Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Peptic Ulcer

Friday, October 31, 1947 No. 5

STAFF MEETING BULLETIN
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INDEX

Published for the General Staff Meeting each week during the school year, October to June, inclusive.

William A. O'Brien, M.D.

I. UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS
November 3 - November 8, 1947

No. 175

Monday, November 3

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; Interns' Quarters, U. H.

9:15 - Fracture Rounds; A. A. Zierold and Staff; Ward A: Minneapolis General Hospital.

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

11:00 - 11:50 Physical Medicine Conference; Use of the Stewart Colorimeter in Physical Medicine; Sophia Ernst; E-101, U. H.

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

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

12:00 - 12:50 Physiology Seminar; Pulmonary Changes in Vagotomized and Nonvagotomized Guinea Pigs Subjected to Continuous Artificial Respiration; Arthur Sussman; 214 M. H.

12:15 - 1:20 Pediatrics Seminar; Digotoxin; Albert Schroeder; 6th Floor Seminar Room, U. H.

12:15 - 1:20 Obstetrics and Gynecology Journal Club; M-435, U. H.

12:30 - 1:20 Pathology Seminar; Effect of Urethane on Mouse Leukemia; C. S. Lu; 104 I. A.

12:30 - 1:50 Surgery Grand Rounds; A. A. Zierold, Clarence Dennis and Staff; Minneapolis General Hospital.

4:00 - 5:00 School of Public Health Seminar; Subject to be announced; 113 MeS.

Tuesday, November 4

8:30 - 10:20 Surgery Reading Conference; Lyle Hay; Small Conference Room, Bldg. I, Veterans' Hospital.

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

10:30 - 11:50 Surgical Pathological Conference; Lyle Hay and Nathanial Lufkin; Veterans' Hospital.

12:30 - 1:20 Pathology Conference; Autopsies; Pathology Staff; 102 I. A.

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 - 5:30 Surgery-Physiology Conference; O. H. Wangensteen and M. L. Visscher; Eustis Amphitheater, U. H.

5:00 - 5:50 Roentgenology Diagnosis Conference; Oscar Liepschultz and Staff of General Hospital; M-515, U. H.

Wednesday, November 5

8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-515, U. H.

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

11:00 - 11:50 Pathology-Medicine-Surgery Conference; Carcinomatosis; E. T. Bell, O. H. Wangensteen, C. J. Watson, and Staff; Todd Amphitheater, U.H.

12:00 - 12:50 Physiological Chemistry Seminar; Water Storage and Movements of Body Fluids and Chlorides During Acute Liver Disease; Marcus Keil; 214 M.H.

4:00 - 5:00 Infectious Disease Routes, Todd Amphitheater, General Hospital, Veterans' Hospital.

Thursday, November 6

8:15 - 9:00 Roentgenology-Surgical-Pathology Conference; Walter Walker and H. M. Stauffer; M-515, U. H.

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; Todd Amphitheater, U.H.

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

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

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

1:00 - 1:50 Fracture Conference; A. A. Zierold and Staff; Minneapolis General Hospital.

1:30 - 3:00 Pediatric Psychiatric Rounds; Reynold Jensen; 6th Floor West Wing, U. H.

4:00 - 4:50 Bacteriology Seminar; Identification of the Shigella, Salmonella and Eberthella; Henry Bauer; 214 M. H.

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

5:00 - 5:50 Roentgenology Seminar; Spinal Cord Lesions in Hodgkin's Disease; Marcus J. Smith; M-515, U. H.

7:00 - 8:00 Urology-Roentgenology Conference; H. M. Stauffer and George Eaves; M-515, U. H.

Friday, November 7

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

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

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

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

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

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

11:00 - 12:00 Surgery-Pediatric Conference; C. Dennis, A. V. Stoesser and Staffs; Minneapolis General Hospital.

11:30 - 12:50 University of Minnesota Hospitals General Staff Meeting; Right Heart Catheterization; Craig Borden; New Powell Hall Amphitheater.

1:00 - 1:50 Dermatology and Syphilology; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.

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

5:30 - 6:20 Surgery Literature Conference; Clarence Dennis and Staff; Minneapolis General Hospital.

Saturday, November 8

7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; Station 21, U. H.

8:30 - 10:00 Psychiatry and Neurology Grand Rounds; Staff, Veterans' Hospital.

9:00 - 9:50 Surgery-Roentgenology Conference; O. H. Wangensteen, L. G. Rigler, and Staff; Todd Amphitheater, U. H.

9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-515, U. H.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; M-515, U. H.

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

11:00 - 12:20 Anatomy Seminar; The Brain as a Reticulo-endothelial Organ; Berry Campbell; 226 I. A.

II. CLINICAL INVESTIGATION AND EVALUATION OF 416 CONSECUTIVELY OPERATED CASES OF PEPTIC ULCER.

David Gaviser

PART ONE

Introduction

Peptic ulcer is primarily a medical disease. Surgery has a place in its treatment only when complications develop. In the past, surgical procedures were done on an empirical basis. The results of this surgery have proved unsatisfactory.

With the realization that the acid factor was of paramount importance in the cause of recurrent ulceration, surgeons became more radical in their approach to the ulcer problem. Today, radical subtotal gastric resection has become accepted treatment, but opinions differ as to how extensive the resections should be.

In the last few years, evaluation of results of subtotal gastric resections have appeared in the literature. There has also been interest in vagotomy in the treatment of duodenal ulcer, although it is too early to judge its effectiveness. Only through critical studies of the results of these procedures can a true evaluation be made of the treatment of peptic ulcer.

The study was conducted to survey and evaluate results of the surgical procedures for treatment of peptic ulcers at the University of Minnesota Hospitals from January 1, 1940 to July 1, 1945.

Discussion of Problem

Four hundred sixteen consecutive operated cases of peptic ulcer were considered in this investigation. All were followed by questionnaire to the patient and by clinical examination in the Out-Patient Department.

Since 1940 the Surgical Department of the clinic has set aside one morning each week for patients who have had, or will have gastrointestinal surgery. These patients are seen by the Chief of the Department of Surgery, and members of his staff interested in the problem of peptic ulcer. An attempt is made to maintain complete follow-up of the patient's status post-operatively by having the patient report to the clinic one week following discharge; then on month later; then at three month intervals for a period of one year. During the second year following the operation the patient reports every six months. Following the second year, he is examined once a year thereafter. If the patient does not report for check-up, periodic letters are sent him urging his return for examination. In the event he is unable to do so, a written report of his present health is requested. The results of these periodic visits and the information obtained by the questionnaires form the basis of this report.

(Questionnaire)

Date_____

Hospital #_____

Dear_____

We are interested in knowing about your digestion since your operation for ulcer. We would appreciate careful answers to the following questions. You may write your answers to the questions in the space provided below for each question. If the space provided is not sufficient you may use the back of this letter

1. How is your general health at the present time? Good or otherwise. Explain.

2. Are your free from pain? Have you found blood in the stool? Have you had tarry stools? Has there been any vomiting? Are your having any difficulty with your digestion? List any specific complaints.

3. Have you gained, remained the same, or lost weight? Give amounts and period of time. What is your height? What is your present weight?

4. Are you able to eat 3 regular full meals a day? Give an example of an

average meal for each period of the day.

5. Are you able to eat all foods? List any and all foods which you feel give you trouble.

6. Do you drink milk? Did you drink milk before operation?

7. Are you able to work? What type of work do you do? How soon did you return to work after operation?

We should like you to continue to have periodic check-ups in this clinic. A self-addressed envelope is enclosed for your convenience in returning this questionnaire.

Sincerely yours,

O. H. Wangensteen, M.D.
Department of Surgery
University Hospitals
Minneapolis, Minnesota

The investigation covered the state of health of the patient post-operatively; presence or absence of symptoms for which he was operated; occurrence of new symptoms more serious than the original; quantitative and qualitative food intake; digestive function; ability to maintain normal nutrition; ability to carry on normal occupations; and the patient's own evaluation of results of the operation.

Operative Procedure

In 1940 three types of operation were performed for duodenal ulcer; the so-called Types III, IV, and IVA. The Type IV was discontinued because results indicated it was an unsatisfactory operation. Since 1941 the standard procedures have been Types III and IVA.

Type III operation consists of at least 75 per cent resection, followed by a retrocolic anastomasis with the jejunum at the duodenojejunal junction producing a short, afferent loop with inversion of the lesser curvature in the Hofmeister pattern.

Type IVA differs from Type III only in the handling of the duodenum. In this instance the pyloric antrum is sectioned about two finger breadths proximal to the pyloric sphincter and the antral mucosa is excised, employing the pyloric sphincter and the antral musculature for closure. The Type IVA procedure is utilized only in those cases of the so called inoperable duodenum.

Type IV is the well known Finsterer antral exclusion type of operation, in which the antral mucosa is left intact.

The operative procedures Type III and IVA are based on the premise that a satisfactory operation for ulcer is one in which a sufficient amount of stomach is removed to control acidity and render the patient achlorhydric; to prevent the occurrence of stomal ulcer; and still leave the patient with a residual pouch large enough to provide a satisfactory gastric capacity. Wangensteen has stated "operative procedures directed at the relief of ulcer which fail to reduce gastric acidity are potentially dangerous and should be abandoned. Only an extensive gastric resection (three-quarter resection) with complete excision of the antral mucosa affords real promise of effectual reduction of gastric acidity, the sine qua non of a satisfactory operation for ulcer."

A short proximal loop is a prime requisite of both procedures and sufficient laboratory and clinical data is available to substantiate this. Merendino et al, found in the laboratory, when a long proximal loop was employed with a three-quarter resection in the dog, perforated gastro-jejunal ulcers occurred spontaneously. At the Lahey clinic, an incidence of 11.4 per cent of recurrent gastrojejunal ulcers has been reported by Kiefer. In these cases a rather radical resection had been performed with a long proximal loop.

Clinical Observations

The 416 cases in the series were

divided according to location of lesion: Duodenal alone (Series I); Gastrojejunal, duodenal with gastrojejunal, duodenal with gastric (Series II); and Gastric (Series III).

In any discussion of peptic ulcer, duodenal ulcer should be considered apart from the gastric ulcer. The duodenal ulcer represents a different problem. There is always the possibility that malignancy is present in the gastric ulcer. Prolonged observation and medical therapy may unfavorably affect the outcome of the patient with a gastric lesion by delaying surgery until the lesion has become inoperable from a curative viewpoint. Although typical lesions of benign ulcer or carcinoma are not difficult to diagnose there are many instances where, despite all diagnostic aids, it is not always possible to make a definite diagnosis until permanent microscopic sections are interpreted. A more critical attitude toward gastric ulcer should be adopted so that patients will be referred by the internist for resection at an earlier date. Certainly questionable lesions should be given three to four weeks medical management to determine whether or not healing will occur. Even if healing does occur, some lesions will turn out to be carcinoma.

In the duodenal ulcer, medical management should be carried out for an extended period of time, since the majority of patients can be adequately controlled. It is only in cases where medical management has proved ineffective that surgery should be undertaken.

Location of Ulcer

In the 416 cases of peptic ulcers followed, 253 cases or 61 per cent were duodenal (213 were male, and 40 female, a ratio of five to one. Gastric lesions totalled 90 cases or 21.5 per cent (there were 72 males and 18 females, a ratio of four to one). The remaining 73 cases or 17.5 per cent consisted of duodenal and gastric lesions; duodenal and gastrojejunal occurring together; and gastrojejunal lesions alone, (58 males and 15 females.) Complete totals reveal that males outnumber females by a ratio of 4.6 to one. The location of the ulcer according to sex is shown in Table I.

TABLE #1

LOCATION OF ULCER

	Male	Female
Duodenal	213	40
Pyloric	7	2
Gastric	65	16
Duodenal & Jejunal	15	3
Duodenal & Gastric	28	8
Jejunal	15	4
	343	73

Total Cases: 416

Cases with Previous Surgery

Table #2 shows the number of cases in which previous surgery had been done. Forty cases or nine and six tenths per cent had surgical repair of free perforations. Forty cases had gastroenterostomies. Seven cases had small resection, three had Type IV operation. One patient had Devine exclusion operation; two had local excision of ulcer, and one was a Schmilinsky. In some instances multiple operative procedures has been done on the same patient.

TABLE #2

	Total Cases	Surgical Repair Perf.	G. E.	Sm. R.	Gr. IV	Other
Duodenal	253	25	10	1		Schmilinsky
Pyloric	9	1				
Gastric	81	3	2			
Duodenal & Jejunal	18	4	15		3	
Duodenal & Gastric	36	4	1			
Jejunal	19	3	12	6		Devine Exclusion. (2) Ex. Ulcer
TOTAL	416	40	40	7	3	4

Indications for Surgery

Indications for gastric resections were intractable pain, hemorrhage, and obstruction.

Intractable pain was the single consideration of 85 of the 416 cases or 20 per cent of the patients that were operated upon for ulcer in this clinic. These patients were unable to control their pain under medical treatment. Pain occurred in combination with other symptoms in 316 or 76 per cent of the cases.

Acute massive hemorrhage which endangers life constitutes a major problem in the handling of the ulcer patient. Whether bleeding will stop or continue is always questionable. In the younger individual bleeding usually will cease spontaneously under conservative therapy. However, there were in the study five patients under the age of forty-five whose bleeding persisted. Youngest of these was a 14-year-old male who finally needed emergency surgery. The decision to operate for acute hemorrhage in the patient over 45 demands careful consideration of all findings in the individual patient. Age and the degree of arteriosclerosis appeared to be an important factor in the mortality of the older age group. Twenty-six patients were admitted because of acute massive hemorrhage. Of this group 22 underwent emergency surgery with ensuing mortality of seven or 31 per cent. The youngest fatality was 33, while all others were over 50 years of age. Massive hemorrhage occurred in all cases. Six patients had bled to low levels with associated drops in blood pressure to shock levels. Despite repeated transfusions, hemorrhage continued with repeated drops in blood pressure to shock levels, indicating that a fairly large vessel was open in the base of the ulcer At operation, the patients with duodenal ulcer were bleeding from the gastro-duodenal artery or one of its branches.

The longest period of hemorrhage prior to surgery was thirty-eight days, and the shortest four. None of the patients were operated in the early course of their hemorrhage. Conservative therapy had been attempted, but had proved unsuccessful. Surgery was done as a last resort with the full realization that these patients were poor surgical risks.

The amount of blood transfused prior to surgery varied from 3000 cc. to 9000 cc. Attempts to establish good preoperative hemoglobin levels were unsuccessful because the patients' blood loss continued to exceed the replacement.

Six patients expired from unavoidable complications. One patient (MM) expired on the third post-operative day from acute hemorrhage due to erosion of a duodenal ulcer into the gastro-duodenal artery. She had previously had a gastric resection for a bleeding gastric ulcer and the presence of a duodenal

ulcer was not detected at surgery.

In 12 cases or two and seven tenths per cent, hemorrhage occurred without any other accompanying symptom, the patient having little or no warning of the onset. This constitutes a very important indication for surgery because of the difficulty of managing such an individual by conservative means. These patients should be operated to prevent future episodes.

History of hemorrhage associated with pain was given in 104 cases or 24 per cent; 57 or 13 per cent had hemorrhage, pain, and vomiting; and 43 cases or ten and three tenths per cent had hemorrhage, pain, and obstruction.

Hemorrhage occurred as a symptom in 51 and six tenths per cent of the cases.

Obstruction as the only symptom was found in three cases. When associated with severe pain it was found to be present in 47 cases or 11.2 per cent. Obstruction, pain, and hemorrhage occurred in 43 or 10.3 per cent.

The indications for surgery are shown in Table #3.

TABLE #3

INDICATIONS FOR SURGERY

	DUODENAL		PYLORIC		GASTRIC		DUOD.&JEJ.		DUOD.&GAST.		JEJUNAL	
	M(213)	F(40)	M(7)	F(2)	M(65)	F(16)	M(15)	F(3)	M(28)	F(8)	M(15)	F(4)
Pain	40	3	2		14	4	4		9	2	6	1
Hemorrhage	5(2)*	1			2	1(1)*		1(1)*	1			1
Obstruction		1								1	1	
Pain and Hemorrhage	54(6)*	9(3)*	1		21(4)*	5	3		5	1(1)*	5	
Pain and Vomiting	31	9			17	2	2		2	1		1
Pain and Obstruction	27	8	2	1	2	1			4	2		
Pain Vomiting & Hemorrhage	30(3)*	2			7(2)*	3	5	1	6		3	
Pain Hemorrhage Obstruction	26(1)*	7(2)*	2	1	2		1		1	1		1

Total cases numbered 416. 394 were done as elective procedures.

*26 patients came in with acute massive hemorrhage of which 22 were done as an emergency procedure.

Immediate Mortality of Operated Cases

The overall mortality in the 416 operated cases was 19, or four and five tenths per cent. This includes seven cases of emergency operations for acute hemorrhage. Twelve deaths, two and nine tenths per cent, occurred as a result of elective procedures. Eight of the elective cases were classed as unavoidable deaths, and four were related to surgical complications.

Late Mortalities

In response to questionnaires, it was learned that 18 patients had expired since leaving the hospital. From the information received there were no deaths relating to operation for ulcer.

Age Incidence

The average age of Series I was found to be 46.4 years. The youngest patient was a male who was operated upon at the age of 14 for recurrent massive hemorrhage from a duodenal ulcer, which began at 10 years of age. The oldest patient in this group was a male 83.

In Series II, the agerage age was 53.0 years. The youngest patient was 17 years, and the oldest 84.

The average age of Series III was shown to be 54.3 years. The youngest was a male 23 years, and the oldest a male 75.

The following tables indicate the age distribution according to sex and age periods for Series I, II, and III.

TABLE #4

SERIES I

Age	Males	Females
10-20	1	0
21-30	17	2
31-40	65	8
41-50	62	15
51-60	42	10
61-70	20	4
71-80	5	0
81	1	1
	213	40

Age Distribution (Continued)

Average Age	Average Age
45.5	47.4
Youngest Age	Youngest Age
14	22
Oldest Age	Oldest Age
83	81

SERIES II

Age	Males	Females
10-20	1	0
21-30	2	2
31-40	9	3
41-50	14	7
51-60	18	2
61-70	12	2
71-80	1	1
81	1	0
	58	15

Average Age	Average Age
51.33	54.68
Youngest Age	Youngest Age
17	33
Oldest Age	Oldest Age
85	79

SERIES III

Age	Males	Females
10-20	0	0
21-30	2	0
31-40	9	2
41-50	20	2
51-60	19	8
61-70	17	5
71-80	5	1
81	0	0
	72	18

Average Age	Average Age
52.8	55.8
Youngest Age	Youngest Age
23	36
Oldest Age	Oldest Age
75	71

Duration of Symptoms

Since duodenal ulcer is a chronic recurrent disease, symptoms very often occur over a long period of time. In Series I, the average duration of symptoms was found to be 12.9 years.

The average duration of symptoms in Series II was 16.1 years.

In Series III, the average duration of symptoms was found to be 8.4 years.

Extent of Gastric Resections

In 1940 the extent of the resection was determined by measurement in square centimeters. Subsequently, this method of determining the amount of resection was discarded in favor of actual weight of the specimen. It was believed that a more accurate determination could thus be accomplished. The stomach specimen was weighed after excision of all attached tissues.

Table #5 indicates the weights of the resected specimens according to whether patients were obstructed or not.

In Series I the average weight of the resected specimen in the non-obstructed patients was 182.23 grams. The average weight in the obstructed cases was found to be considerably higher; namely, 246.14 grams.

The weights of the specimens in Series II were greater than in Series I, averaging 212.5 grams for the non-obstructed cases and 312.65 for the obstructed.

In Series III, the average weight of the specimen in the non-obstructed patient was 207.3 grams as compared to 285.4 grams in the obstructed.

TABLE #5

WEIGHTS OF RESECTED SPECIMENS

	No. of Cases	Average Wt. Res. Spec.	Minimum Wt. Res. Spec.	Maximum Wt. Res. Spec.
		SERIES I		
Obstructed	64	246.14 gms.	115 gms.	550 gms.
Non-Obstructed	171	182.23 gms.	95 gms.	390 gms.
		SERIES II		
Obstructed	12	312.66 gms.	172 gms.	460 gms.
Non-Obstructed	56	212,5 gms.	75 gms.	385 gms.
		SERIES III		
Obstructed	9	285.4 gms.	180 gms.	434 gms.
Non-Obstructed	74	207.3 gms.	95 gms.	425 gms.

TABLE #5 (Continued)

ACCORDING TO SEX

	No. of Cases	Average Wt. Res. Spec.	No. of Cases	Average Wt. Res. Spec.
		MALES		FEMALES
		SERIES I		
Obstructed	50	242.8 gms.	14	251.5 gms.
Non-Obstructed	148	186.1 gms.	23	156.91 gms.
		SERIES II		
Obstructed	5	266.6 gms.	7	345.7 gms.
Non-Obstructed	48	211.3 gms.	8	219.0 gms.
		SERIES III		
Obstructed	7	293.59 gms.	2	257.5 gms.
Non-Obstructed	59	212.5 gms.	15	186.0 gms.

GASTRIC ANALYSES

Preoperative Gastric Analyses

Preoperative gastric analyses were done as a routine procedure in this clinic. Gastric acidity was determined in the morning. Breakfast was withheld on all patients. A #14 duodenal tube with four perforations at the tip was introduced through the nose into the stomach and continuous suction was employed. Fasting specimens were obtained and five mg. (0.3 mg. Histamine base) were given in three consecutive doses at one half hour intervals to provide the stimulus for gastric secretion. Gastric acidity was determined by the usual colorimetric titration, using Topfer's reagent as the end point for free hydrochloric acid and phenolphthalein as the end point for the total acid. The maximum determination of the three periods was taken, and the average value of 71.5 degrees of free acid was found in Series I. In Series II, the maximum average value was 61.3 degrees, and in Series III, 49.7 degrees.

Postoperative Gastric Analyses

Table #6 shows the postoperative values obtained in the three series, according to sex and type of operation. A total of 229 patients had one or more determinations done.

In the Type III operation, achlorhydria was found in 85.6 per cent of the patients of Series I and II; and in 88 per cent in Series III.

TABLE #6

POSTOPERATIVE ACID DETERMINATIONS TRIPLE HISTAMINE STIMULATION

SERIES I

Males	Achlorhydric	1-10 Degrees	11-20 Degrees	21-30 Degrees	31 Degrees Plus
Type III	77	2	4	3	8
Type IV	4				1
Type IVA	23	1	2	1	1
Total	104	3	6	4	10
Females					
Type III	13			1	1
Type IV	1		1		
Type IVA	3				
Total	17		1	1	1
Total	121	3	7	5	11

Total Determinations 147

SERIES II

Males	Achlorhydric	1-10 Degrees	11-20 Degrees	21-30 Degrees	31 Degrees Plus
Type III	22				1
Type IVA	1				
Total	23				1
Females					
Type III	7				
Type IVA	1				
Total	8				
Total	31				1

Total Determinations 32

SERIES III

Males	Achlorhydric	1-10 Degrees	11-20 Degrees	21-30 Degrees	31 Degrees Plus
Type III	36	1	2	2	
Females					
Type III	8	1			
Total	44	2	2	2	

Total Determinations 50

The results of the postoperative acid determinations indicated that achlorhydria was more easily obtained in female patients. In Series I and II achlorhydria was found to be present in 90.9 per cent of the females as compared to 84.6 per cent in the males. No appreciable difference was noted in gastric ulcers (Series III) according to sex. Percentages for this group were as follows: males 87.8 per cent; females, 88.8 per cent.

In the Type IVA operation, achlorhydria was found in 84.8 per cent of the patients. Determinations in this operation also show achlorhydria more easily obtained in females. It was found to be 100 per cent for the females and 82.7 for the males.

The combined result of Types III and IVA in Series I and II show 85.4 per cent achlorhydria in all patients. Results further indicated that seven and four tenths per cent of the patients exhibited acid of 31 degrees or over. In Series III, no patients had acid determinations over 26 degrees.

In the Type IV operation, there were 71 per cent of the patients with achlorhydria found in Series I and II.

Evaluation of Present Status

Of the 416 cases investigated, 19 expired in the hospital, 18 expired since leaving the hospital, and 15 were lost for follow-up study.

Many factors were taken into consideration in evaluating the patients as to their present status of health. Each patient was questioned regarding his opinion as to how he was feeling; any symptoms he might have relating to digestion; such as pain, vomiting, hemorrhage, and food intolerance. He was also questioned regarding weight changes and ability to work. Patients that stated they had any difficulty were requested to return to the Out-Patient Department at an appointed time for clinical observation which included x-ray examination, hemoglobin, and other indicated studies. All other patients reported for regular periodic check-up examinations. The patients in the survey were evaluated on the basis of their statements in answer to the questionnaires, clinical observation, and personal interviews. The results of the cases studied were classified into four categories; namely, Excellent, Good, Satisfactory, and Poor.

The "Excellent" group comprised those patients who were entirely free of symptoms, ate regular diets as to quality and quantity, maintained normal nutritional status, and were engaged in regular employment.

The patients classified as "Good" enjoyed the same state of health as the "Excellent" group, but were placed in this group by reason of their terminology as to how they were feeling.

The "Satisfactory" group consisted of patients who stated they were doing well, but had occasional minor complaints, such as nausea, or diarrhea, or a feeling of fullness, or heartburn. Some patients were unable to eat as large a meal as they did prior to surgery. Included in this group were also the patients that had some food intolerance, and those that had mild symptoms of the so-called "dumping syndrome." Each patient that listed a complaint was observed clinically and personally interviewed. It was found that generally all the patients in this group were doing well and able to carry on their regular employment.

The patients that were considered in the "Poor" group were those who had either recurrent ulcerations; symptoms suggestive of recurrent ulcerations; or those that stated they were in poor health. The patients that stated they were in poor wealth revealed they had distress after meals; were restricted as to quantity and quality of food; were unable to maintain normal nutrition; and unable to work. No evidence of recurrent ulcerations was found in the latter.

All the patients evaluated have been followed for at least two years; some as long as seven.

The results of Series I and II accord-

ing to type of operation are combined as differentiated from Series III (gastric ulcer).

SERIES I AND II

Result	Type III Number	(231) Per cent	Type IVA Number	(55) Per cent	Type IV Number	(6) Per cent
Excellent	48	(20.7%)	14	(25.4%)	1	(16.6%)
Good	141	(61.0%)	30	(54.5%)	1	(16.6%)
Satisfactory	33	(14.2%)	10	(18.1%)	1	(16.6%)
Poor	9	(3.8%)	1	(1.8%)	3	(50.0%)

In the patients that had Type III operation in Series I and II, it was found that 82 per cent were doing very well. These patients were asymptomatic; observed no dietary restrictions; and were capable of carrying on regular employment.

Patients graded satisfactory totaled 14.2 per cent. They were all benefited by the operation and were enjoying fairly good health. None of the patients required medical care, except for minor complaints such as occasional bloating, diarrhea, heartburn, or some food intolerance. Some patients ate more frequently and others complained of symptoms of the so-called "Dumping Syndrome". These individuals were found to have adjusted to this difficulty by decreasing the size of the meals, eating more frequently, avoiding liquids with their meals, and allowing a short rest period following meals. All patients, with the exception of one, were capable of pursuing their regular work. The exceptional case was an individual that gave a poor work record over many years, and also was suffering from psychoneurosis.

There were nine cases, three and eight tenths per cent classified as "Poor" in the combined Series I and II who had Type III operation. Two patients, .86 per cent, were found to have recurrences. Two, .86 per cent, gave a history of postoperative hemorrhage. Five patients stated they were in poor health and had symptoms that did not permit their classification in the "Excellent", "Good," or "Satisfactory" groups.

The following is a brief summary of the nine patients who had Type III operation in Series I and II and were found to be unsatisfactory.

1. , male, age 49 with diagnosis of active duodenal and gastrojejunal ulcer. Patient had typical ulcer history of 27 years duration. Gastroenterostomy had been performed in 1937. Admitted 5-13-44, giving history of hematemasis, melena, and epigastric pain. Hemorrhage occurred on five occasions prior to admission during the previous year. He was operated on 5-15-44, at which time 75 per cent gastric resection was done. The weight of the resected specimen was 155 grams. Operative findings were as follows: gastrojejunal ulcer perforated onto colon and active duodenal ulcer.

   Patient was readmitted on 10-5-44 because of epigastric pain and hematemesis. He was transfused and treated conservatively. Diagnosis of probable recurrent ulcer was made.

   His third admission was for acute onset of paroxysmal auricular fibrillation and hypertension. At this time his ulcer symptoms were well controlled by medical management.

   Patient's fourth admission on 3-22-45 was for recurrence of epigastric pain and melena. He was again treated conservatively.

He was readmitted for the fifth time because of persistence of epigastric pain and recurrent hemorrhages. X-ray examination showed presence of stomal ulcer. Patient was re-operated on 5-1-45, at which time a jejunal ulcer was found, and 78 grams of stomach was removed.

Patient was last seen in the Out-Patient Department in May, 1947, at which time he was feeling well.

2. , a male, age 37 with diagnosis of obstructed duodenal ulcer. Patient had typical ulcer history for 15 years. Admitted to hospital 5-7-42 with history of recurrent attacks of vomiting and severe epigastric pain. X-ray examination showed duodenal ulcer with fairly high grade obstruction. He had free acid to 84 degrees. He was operated on 5-15-42. Weight of resected specimen was 220 grams. Operative findings were as follows: Large stomach with indurated pylorus; posterior wall duodenal ulcer perforated onto pancreas with considerable inflammatory reaction around entire duodenum.

Patient got along quite well until December, 1947, when he had recurrence of epigastric pain and lost weight. Physical examination was negative, except for Blood Pressure of 210/135. X-ray examination revealed what was believed to be a carcinoma of the residual gastric pouch. Because of this finding, he was re-operated on May 15, 1947. A stomal ulcer was found with considerable inflammatory reaction around the anastomosis. The proximal jejunal loop was somewhat longer than usual. An additional amount of stomach was excised and a short loop anastomosis was made.

3. male, age 34. Admitted to hospital 9-29-40 with diagnosis of chronic duodenal ulcer. Gave a typical ulcer history of ten years duration. Had surgical repair of perforated duodenal ulcer three years prior to admission. Patient had free acid to 90 degrees. Operated 9-30-40; weight of resected specimen was 157 grams. Operative findings were posterior wall duodenal ulcer perforated onto pancreas and an anterior wall ulcer in juxtaposition to pylorus. This necessitated closure of an open duodenum. Patient made an uneventful recovery.

Patient was achlorhydric on repeated examinations post-operatively. Three years after operation he began to have constant gnawing epigastric pain, and at the same time had hematemesis and tarry stools.

In answer to questionnaire, patient stated he continues to have epigastric pain, observes a restricted diet, eats small meals frequently, and has occasional vomiting. Although he has repeatedly been requested to return to clinic for examination, he had not done so. In view of patient's story, he was considered to have a possible recurrent ulcer. However, he was admitted 10-47 with a small bowel obstruction and operated upon. No ulcer was found at operation. X-ray examination was negative.

4. male, age 41, admitted 2-13-45 with diagnosis of chronic duodenal ulcer with obstruction. Gave typical ulcer history 13 years duration. He had three episodes of hematemesis and melena in year prior to admission. Also had epigastric pain and vomiting. Vomiting increased prior to admission. X-ray examination revealed presence of active duodenal ulcer with some obstruction. He had free acid to 40 degrees. Patient operated on 2-23-45. Weight of resected specimen was 210 grams. Operative findings were supraduodenal ulcer with marked scarring.

He got along very well postoperatively, returned to his farm work and had no digestive difficulty. Postoperative acid determination one year later showed free acid to 50 degrees.

On March 4, 1947, he began to have tarry stools and noted on-set of weakness. When he reported to the clinic one week later, x-ray examination and gastroscopy did not reveal presence of

any ulcer. He was treated conservatively.

On last visit to clinic July 15, 1947, he was asymptomatic. In view of the occurrence of hemorrhage the possibility of a recurrent ulcer must be considered.

5. , age 76, male admitted 9-26-44, with diagnosis of duodenal ulcer. Gave typical ulcer history 8 years duration. He had symptoms of epigastric pain, attacks of vomiting, and repeated episodes of hematemesis and melena. Had had surgical closure of perforated duodenal ulcer on 1-7-44. He had free acid to 65 degrees. Operated 10-9-44. Weight of resected specimen was 206 grams. Operative findings were duodenal ulcer just distal to the pylorus.

Patient continued to have difficulty postoperatively. He complained of frequent belching, bloating, and abdominal distress. He had been unable to eat a regular diet, and eats frequently.

X-ray examination done on 11-29-46 showed the presence of gastritis in the residual gastric pouch.

Patient was last seen in the clinic in May, 1947, at which time he was still complaining of above mentioned symptoms, although no clinical evidence was found. His difficulty is probably on basis of gastritis.

6. male, age 62 admitted 3-14-44. Gave typical ulcer history of three years duration. He complained of dull constant epigastric pain and weight loss. His preoperative acids were as high as 48 degrees. Patient was operated on 3-27-44. The weight of the resected specimen was 155 grams. Operative findings were posterior wall duodenal ulcer perforated onto pancreas.

Postoperatively, patient was unable to gain weight and had multiple complaints such as epigastric pain, poor appetite and marked weakness. X-ray examinations have been negative for presence of recurrent ulcer.

In 1946, patient was hospitalized on Neurology service because of pain in back and legs: parasthesias both arms and legs; tinnitus and decreased hearing in left ear. Diagnosis of primary lateral sclerosis was made.

On May 7, 1947, local doctor reported patient was too ill to return to clinic. X-ray examination at this time showed no evidence of ulcer.

7. female, age 42 admitted 3-21-45 with diagnosis of duodenal ulcer with obstruction. Had typical ulcer symptoms for ten years, consisting of epigastric pain, nausea, vomiting. Had hematemesis and melena on two occasions. She was operated on 4-2-45. Weight of the resected specimen was 235 grams. Operative findings were posterior wall duodenal ulcer perforated onto pancreas. The closure of the duodenum was difficult. Postoperative convalescence was complicated by development of a left subphrenic abscess which was drained.

Patient was readmitted to hospital on 10-6-45, at which time she had evidence of small bowel obstruction. At operation volvulus and gangrene of small bowel was found. This necessitated resection of four feet of small bowel.

She was last seen in February, 1947. Complained of pain after meals and bloating. She observed dietary restrictions and was limited to frequent small feedings. Her height is 5'5" and weight 101 pounds. She appears considerably underweight. X-ray examination shows a well functioning gastric resection with no evidence of recurrent ulceration.

Patient has many home difficulties and is extremely nervous. Psychotherapy has benefited her to some degree. It may be that in the event her emotional problems were alleviated, her general health would improve.

8. male, age 47 admitted 11-23-43 with diagnosis of duodenal ulcer. Had typical ulcer history of 13 years duration. He complained of epigastric pain

and occasional vomiting. His preoperative acids were as high as 54 degrees. He was operated on 12-1-43. Weight of the resected specimen was 165 grams. Operative findings were anterior wall duodenal ulcer.

Patient never reported for periodic check-ups. This might have been due to the fact that he resided in Nebraska. In answer to the questionnaire, he stated his health was poor, had frequent diarrhea and abdominal distress. He was unable to carry on his work. Repeated requests for patient to return for follow-up examination have not been answered.

9. , male, age 37 admitted 5-5-42 with diagnosis of duodenal ulcer with obstruction. Gave a typical ulcer history of nine years duration. He complained of epigastric distress, vomiting and melena. Fasting specimen showed 51 degrees of free acid. He was operated on 5-5-42. Resected specimen weighed 220 grams. Operative findings were anterior wall duodenal ulcer.

Patient had meningitis in 1946 and is suffering from postmeningeal effects.

He last reported to the surgery clinic 1-28-47 at which time he complained of abdominal distress and diarrhea. It was necessary for him to limit the size of meals, and eats frequently. He also complained of feeling weak and tired. X-ray examination showed no evidence of recurrence.

It is felt that because the patient had meningitis it might be a contributing factor as to his state of health at this time. Patient was considered an unsatisfactory result on the basis of his complaints.

RESULTS OF TYPE IV-A

Operation in Series I and II

There were 55 patients with Type IV-A operation followed in these 2 Series. Eighty per cent of these patients were enjoying very good health. Ten patients, 18 per cent of the cases, were classified "Satisfactory". One patient, one and eight tenths per cent of the cases followed, was classified a poor result.

Following is a summary of the one case that had Type IV-A operation in Series I and II and was classified "Poor".

male, age 58, had six hospital admissions. First admission was on 9-24-40, at which time he gave a history of peptic ulcer of 44 years duration. Symptoms began at 14 years of age. He had had six severe hemorrhages prior to admission to hospital on 9-24-40. In 1926 patient had a gastroenterostomy performed. Subsequent to this, he had three severe episodes of bleeding.

On 9-24-40, patient was hospitalized because of presence of weakness, tarry stools, and drop in hemoglobin. Diagnosis was bleeding peptic ulcer. He was treated conservatively with good results.

His second admission was on 8-5-42. At that time he was readmitted for consideration of surgical treatment for chronic duodenal ulcer and possible stomal ulcer. He had continued to have gastric hemorrhages since his last admission, the last hemorrhage being just prior to this admission. He had had little or no distress in his abdomen. Patient had been very cooperative, followed his diet well, and had taken very good care of himself. In view of the recurrent hemorrhages gastrectomy was the treatment of choice. Patient was operated 8-11-42. The operative findings consisted of the following: There was considerable induration in the neighborhood of the duodenum. Questionable gastrojejunal ulcer present. Because of the large amount of induration surrounding the duodenum, it was felt that in this case a Type IV-A operation should be done. The weight of the resected stomach was only 75 grams. However, the stomach was very small.

The third admission for treatment of a

colles' fracture involving the right wrist.

Patient was admitted for the fourth time on 10-1-45. At that time he complained of the occurrence of tarry stools beginning on 9-30-45.

This was preceded by three weeks' mild distress. It was believed this patient had a bleeding stomal ulcer. He was treated conservatively with continuous intragastric drip of milk and cream, and milk of trenisium. On conservative therapy, patient's bleeding stopped and he was discharged on 10-29-45.

He was readmitted for the fifth time on 4-22-46. Patient had been doing quite well on a medical regimen, but was admitted this time for treatment of nocturnal exertional dyspnea. Diagnosis at this time was primary hypertension and quiescent gastrojejunal ulcer.

His sixth admission was on 11-11-46. At that time patient complained of epigastric pain coming on late after meals and relieved by food and alkaline medications. On 11-13-46 patient was operated and bilateral supradiaphramatic Vagotomy was done. X-ray examination on 1-22-47 showed absence of any evidence of pathology except for rather slow emptying into the jejunum. Patient is apparently not having any difficulty and has resumed his occupation.

It has been stated by Lewisohn, Lahey Hinton and others that in order to achieve satisfactory results the duodenal ulcer must be removed. However, in the cases followed and studied here with IV-A operation where the ulcer was left in situ the results were gratifying, in that a low percentage of poor results was found. In the one poor case, one and eight tenths per cent of the patients in Series I and II with Type IV-A operation, it was found that the patient developed a recurrence because an inadequate resection was done.

The Type IV operation has proved to be an unsatisfactory procedure in the treatment of duodenal ulcer. This procedure was discontinued here early in 1941. Because this study is an evaluation of 416 consecutively operated cases from January 1, 1940 to July 1, 1945, the results of the IV operation were also included.

There were six patients followed. There were two additional patients operated in 1940 who had Type IV operation, and then were re-operated (Type III) within a six month period. They have been included in the patients followed that had Type III operation.

Of the six patients followed, three were doing well. The remaining three were found to be poor.

The following is a brief summary of the three cases who had Type IV operation:

1. , male, age 24 admitted 4-6-40 with diagnosis of duodenal ulcer. Gave typical ulcer history of 12 years duration. He complained of severe epigastric pain. Patient was operated on 4-11-40. Specimen measured 244 square centimeters. Operative findings were anterior wall duodenal ulcer with a good deal of surrounding induration.

   Postoperatively patient did well and was inducted in the Army March 21, 1941. He received medical discharge on October 22, 1943 because of marginal ulcer. Surgery was recommended by the Veterans Administration. Patient has been seen in this clinic where x-ray examinations reveals a G.J. ulcer. Plans are underway to re-operate this patient.

2. , female, age 46, admitted with typical history of duodenal ulcer on 5-24-40. She previously had surgical repair perforated ulcer in 1920, and gastroenterostomy in 1926. Patient continued to have intermittent periods of epigastric pain. In February 1940, she had severe hemorrhage and onset of severe epigastric pain. Operated 5-24-40, Type IV operation. Operative findings: Anterior and posterior wall duodenal ulcer. Weight resected specimen not given (Specimen greater curvature 18 centi-

meters, less seven centimeters proximal line of resection 4.5--distal 6.5)

Patient got along fairly well but had episodes of severe epigastric pain associated with ingestion of fried and fatty foods. On 9-26-41, had cholecystectomy done. Diagnosis: chronic cholecystitis and cholelithiasis. She felt fairly well subsequently until February, 1946, when she began to have severe epigastric pain, melena, extreme weakness. Again in summer of 1946 had melena and a repetition of this in November, 1946.

Readmitted January 12, 1946. Reoperated January 13, 1947, Type III operation. Operative findings: Long proximal loop 45 centimeters plus ten centimeters of entero-anastomosis. Distance from proximal side entero-anastomosis .15 centimerers. Total length 70 centimeters from ligament of Treitz to gastrojejunal anastomosis. Diagnosis: Gastrojejunal ulcer.

3. , male, age 55, admitted April 23, 1940 with typical history of duodenal ulcer of 30 years duration. His symptoms were epigastric pain, bloating, weight loss. Operated on 4-27-40. Operative findings: Anterior wall duodenal ulcer with considerable induration. Weight of resected specimen not given.

Patient got along fairly well for about a year, and then began to have gastric pain, bloating, and had to restrict his diet. He returned to clinic in July, 1947, complaining of above symptoms.

He was readmitted 7-19-47 and reoperated 7-28-47, at which time the antral segment was excised. Patient previously had had a long proximal loop and an entero-anastomosis. This was excised with a segment of stomach and a short proximal loop was made.

RESULTS OF SERIES III

According to Type of Operation

All the patients in this series were treated by Type III operation because handling of the duodenum presents no technical problem. All the patients had gastric ulcers.

Of the 72 cases followed, 55 or 76 per cent of the patients were feeling very well; 15 or 21% were classified satisfactory; and two or two and seven tenths per cent were poor.

No recurrences were found in this series.

The following is a brief summary of the two cases in this series that were unsatisfactory.

1. male, age 58, admitted to hospital 6-2-43. He had typical ulcer history for eight years. Symptoms consisted of epigastric pain, nausea, and vomiting. Patient had been performing gastric lavage for a period of eight weeks. He was admitted in a state of alkalosis with extrarenal uremia. Patient was very malnourished. Operated on 6-14-43 after his alkalosis had been corrected and B.U.N. had returned to normal. Resected specimen weighed 360 grams. Operative findings were as follows: Prepyloric ulcer and an extralumenal cecatricial obstruction of stomach and duodenum.

Postoperatively, there was some improvement but patient has never done too well. He has occasional nausea and vomiting, must eat frequent small meals, and avoids many foods.

2. , male, age 47 admitted to hospital on 12-9-40 with five week's history of acute onset of epigastric pain, weakness and melena. The postoperative diagnosis was probable carcinoma of the stomach. Operated on 12-16-40. Weight of resected specimen was 250 grams. Operative findings: Benign gastric ulcer mid portion lesser curvature. Size of ulcer was two and one half by one and one half centimeters.

Postoperatively, patient did fairly well for four years. In June, 1945, he began to have more difficulty. Was underweight, complained of

distress after meals, nausea, observed many dietary restrictions and ate frequent small meals Patient has been requested to return to clinic by letter and telephone in July, 1947, but patient fears further surgery, is reluctant to return.

Postoperative Weight Changes

There were a significant number of patients that had difficulty maintaining what would be considered normal weight. Although the inability to gain weight in patients who have had subtotal gastric resections is not uncommon, symptoms arising from this are rare.

Table #7 indicates the weight changes that occurred in Series I, II, and III.

TABLE #7

POSTOPERATIVE WEIGHT CHANGES

Series	No. Gained Wt.	Average Wt. Gained	No. Lost Wt.	Av. Wt. Lost	No Change
I	112	14 lbs.	95	11.9 lbs.	16
II	42	12 lbs.	13	12 lbs.	7
III	47	14.6 lbs.	17	9.2 lbs.	3
	201* 57%	13.5 lbs.	125* 35.5%	11.0 lbs.	26* 7.3%

* 57% gained weight
35.5% lost weight
7.3% had no change of weight

Postoperative Hemoglobin Values

The following table #8 indicates 347 post-operative hemoglobin values for patients according to sex. It also shows the result as to number of years followed.

It was found that two years following surgery, the males showed a normal hemoglobin in 92.6 per cent of the cases as compared to 70 per cent in the females.

Three years following surgery 83.4 per cent males showed normal hemoglobins, whereas the females totaled 57.8%.

Normal hemoglobins were found in the males in 95 per cent of the cases as contrasted by 75 per cent of the females four years following surgery.

Five years following surgery, the males had normal hemoglobins in 90.7 per cent of the cases as compared to 54.5 per cent in the females.

Ninety five per cent males and only 25 per cent females had normal hemoglobins six years following surgery.

Seven years following surgery, normal hemoglobins were found in 100 per cent of the males, and 83 per cent of the females.

There is a marked difference in hemoglobin values between males and females as shown through the entire seven year follow-up. Males appeared more capable of maintaining normal hemoglobins.

In the patients who were not bleeding from a recurrent ulcer, only one case was encountered of severe anemia which did not respond to iron therapy. This was the case of a female who had hemoglobin value of 6.5 grams. The

cause of anemia could not be determined because of patient's refusal to have further studies done.

TABLE #8

POSTOPERATIVE HEMOGLOBIN VALUES

	2 Year		3 Year		4 Year		5 Year		6 Year		7 Year	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Anemia	2	3	4	3	1	1	2	2	1	0	0	0
Borderline	4	3	4	5	1	1	3	3	0	3	0	1
Normal	76	14	41	11	38	6	49	6	19	1	34	5
Total	82	20	49	19	40	8	54	11	20	4	34	6
Total Cases	102		68		48		65		24		40	

Normal - Hemoglobin greater than 12.5 grams values as high as 17 grams.

Borderline - Hemoglobin greater than 11 grams but less than 12.5 grams.

Anemia - Hemoglobin value less than 11 grams.

POSTOPERATIVE GASTRO-INTESTINAL FUNCTION

Postoperative Digestive Difficulties

Table #9 indicates the number of patients that had any digestive difficulty as reported by years.

"Multiple complaints" refers to those patients that had more than one digestive complaint. "None" refers to the patients that had no complaints, except for single minor complaints as listed.

There were 364 patients followed in Series I, II, III. Three hundred twelve or 86 per cent of the patients had no digestive difficulty whatever. Minor symptoms were found in 37 or ten per cent of the cases. Fifteen patients or four per cent of the cases, had multiple complaints.

TABLE #9

POSTOPERATIVE DIGESTIVE DIFFICULTY

ALL SERIES

Year	Total Cases	Dead	No Record	Followed	Multiple Digestive	None	(	(Nausea	Bloat.	Heartburn	Diar.	Pain	Dump.	Vomit
1940	63	7	5	51	5	46	(		1		1			
1941	65	10	5	50		50	(		1	1				
1942	76	4	2	70	1	69	(		5				4	1
1943	69	4	2	63	3	60	EXCEPT	1	1		1		4	
1944	81	9		72	2	70		1	2		1		2	
1945	62	3	1	58	4	54	(	4		1	1	2	1	
TOTAL	416	37	15	364	15	349	(	6	10	2	4	2	11	1

TABLE #10

CASES OF "DUMPING SYNDROME"

SERIES I

Name, Age Sex	Diagnosis	Operation Date	Weight Resected Specimen	Preop. Wt.	Present Wt.	Symptoms
( ) 64 (M)	Duodenal Ulcer with Obstruct.	IVA 2-2-42	215 gms.	125	140	Feels weak and exhausted for about 1 hour after meals - mainly after heavy meals.
( ) 57 (F)	Duodenal Ulcer with Obstruct.	III 4-1-42	285 gms.	106	103	Feels exhaused after meals - rest for ½ hour. Has slight epigastric distress.
( ) 36 (M)	Duodenal Ulcer	III 1-19-43	165 gms.	190	193	Perspires a great deal after meals for ½ hour.
( ) 49 (M)	Duodenal Ulcer	III 10-25-43	120 gms.	145	139	Weakness and sweating after some meals relieved by lying down.
( ) 43 (F)	Duodenal Ulcer	III 9-13-43	120 gms.	125	118	Weakness, sweating, nausea for ½ hour after meals relieved by lying down. Does not occur after every meal.
( ) 61 (M)	Duodenal Ulcer with hemorrhage & Obstruction.	III 11-28-44	210 gms.	130	115	Following meals has sensation of fulness, feels weak and drowsy and must lie down for 15 minutes.
			SERIES II			
( ) 23 (M)	Gastro-jejunal stomal ulcer - D.U.	III 11-15-43	285 gms.	139	147	Sick feeling after meals, weakness, palpitation and breaks out in cold sweat lasts ½ hr. to 1 hr. after after meals.
( ) (M) 52	Duodenal & Gastric Ulcer	III 3-20-44	172 gms.	130	133	Becomes sleepy after evening meal-feels somewhat faint and dyspneic-disappears on lying down for ½ hour.
( ) 56 (M)	Gastro-jejunal Ulcer	III 4-11-45		135	144	Has nausea, weakness, flushing of face, palpitation, feels faint, perspires freely for 15 min. to ½ hr. after meals.
			SERIES III			
( ) 59 (M)	Gastric Ulcer	III 4-13-42	425 gms.	182	170	Weakness and sweating after meals relieved by lying down - duration ½ to 1 hour.
( ) 46 (M)	Gastric	III 7-17-42	200 gms.	140	160	Feels weak and tired after some meals. Becoming less severe and less frequent.

A definite pattern of unpleasant symptoms has been noted in some of the gastrectomized patients. These symptoms occur during the progress of eating, immediately after, or within one half hour after finishing the meal. The patient becomes distended and has a sensation of fullness in the epigastric region. A feeling of an unpleasant sensation of generalized warmth occurs, and with this the occurrence of cold sweat mainly on the forehead. Some of the patients complain of weakness or fatigue, others feel very sleepy. There is an associated cardiac palpitation, and the patient may appear very pale. To the previously described symptoms has been given the name "Dumping Syndrome". The name has been derived from the fact that it was believed the rapid dumping of food into jejunum and resulting distention was responsible for this effect.

Eleven patients, two and six tenths per cent, complained of symptoms commonly called the "Dumping Syndrome." In no case were the symptoms of a severe degree, but rather could be classified as moderate or mild in nature. With the exception of one patient (.) all the patients were able to maintain normal nutrition. These patients have had to make some adjustments in their dietary intake and usual routine. They found that decreasing the size of their meals, avoiding liquids with their meals, and eating more frequently diminished their symptoms. Others learned that resting immediately after eating would tide them over the period of discomfort.

Table #10 indicates the cases of "Dumping Syndrome" in Series I, II, and III.

Postoperative Quantitative Food Intake

Table #11 shows the number of patients followed for each year and their ability to observe normal eating habits with regard to quantity and regularity for Series I, II, and III.

The term "3 regular meals" implies that the patient eats regularly and his intake is the average amount of normals. The designation "3 regular meals plus" refers to the patient who eats at a regular time, whose intake is slightly smaller than normal amounts, and includes supplemental feedings between meals. "Frequent small feedings" indicates that the patient is unable to take a normal size meal and therefore must eat frequently and of smaller amounts.

There was a total of 364 patients followed with regard to quantitative food intake. Two hundred forty-four patients, or 67 per cent of the cases were enjoying three regular meals. Ninety-five patients, or 26 per cent of the cases, ate three regular meals plus supplemental feedings. Twenty-five patients, or six and five tenths per cent were restricted as to the amount of food they could eat at one time and also were eating frequently.

Postoperative Food Intolerance

Table #12 indicates the number of patients with food intolerences by years for three series.

There were 364 patients followed. The majority of patients followed in the study, 60.8 per cent, were able to eat all foods without restrictions. Thirty-four and seven tenths per cent of the patients were able to eat a regular diet, but had difficulty with single foods. Four and four tenths per cent observed dietary restrictions for multiple foods.

It was found that a considerable number of patients were not drinking milk since their operation. The question arose as to whether this was due to an intolerance to milk, or merely a dislike because of long usage in medical regimen prior to surgery. Symptoms of intolerance to milk were nausea, feeling of fullness, upper abdominal distress, and vomiting in some cases.

Of the 364 patients followed in the three series, 93 patients reported they did not drink milk postoperatively. Twenty-eight patients stated they did not drink milk preoperatively and postoperatively. A definite aversion to

TABLE #11

POSTOPERATIVE QUANTITATIVE FOOD INTAKE

MALES AND FEMALES COMBINED					QUANTITATIVE FOOD INTAKE			MILK			
								Pre-op		Post-op	
Year	Total Cases	Dead	No Record	Followed	3 Reg. Meals	3 Reg. Meals /	FSF	YES	NO	YES	NO
1940	63	7	5	51	30	14	7	45	6	37	14
1941	65	10	5	50	36	14		45	5	36	14
1942	76	4	2	70	52	13	5	63	7	56	24
1943	69	4	2	63	38	18	7	57	6	41	22
1944	81	9		72	48	21	3	71	1	43	29
1945	62	3	1	58	40	15	3	54	4	40	18
TOTAL	416	37	15	364	244	95	25	336	28	243	121

TABLE #12

POSTOPERATIVE FOOD TOLERANCE

ALL SERIES

Year	Total Cases	Dead	No Record	Followed	Restricted	All	EXCEPT	Milk	Choc.	Sweets	Spicy Foods	Fried Foods
1940	63	7	5	51	6	45		2		8	1	
1941	65	10	5	50	2	48			3	17	1	
1942	76	4	2	70	3	67		7		14		
1943	69	4	2	63	5	58		11		7		1
1944	81	9		72	3	69		10	3	9		2
1945	62	3	1	58	2	56		7		6		
TOTAL	416	37	15	364	21	343		37	6	61	2	3

milk was noted in 56 patients, or 16.9%. These individuals reported no distress from milk but had acquired a distaste for it from long usage as part of the medical regimen. The remaining 37, 11 per cent, did not drink milk postoperatively because they were intolerant to it.

Eleven patients were studies who stated they were intolerant to milk. A Rehfuss duodenal tube was passed into the stomach and positioned under fluoroscope, so that the end lay just over the stomal opening. Two hundred cc. of three and one half per cent butter fat milk was placed in an ordinary intravenous flask which was completely covered to prevent the patient from knowing what was being administered. This was run in rapidly to simulate the patient's drinking milk under ordinary circumstances.

Table #13 shows patients' reaction to milk and cream and emptying time of the stomach after administering milk and cream.

One patient noted slight transitory upper abdominal distress. Another complained of nausea, weakness, and had marked diphoresis. His difficulty lasted for about fifteen minutes and gradually disappeared. This is the only case observed here where symptoms elicited were comparable to those of "Dumping Syndrome".

In nine patients no distress was noted during the period of administration and for one half hour following. It would appear that the psychological factor might play a part in patients who were intolerant to milk.

Four patients were given fifty cc. of thirty-five per cent butter fat cream in the same manner as above described for milk, and no distress was noted in any case.

In five patients there was moderate increase in emptying time of the stomach after the administration of milk.

In the three of the four patients who were given cream, there was an appreciable delay in the emptying time of the stomach.

Carbohydrates particularly in form of desserts was most common food listed with which patients had difficulty. Sweets were not tolerated in 61 or 16.7 per cent of the patients.

Eleven patients were investigated for intolerance to sweets by putting 50 grams of glucose and 200 cc. of water into the stomach. This was administered in the same manner as was done with milk. Blood sugars were taken for fasting values at 15 minute intervals for the first hour; then at one half hour intervals for the remainder of the two and one half period. Only one patient complained of any distress. He had slight nausea during the first fifteen minutes of the test.

The blood sugar values in the 11 patients show a rapid and often an abnormally high increase. They also show abnormally low values at two to two and one half hours. The time of maximal increase of blood sugar was found to be at thirty minutes in seven of the cases; forty-five minutes in three cases; and one hour in one case.

Two cases showed increase over 210 mg. per cent during first fifteen minutes. In six of the cases the blood sugar was markedly increased.

In the hypoglycemic period there were four patients whose blood sugars were 66 mg. per cent or lower. One had blood sugar value of 39 mg. per cent at one and one half hour period without experiencing any symptoms. No patients with low blood sugar values had symptoms.

From this small series of patients, it appears that there is no relation between blood sugar values and the occurrence of symptoms. No distress occurred in these patients from the ingestion of a hypertonic glucose solution although they claimed they were distressed by carbohydrates.

Table #14 shows the blood sugar values obtained.

TABLE #13

TOLERANCE TO MILK AND CREAM

Name Sex	Diagnosis	Weight Resected Specimen	Reaction Milk	Control* Emptying Time	After Milk	Reaction Cream	Emptying Time After Cream
( ) F	Duodenal Ulcer	195 gms.	none	12 min.	25 min.		
( ) M	Duodenal Ulcer	145 gms.	none	15 min.	18 min.	none	41 min.
( ) M	Duodenal Ulcer	175 gms.	Sl. transitory upper abd. distress.	10 min.	18 min.		
( ) M	Duodenal Ulcer & Gastric	305 gms.	none	12 min.	16 min.	none	20 min.
( ) M	Duodenal Ulcer	301 sq. cm.	none	10 min.	15 min.		
( ) M	Gastric Ulcer	290 sq. cm.	none	14 min.	14 min.	none	30 min.
( ) F	Duodenal Ulcer	150 gms.	none	10 min.	15 min.		
( ) M	Duodenal Ulcer	185 gms.	none	10 min.	14 min.		
( ) M	Duodenal Ulcer	220 gms.	none	11 min.	23 min.		
( ) F	Duodenal Ulcer	235 gms.	none	10 min.	10 min.		
( ) M	Gastro-jejunal	No wt.	Began to perspire complained of feeling weak, tachycardia, nauseated.	3 min.	25 min.	none	54 min.

* Thin Barium Mixture

150 c.c. H_2O

70 gms. Barium

TABLE #14

GLUCOSE TOLERANCE TEST

Name Sex	Diagnosis	Reaction to Glucose	Fasting	15 Min.	30 Min.	45 Min.	1 Hr.	1½ Hr.	2Hr.	2½Hr.
( ) M	Duodenal Ulcer	None	80	179	188	151	143	124	75	56
( ) F	Duodenal Ulcer	None	133		364		263	174		148
( ) M	Duodenal Ulcer	Slight nausea 15 min.	65	151	192	120	90	39		66
( ) M	Duodenal Ulcer	None	95	171	180	133	130	89	71	
( ) F	Duodenal Ulcer	None	71	208	273	289	200	130	87	
( ) M	Duodenal Ulcer	None	61	105	115	119	122	40	44	
( ) M	Duodenal Ulcer	None	80	149	158	152	84	44		
( ) F	Gastric	None	110	235	303	227	118		104	102
( ) M	Duodenal Ulcer	None	116	220	258		289	136	167	
( ) M	Duodenal Ulcer	None	85	167	214	238	187	105	77	66
( ) M	Duodenal Ulcer	None	105		283	149	83	79	77	

Postoperative Ability to Work

It has been stated that the patient should be capable of carrying on regular employment to warrant classification of a good result. In the study, 341 cases were followed as to their ability to work.

The type of work was divided into heavy, medium, and light for both sexes. These designations were set up according to work usually done by men and women. Males classified as doing heavy work were farmers, machinists, common laborers and men whose occupations required expenditure of considerable physical exertion. Females employed in heavy manual labor outside of home, particularly heavy farm chores were placed in "heavy type" classification.

Men employed in a managing or executive capacity, clerks in stores, or those whose jobs demanded considerable physical movement were classed in "medium type" work. Women doing their own housework or working as light domestics were also classified "medium".

Men in desk positions, white collar workers, and those doing sedentary work were classified as "light". Women doing light household tasks, secretaries, and office personnel were classified as doing "light" work.

Of the 341 cases followed, 283 were males and 58 females.

The following Table #15 indicates the total patients followed in the three Series according to their ability to work, and the type of work they are doing.

TABLE #15

	Males (283)		Females (58)	
	No.	Percent	No.	Percent
Heavy Work	155	54.7	6	10.3
Medium Work	60	21.2	35	60.3
Light Type Work	44	15.1	16	27.7
Not Working	24	8.4	1	1.7

Of the 24 males not working, ten were unable to work because of difficulties relating to their postoperative conditions. In the remaining 14 patients were included patients unable to work because of a condition not related to their operation and patients who were retired and not working.

The one female reported above unable to work had a recurrent ulcer.

It was found that the majority of patients who were doing light work returned to their employment in six to seven weeks. Those doing medium type work returned in approximately two to two and one half months. Wtih the exception of a few cases, the majority of patients returned to heavy type work in three months.

Summary

1. Four hundred sixteen consecutively operated cases of peptic ulcer were considered in this investigation. It included all the cases treated from January 1, 1940 to July 1, 1945. Patients were followed by questionnaire and clinical examination in the Out-Patient Department. Investigation covered the state of health of the patient postoperatively. All the patients evaluated were followed for at least two years, and some as long as seven years.

2. The 416 cases were divided according to location of lesion: duodenal alone (Series I); gastrojejunal duodenal with gastrojejunal, duodenal with gastric (Series II; and gastric (Series III). This division of cases was made so that duodenal ulcer could be considered apart from gastric ulcer since they represent different problems.

3. In the complete follow-up there were 343 males and 73 females indicating a ratio of three and one-half to one.

4. Pain occurred as a symptom in 96 per cent of the cases. Hemorrhage occurred as a symptom in 51.6 per cent,

and obstruction occurred in 19.4 per cent.

5. The overall mortality of the cases operated was four and five tenths per cent. This included the seven cases of emergency operations for acute hemorrhage. Mortality for elective surgery was two and nine tenths per cent.

6. The average age found in each of the Series was as follows: Series I, 46.4 years; Series II, 53.0 years; and Series III, 54.3 years.

7. The average duration of symptoms shown in each of the Series was as follows: Series I, 12.9 years; Series II, 16.1 years; and Series III, 8.4 years.

8. In Series I, the average weight of the resected specimen in non-obstructed patients was 182.23 grams; the average weight of specimen for obstructed patients was 246.14 grams.
In Series II, the average weight of resected specimen for non-obstructed patients was 212.5 grams; and for obstructed 312.66 grams.
In Series III, the average weight of resected specimen for non-obstructed patients was 207.3 grams as compared to the obstructed of 285.4 grams.

9. Achlorhydria was found in Type III operation in Series I and II as follows: 85.6% of cases were achlorhydric; 85 per cent males, and 90 per cent females.
In Series III, where Type III operation is always used, achlorhyrdia was found in 88 per cent of the cases; 88 per cent males, and 89 per cent females.
Achlorhydria was found in Type IV-A operation in Series I and II as follows: 84.8 per cent of cases were achlorhydric; 82.7 per cent males, and 100 per cent females;
In Type IV operation, achlorhydria was found in 71 per cent of the cases.
It was shown the achlorhydria was more easily obtained in females than in males.
Eighty-seven per cent of the patients who had gastric analyses postoperatively with triple histamine were achlorhydric.

10. Patients were classified postoperatively into four categories; namely, "Excellent," "Good", "Satisfactory", and "Poor." A favorable result was shown in 95.2 per cent of the males and 96 per cent females in Series I and II. In Series III, a favorable outcome was shown in 96.6 per cent of the males and 100 per cent of the females.

Patients who had Type III operation in Series I and II revealed a favorable result in 95.9 per cent of the cases. The unsatisfactory result in these Series was three and eight tenths per cent, which included recurrence of .86 per cent and postoperative hemorrhage of .86 per cent.

In Series III, favorable result was obtained in 97 per cent of the patients. There were no recurrent ulceration in this Series.

In patients who had Type IV-A, a favorable result occurred in 98.2 per cent of the cases. The unsatisfactory result of one and eight tenths included one recurrent ulceration or one and eight tenths per cent.

Fifty per cent of the patients who had Type IV operation were unsatisfactory. There were only six cases followed with this type operation.

11. Of the 51 patients followed 7 years, hemoglobin values were obtained in 40 cases. Normal hemoglobin was noted in 100 per cent of the males and 83 per cent of the females. Only one case of severe anemia which did not respond to iron therapy was encountered.

12. Fifty per cent of the patients gained weight. In seven and three tenths per cent no change was noted. Thirty-five and five tenths per cent lost weight.

13. There was a total of 364 patients followed with regard to postoperative digestive difficulties. Three

hundred twelve, 86 per cent, had no digestive difficulty whatever. Minor symptoms were found in 37, or 10 per cent; and 15, four per cent, had multiple complaints.

14. Three hundred sixty-four patients followed with regard to quantitative food intake. Two hundred forty-four patients, 67 per cent, enjoyed three regular meals; 95 patients, 26 per cent, ate three regular meals plus; and 25 patients, six and five tenths per cent, had frequent small feedings.

15. Of the 364 patients followed regarding food intolerance it was found that 60.8 per cent were able to eat all foods without restriction; 34.7 per cent were able to eat regular diet, but had difficulty with a single food; and four and four tenths per cent observed dietary restrictions for multiple foods.

Ninety-three patients reported they did not drink milk postoperatively. Sixteen and nine tenths per cent did not drink it because of distaste for it because of long usage as part of their medical regimen. Eleven per cent did not drink milk because they were intolerant to it.

In 11 patients studied for intolerance to milk one patient had slight distress, and another had symptoms quite typical of the "dumping'syndrome" following the administration of milk.

In a small series of cases studied for intolerance to cream no distress was noted.

It would appear that some intolerance to milk and cream might be explained on a psychological basis.

Intolerance to sweets was noted in 16.7 per cent of the cases. Eleven patients were studied for intolerance to sweets by administration of glucose into the stomach, and the simultaneous determination of blood sugars. Blood sugar obtained showed rapid initial rise within the first 30 minutes. Abnormally low values were obtained at two to two and one half hours.

Two and six tenths per cent of the patients complained of symptoms of the so-called "dumping syndrome." In no case were the symptoms of a severe degree.

16. On investigation of the work record of the patients it was found that 90 per cent of the males were engaged in regular employment at the present time; four and nine tenths per cent were not working because of a condition not related to their operation or were retired; and three and five tenths per cent were unable to work because of difficulties relating to postoperative condition.

Ninety eight and three tenths per cent females were engaged in regular employment at the present time; and one and seven tenths per cent was not working because of recurrent ulcer.

Conclusion

It appears from this follow-up investigation and study that the Type III and IV-A operation indicate a gratifying number of favorable results. The majority of patients have been freed from their disease; are not threatened with constant danger of complications; and are restored to a more normal way of living. They are able to enjoy life without observing dietary restrictions and able to resume gainful and useful employment.

There were a small number of patients, who although benefited by the operation and were enjoying fairly good health, reported minor difficulties. None of these difficulties interfered with the patient's way of living, and were not severe enough to warrant concern. All of these patients were found to have made a very good adjustment.

The operation as practiced here for peptic ulcer has resulted in only

three recurrences, a recurrence rate of less than one per cent. The mortality in elective operations was two and nine tenths per cent.

Subtotal gastric resection has been shown at this time to be an eminently satisfactory method of affording a very favorable result. Until other means of treatment are developed which will produce a more satisfactory result, subtotal gastrectomy will continue to be the best aproach to the problem of peptic ulcer.

III GOSSIP

The 26th U.S. Army General Hospital with a professional staff selected from the faculty of the University of Minnesota and many nurses from our school made an outstanding record in World War II. Its story has been compiled in history form for publication. More than 600 illustrations are used to supplement the text. To cover publication costs, advance subscriptions are being taken at $15.00 per copy. Send a check for this amount to Dr. R. F. Erickson, 816 La Salle Building, Minneapolis, Minnesota. Practically everyone who was with the unit has sent in an order. It now remains for staff members who were not privileged to serve with the hospital and other friends of the group to do their part....Presentation last week of Achylia Pancreatica by Dr. Charles D. May, newest member of the Pediatrics staff, was well received. One of the largest crowds of the year attended and found the program of great interest. Dr. May who is a native of St. Louis had his training in the east and a staff connection in Boston before coming here. We welcome Dr. May to our group and trust that he will find here an opportunity for continued development and service....Dr. Irvine McQuarrie writes from Japan that he has been kept busy with studies of reports on medical education and medical service and with visits to medical schools, dental schools, hospitals and research institutions. For recreation he has made trips into the country to observe the character of the people in their postwar phase. He is impressed with the work with which the Army of Occupation is doing. He visited the War Crimes trials and saw the celebrated Tojo and the other defendants. Among others, he spoke of meeting Annie Laurie Baker, Minnesota Medical Social Worker, who has done such an outstanding job in the international field, He also saw Captain Wayne LeBien who runs a large dispensary for U.S. dependents and children. Dr. McQuarrie is enjoying his experience immensely and wishes to be remembered to his friends.....Hospital crowding continues at the University of Minnesota and every day one sees ample justification for the Mayo Memorial unit. It is unfortunate that building costs have kept it back for we would be well on our way at this time if prices had not gone up....The Veterans Hospital Service continues to maintain its high level. It is difficult for anyone who knew the old veterans to appreciate the change which has taken place. The staff is in the younger age group. There are no interns or undergraduate students. Each department is stimulated by the desire to do an outstanding job and the administration is behind them. Visiting clinicians invariably come back singing their praises. Physicians of the state should take time off and visit the hospital and learn first-hand what is being done....The Cancer Detection Center will be located in the temporary building west of the Out-Patient Department or the "outdoor" as our Canadian members call it. It will operate five days a week and will be prepared to handle ten new patients daily. Only those individuals who are apparently free of any disease will be admitted as the purpose of the project is to examine the apparently well for possible malignancy or other disease. A definite procedure has been worked out so that if certain abnormal signs are detected, further studies will be made. Patients will be admitted directly or by referral from physicians. No treatments will be given and anything abnormal found will be referred to the physician named by the patient as the one whom he wishes the information sent. Dr. David State will be in active charge. Support for the project is coming from the Minnesota Department of Health and the Minnesota Division, American Cancer Society. Similar projects have been developed in other states. Greatest confusion is mixing the idea with Cancer Clinics where the diagnosis and treatment of cancer is carried out.....I was a hospital patient last week. It is interesting to see the operation of our institution from the standpoint of a patient. All that I can say is - that if I am disabled at any future date - please bring me here. I have never received such fine consideration in any hospital since the last time I was here.

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