII. The figures speak for themselves. It is heartening to note that it was possible to salvage almost half of these patients with relatively advanced cancers of the head and neck.

Discussion

The successful treatment of cancers of the head and neck requires close cooperation between surgeon and radiotherapist, and a continuity of care, so that each agent or procedure used in treating the patient is applied at the optimum time. Extirpation of the lymph node bearing areas of the neck by neck dissection is an integral part of such a balanced program. The operative mortality is low; the postoperative morbidity is not excessive; and the residual disability, if any, is minimal. Most complications can be avoided by careful planning, gentle dissection, and good supportive care. Massive antibacterial therapy and excellent anesthesia are of vital importance in the combined procedures. In cases where preoperative x-ray irradiation is to be employed, it is preferable to carry out the surgery before the maximum skin reaction occurs so that healing may take place uncomcomplicated by the dense fibroplasia and the obliteration of vessels associated with the reaction to irradiation. The dosage employed is less than the usual full therapeutic dose and is individualized, since the degree of reaction to irradiation varies considerably among patients.

Neck dissection appears to be indicated as a prophylactic measure in most patients with cancers of the oral cavity except the lip. Combined procedures with excision of the primary tumor and its node bearing area in continuity represent the ideal operations and can be performed with little increase in complications or morbidity for cancers of the alveolar ridge, buccal mucosa, floor of mouth and tongue. The results of neck dissections performed as a part of a planned program of cancer therapy in this group of patients with relatively advanced cancers should encourage the wider application of these procedures.

Conclusions

A group of 221 patients with cancers of the head and neck have been submitted to formal neck dissections with a mortality of 3.1 per cent. The most frequent complication was local wound infection. The five year survival rate of the 156 patients in whom this could be calculated was 48 per cent. Such a survival rate in a group of patients with relatively advanced cancers speaks for the wider use of such procedures.

II. MEDICAL SCHOOL NEWS

Coming Events

Oct. 26-28 -- Continuation Course in Diseases of the Chest
Oct. 30 - Nov. 4 -- Continuation Course in Neurologic Roentgenology
Nov. 4 -- Homecoming Clinic and Luncheon 9:15 a.m. to kick-off time
Nov. 9 - 11 -- Continuation Course in Poliomyelitis
Nov. 27 - Dec. 1 -- Continuation Course in Child Psychiatry

* * *

Homecoming Clinic and Luncheon

All medical alumni are cordially invited to the Homecoming Clinic and Luncheon to be presented by the Minnesota Medical Alumni Association beginning at 9:15 a.m., Saturday, November 4.

The Clinical Session, which will be held in Eustis Amphitheater at the University Hospitals, will open with a Pediatric-Surgical Conference headed by Doctors Irvine McQuarrie and Owen H. Wangensteen. Doctors E. T. Bell and Leo G. Rigler will later conduct a Clinical-Pathological Conference which will renew fond memories for many Minnesota alums. Mr. Ray Amberg, Director of the University Hospitals, will be host at mid-morning coffee and doughnuts served in the hospital.

Following the clinical session a brief tour will afford medical grads an opportunity to inspect the nearly completed Variety Club Heart Hospital, the new University Student Health Service Dispensary, and to check progress on the Mayo Memorial Building. The buffet luncheon, presented by the General Alumni Association and served at $1 per person at the Coffman Memorial Union, will provide a convenient means of obtaining a pre-game lunch and will at the same time give alumni additional opportunity to get together with former graduates and faculty members.

* * *

Chest Disease Course

Physicians registered for the continuation course in Diseases of the Chest, October 26-28, will have an opportunity to hear three outstanding contributors in this field of medicine.

Dr. James J. Waring, Professor and Chief of Medicine at the University of Colorado, will speak on "Physical Diagnosis in Chest Diseases" and will participate in a panel discussion on "Carcinoma of the Lung."

Dr. O. A. Sander, Associate in Medicine, Marquette University Medical School, will discuss "Industrial and Occupational Disorders of the Respiratory Tract."

Dr. John H. Skavlem, President of the American Trudeau Society and Associate Professor of Medicine of the Cincinnati University Medical School, will discuss the "Management of Patients with Abnormal Shadows Detected by Chest X-ray Surveys" and will participate in a panel discussion on "Current Concepts in Tuberculosis."

The course is sponsored by the Minnesota Trudeau Society which will hold its annual meeting on the evening of Friday, October 27. All physician registrants for the course are invited to be the guests of the Trudeau Society at this annual dinner meeting.

* * *

Faculty News

Doctors Harold S. Diehl, Howard L. Horns, and George N. Aagaard will attend the annual meeting of the Association of American Medical Colleges October 23-25 at Lake Placid, New York. Dr. Aagaard will be one of a panel of speakers on postgraduate medical education for physicians.

* * *

Nov. 2 - 8:15 p.m. Rigler Lecture: "Backache"
Knute Lindblom; Medical Sciences Amphitheater

III. UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS

No. 303 October 22 - October 28, 1950

Sunday, October 22

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

10:30 - Surgical Conference; Todd Amphitheater, U. H.

Monday, October 23

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

9:00 - 10:00 Pediatric Rounds; Dr. Lowry; 5th Floor, Minneapolis General Hospital.

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

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

11:00 - 11:50 Physical Medicine Seminar; Anatomy and Kinesiology of Erector Spinae and Superficial Muscles; Glenn Gullickson; E-101, U. H.

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

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

12:00 - 12:50 Physiological Chemistry Seminar; Some Factors Effecting Tubular Readsorption of Sodium by the Kidney: R. B. Harvey and D. H. Simmons; 214 Millard Hall.

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

1:00 - 2:00 Staff Meeting; Classroom, 4th Floor, Minneapolis General Hospital.

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

2:00 - 3:00 Journal Club; Classroom, Station I, Minneapolis General Hospital.

4:00 - 5:00 Pediatric Seminar; Influenzal Meningitis; A. Diehl; 6th Floor West, U. H.

4:30 - 5:30 Dermatological Seminar; M-436, U. H.

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

5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staffs; Powell Hall Amphitheater.

5:00 - X-ray Conference with Radiologists; Powell Hall Amphitheater.

Tuesday, October 24

8:00 - 9:00 Pediatric Rounds; Dr. Adams; 4th Floor, Minneapolis General Hospital.

8:00 - 9:00 Fracture Conference; Auditorium, Ancker Hospital.

Tuesday, October 24 (Cont.)

8:30 - Pediatrics Allergy Rounds; Dr. Nelson; 4th Floor, Minneapolis General Hospital.

8:30 - 10:20 Surgery Seminar; Seminar Conference Room, Bldg. I, Veterans Hospital.

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

9:00 - 10:00 Pediatric Rounds; F. H. Top; 7th Floor, Minneapolis General Hospital.

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

10:30 - 11:50 Surgical Pathological Conference; Lyle Hay and E. T. Bell; Veterans Hospital.

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

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

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

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

3:30 - 4:20 Clinical Pathological Conference; Staff; Veterans Hospital.

4:00 - 5:00 Physiology-Surgery Conference; Role of Urease in Gastric Secretion; David Glick; Todd Amphitheater.

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

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

8:00 p.m. Journal Club; E-101, U. H.

Wednesday, October 25

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.

8:30 - 9:30 Clinico-Pathological Conference; Auditorium, Ancker Hospital.

8:30 - 10:00 Orthopedic-Roentgenologic Conference; Edward T. Evans and Bernard O'Loughlin; Room IAW, Veterans Hospital.

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

9:00 - 10:00 Pediatric Rounds; Dr. Lowry; 5th Floor, Minneapolis General Hospital.

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

12:00 - 1:00 Radio-Isotope Seminar; Use of Radioactive Iodine in Tracer Thyroid Studies; E. P. Engels; 113 Medical Science Building.

Wednesday, October 25 (Cont.)

12:15 - Staff Meeting; Classroom, 4th Floor, Minneapolis General Hospital.

3:00 - 4:00 Pediatric Rounds; E. J. Huenekens; 4th Floor, Minneapolis General Hospital.

3:30 - 4:30 Journal Club; Surgery Office, Ancker Hospital.

4:00 - 5:00 Infectious Disease Rounds; Classroom, 8th Floor, Minneapolis General Hospital.

5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; E-101, U. H.

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

8:00 p.m. Dermatological Pathology Conference; Todd Amphitheater, U. H.

Thursday, October 26

8:00 - Pediatric Rounds; Forrest Adams; 4th Floor, Minneapolis General Hospital.

8:30 - 10:20 Surgery Grand Rounds; Lyle Hay and Staff; Veterans Hospital.

9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-109, U. H.

9:00 - 10:00 Pediatric Rounds; Dr. F. H. Top; 7th Floor, Minneapolis General Hospital.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

10:00 - Pediatrics Rounds; Adult Contagion; Minneapolis General Hospital.

10:30 - 11:50 Surgery-Radiology Conference; Daniel Fink and Lyle Hay; Veterans Hospital.

11:30 - Pediatric Conference--Main Classroom, General Hospital.

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

1:00 - 2:00 EKG and X-ray Conference; Classroom, 4th Floor, Minneapolis General Hospital.

2:00 - EKG and X-ray Conference; Classroom, Sta. I, Minneapolis General Hospital.

4:00 - 5:00 Physiology Seminar; The oxygen consumption and mechanical efficiency of the heart before and during heart failure; Gabriel Nahas and Nicholas Hightower; 116 Millard Hall.

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

5:00 - 6:00 Radiology Seminar; Report of Army Medical Mission to Japan; L. G. Rigler; Eustis Amphitheater.

5:00 - Bacteriology Seminar; The Effects of Hormones on Swine Influenza Virus Infection; R. Lindorfer; 214 Millard Hall.

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

Friday, October 27

8:30 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.

9:00 - 10:00 Pediatric Rounds; Dr. Lowry; 5th Floor, Minneapolis General Hospital.

9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.

9:30 - Surgery-Pediatric Conference; O. S. Wyatt and T. C. Chisholm; 4th Floor, Minneapolis General Hospital.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

10:30 - 11:20 Medicine Grand Rounds; Veterans Hospital.

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

11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Paracervical Block for Obstetrics and Gynecology; Donald W. Freeman; Powell Hall Amphitheater.

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

1:00 - 3:00 Pathology-Surgery Conference; Auditorium, Ancker Hospital.

2:00 - 3:00 Dermatology and Syphilology Conference; Presentation of selected cases of the week; H. E. Michelson and Staff; W-312, U. H.

2:00 - 4:00 Physiology Conference; Cardiovascular Demonstration Course; Rodney Harvey; 214 M. H.

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

4:00 - 5:00 Clinical Pathological Conference; A. B. Baker; Todd Amphitheater, U.H.

4:15 - 5:15 Electrocardiographic Conference; 106 Temp. Bldg., Hospital Court, U.H.

4:30 - 5:30 Journal Club; M-436, U. H.

5:00 - Urology Seminar; Powell Hall Amphitheater.

Saturday, October 28

7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; M-109, U. H.

8:00 - Pediatric Rounds; Forrest Adams; 4th Floor, Minneapolis General Hospital.

8:30 - 9:30 Surgery Conference; Auditorium, Ancker Hospital.

9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; E-221, U. H.

9:00 - 10:00 Pediatric Rounds; F. H. Top; 7th Floor, Minneapolis General Hospital.

Saturday, October 28 (Cont.)

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

9:15 - 10:00 Surgery-Roentgenology Conference; J Friedman, O. H. Wangensteen and Staff; Todd Amphitheater, U. H.

10:00 - 11:30 Surgery Conference; O. H. Wangensteen and Staff; Todd Amphitheater, U. H.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.

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

11:00 - 12:00 Pediatric Clinic; Charles May; Classroom, 4th Floor, Minneapolis General Hospital.

11:00 - 12:00 Anatomy Seminar; The Comparative Anatomy of the Lung; Dennis J. Kane; The Fructose of Human Semen; Joseph Wagner; 226 I. A.