

GENERAL STAFF MEETING  
MINNESOTA GENERAL HOSPITAL  
UNIVERSITY OF MINNESOTA

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CASE REPORTCARCINOMA OF SIGMOID COLON.  
PERFORATED COLON.

Path. Koucky.

Case is white female, 72 years of age, admitted to Minnesota General Hospital 1-27-33, expired 2-12-33 (16 days).

11- -32 - Nocturia and dysuria. Urine - orange colored.

Diarrhoea

1-2-33 - After meal, suddenly nauseated and vomited. Vomitus consisted of food previously eaten (no blood). Diarrhoea began. Stools watery and black.

1-3-33 - Diarrhoea persists. Stools still black.

Pain

1-4-33 - Vomiting ceases. Diarrhoea persists for 3 more days. Approximately at same time, crampy, intermittent pain localized in lower abdomen.

1-15-33 - Crampy pain continues and progressively becomes worse. Diarrhoea still present. Stools small and described as pencil shaped.

Distended

1-26-33 - Lost 18 lbs. Placed herself on liquid diet. Bowel movements did not cease entirely. Persistence of crampy, intermittent pain in lower abdomen. Abdomen became distended. Distention fluctuates in degree from time to time.

Past history:

Unreliable because unable to give adequate history and relatives not sufficiently well informed. Apparently, had some attacks which suggest cerebral accident. Two attacks, first was disturbance of vision and second loss of taste (persisted following attack). (Aug. 1932).

Admitted

1-27-33 - Physical Examination: Mouth - dry. Neck - large adenoma of thyroid (nodular). Chest - dropped beats of heart; blood pressure 126/78. Abdomen - distended, visible peristalsis (apparently large bowel), distention most marked in lower part of abdomen, tenderness; intestinal noises at times seem to be ex-

aggerated. Rectal - several (including referring physician) felt mass about 5 inches from anal orifice. This, however, did not appear to be within bowel but outside.

Laboratory

Urine - 1+ albumen, negative sediment. Blood - Hb. 70%, rbc's 3,500,000, wbc's 4,500. X-ray of chest and abdomen - plate of abdomen shows considerable distention of large bowel on right side of abdomen and overlying spine. Some small bowel distention present. Sometime later bowel is shown distended on left side also. Appears to be all large bowel. Small bowel distention on this film also, although it is not as marked as large bowel. Plate of chest large substernal mass probably goiter. Some lengthening and tortuosity of aorta. Proctoscopic examination - proctoscope passed with ease for 17 cm. Rectal mucosa appears normal. Nurses' Notes: Temperature 101. Pulse 100.

Operation

Through right McBurney incision, peritoneum opened and cecum brought into wound. After examination of abdomen, it was thought best to do a cecostomy because of distention. #18 catheter put in gut and inverted into it by modified Witzel technique. Abdomen closed. Left table in relatively good condition. Nasal suction started.

Nasal Scution

1-28-33 - Nasal suction working adequately. Intravenous fluids and glucose. Temperature 102.

1-29-33 - Condition same. Temperature 103.6.

1-30-33 - No change. Pulse slightly irregular from time to time. Temperature 101.6.

1-31-33 - Complains of pain in abdomen.

2-3-33 - Temperature normal.

Pain

2-6-33 - Complains of pain in left chest and abdomen. Medical consultation - heart enlarged to left. Systolic murmur. Irregular pulse.

Probably fibrillating. Some dyspnea on talking. Impression: Arteriosclerosis, cerebral, coronary, mesentery and peripheral. Abdominal pain probably due either to mesenteric anoxemia with irritation or to coronary disease. Impression of consultant - some degree of mesenteric thrombosis.

2-8-33 - Temperature 102.4. Pulse 84, irregular, severe pain in abdomen and left chest.

#### Pain continues, Exitus

2-10-33 - Temperature 101.6 (R). Pain over precordium again. Oxygen relieved pain. Abdomen soft. Pulse thready. Complains a great deal of pain in abdomen and lower chest and left shoulder. Respirations rapid. Pulse weaker and thready. 9:30 P.M. - Expired. Clinical impression - Death due to coronary thrombosis.

#### Autopsy

Body is well-developed but poorly nourished, white female, 72 years of age, measuring 164 cm. in length, weighing approximately 125 lbs. Rigor just beginning. Hypostasis purplish and posterior (slight). Slight edema in lower extremities. No cyanosis or jaundice. Pupils equal, 5 mm. in diameter. McBurney incision, 13 cm. long. Puncture wounds in antecubital fossae. Subcutaneous fat scanty.

#### Free feces

Peritoneal Cavity. As peritoneum is incised, large amount of feces escapes. Entire peritoneal cavity from subdiaphragmatic spaces down to culdesac filled with soft, mushy, gaseous feces. At least 1000 grams present. Appendix not found as it is incorporated in dense mass of adhesions where cecum is attached to anterior abdominal wall.

Pleural Cavities. Generalized adhesions on right side. Very slight excess of fluid on left. Pericardial Sac smooth, moist and contains no excess fluid.

#### Not much

Heart weighs 270 grams, soft and flabby. Left ventricle appears dilated without hypertrophy. Musculature soft and rather thin. No areas of fibrosis, softening infarction, or intramural thrombosis. Valves soft and not deformed. Root of aorta moderate degree of atheromatous

change. Coronaries: left coronary good lumen throughout. Small patches of atheromatous plaques present but no appreciable diminution in size and no thrombosis or embolus seen. Right coronary small orifice (2 mm. in diameter) but lumen of vessel opens immediately beyond opening and continues thereafter with normal size. No obstruction present in this vessel.

#### Collapse - Old Tbc

Right lung - 300 grams, and Left 350. About 70% collapse of both lower lobes without any evidence of pneumonic infiltration. On right side, active tuberculosis involving extreme apex of lung about 1 to 1.5 cm. below pleura. No cavitation. Bronchi on right side contain small amount of blood. Spleen 125 grams, soft. Surface covered with feces. Pulp no change. Liver 1150 grams. Interior no abscess or tumors. Periportal spaces not fibrotic and biliary radicles not dilated. Gall-bladder thick wall, contains no stones, bile ducts patent.

#### Ileum - Edema

Gastro-Intestinal Tract: Esophagus, stomach, duodenum, and upper part of small bowel no change. Mucosa intact. No ulceration, tumors or inflammation. Ileum, particularly as one progresses down toward ileo-cecal valve, becomes more and more edematous and thickened by what appears to be infiltration of fluid within submucosa. Mucosa becomes somewhat reddened near ileo-cecal valve. No ulceration or hypertrophy of lymphatic follicles. Small patch of old fibrinous peritonitis involving one or two loops of small bowel adjacent to cecum.

#### Dilation - Perforation

Cecum attached to anterior abdominal wall by previous cecostomy. Cecum, transverse colon and splenic flexure down to sigmoid at about level of brim of pelvis moderately dilated. Wall very much thickened and edematous. Sigmoid and descending colon show moderate peri-colitis which attaches colon to lateral abdominal wall. Three large perforations in bowel, each defect measures about 6 cm. in

length and 4 cm. in diameter and have irregular outline. Edge of defect black and somewhat necrotic. Bowel beyond edge of defect not necrotic or discolored. These three perforations are one in the transverse colon, one at splenic flexure and one over brim of pelvis in sigmoid colon.

#### Ulceration

Terminal part of sigmoid colon and rectum empty and collapsed. No tumor palpated. After colon is removed and opened, it is observed that there is extensive ulceration involving colon beyond hepatic flexure. Cecum and ascending colon appear quite normal. Mucosa somewhat reddened, edematous but there is no ulceration. Beginning at hepatic flexure, there are irregular patches of ulceration involving mucosa and submucosa. At splenic flexure and in descending colon, these patches fuse into almost continuous extremely irregular ulceration. Edges of ulceration are irregular outline and undermined, numerous sinuses extend out under normal mucosa. In the center of each ulceration, there are irregular islands and bridges and tags of mucosa. Floor of ulceration irregular and shows numerous burrowing sinuses.

#### Carcinoma

About 30 cm. from end of gastro-intestinal tract, there is very small carcinoma which has completely strictured bowel. Lumen very small, barely admits blade of scissor, and carcinoma is only about 1.5 to 2.0 cm. in length and annular constricting type. No demonstrable extension outside bowel.

Pancreas pink, soft, no cysts or fibrosis.

Adrenals no hemorrhage or degeneration.

#### Cystic

Right kidney large (8 cm.) cyst in lower pole, weighs 250 grams.

Left kidney 150 grams. Both capsules strip great difficulty, leaving rough, torn surface scarred, finely pitted and shows numerous small cysts.

Bladder not dilated, trabeculated or thick walled. Mucosa somewhat dirty. Trigone inflamed. No tumors.

#### Senile - Goiter

Genital organs: Uterus tipped backward, fundus impinges against rectal wall.

Uterus, tubes and ovaries only senile changes.

Aorta tortuous, lengthened (grade II or III atheromatous change).

Lymph Nodes - not enlarged.

Organs of neck - Thyroid exposed and shows nodular adenoma which dips behind sternum.

Head - not examined.

#### Gross Diagnoses

1. Carcinoma of sigmoid colon.
2. Intestinal obstruction (colonic).
3. Ulceration of bowel (possibly anemic and distention basis with secondary infection).
4. Perforation of colon, multiple.
5. Peritonitis, acute.
6. Cecostomy.
7. Pulmonary tuberculosis, old.
8. Pleural adhesions.
9. Dilation of heart.
10. Arteriosclerotic kidneys.
11. Chronic cholecystitis.
12. Cysts of kidneys.
13. Arteriosclerosis, general.
14. Pulmonary atelectasis.
15. Adenomatous retrosternal goiter.
16. Retroverted uterus.
17. Cystitis, acute.

#### Microscopic

Tumor - adenocarcinoma. Cells quite mature, grade II.

Colonic ulcers - several sections studied by various men (included parasitologists).

No amebae found. Tissue unusually free of usual evidences of acute inflammation. Numerous phagocytic cells present. Interpretation doubtful.

#### II. ABSTRACT:

##### CARCINOMA OF COLON

Abstr. Koucky.

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#### Carcinoma of Colon:

##### General:

Importance of malignancy of colon as public health problem is obvious. Methods of recognition have been well established, particularly by roentgenologists. Surgical procedures have reached plane of perfection equivalent to maneuvers for resection of other organs. Difficulties of diagnosis caused by insidious nature of disease and dangers of sepsis attending any operative procedure on colon are partly offset by apparently slow growth of tumor. Greatest problem today, as previously stated for other gastro-intestinal malignancies, is stimulating interest among practitioners who see many intestinal upsets but few malignancies, to think of tumor.

##### Anatomy and Physiology of Colon:

Colon in every respect is bifunctional, bilateral organ and can be divided into right and left parts. Right colon develops with terminal small bowel from mid-gut. It has (in embryo) same type of villi; retains same blood supply from superior

mesenteric and same nerve supply from vagus and dorsal sympathetics. It has rich blood and lymph supply. Left colon develops from hind gut, has no villi, derives blood supply from inferior mesenteric vessels and nerve supply from lumbosacral cord. Its vascular and lymph supply is much less than that of right side.

Right colon takes active part in digestion and absorption; left colon is reservoir. Bacterial fermentation and absorption of split products and water takes place in cecum and ascending colon. (Contents liquid.) In right colon contents are more nearly solid and only function is storehouse. These differences do not stimulate different types of tumors but effect of tumor is modified by anatomy and physiology of two parts.

#### Pathology:

Position of malignancies in colon and proportionate frequency of involvement of various sites in gastro-intestinal tract:

	<u>Roughly</u>	<u>Actually</u>
Stomach	50% ( $\frac{1}{2}$ )	52%
Tongue, Esophagus		
Small bowel, Anus	15 ( $\frac{1}{6}$ )	14
Large bowel	33 ( $\frac{1}{3}$ )	34
Rectum	12	13
Sigmoid	10	9
Left colon	5	4
Right colon	10	9

#### Etiological factors: unknown?

Association between polyposis and malignancy has been previously discussed (carcinoma of rectum). Rankin and Fitz-Gibbon in 13 cases of polyposis of colon found malignant changes in all except two. A total of 24 individual malignancies found. These results correspond with studies elsewhere. Association with diverticuli, infection, tuberculosis or other chronic granuloma not of significance. Age, sex, race factors appear to be no different than other carcinomas. Peculiarities of geographic distribution are notable. American savages and Asiatic Indians rarely have gastro-intestinal malignancies? (diet?, inheritance?).

#### Types of carcinoma: scirrhous, polypoid and colloid.

Scirrhous (22%) are narrow, hard infiltrating and form "napkin ring" strictures. Polypoid types (51%) bulky, soft, eroded growths which project into lumen without much extrinsic growth until late.

Colloid (better called mucoid) types (10%) intermediate between other two. They are both bulky and infiltrating. They frequently form considerable sized extrinsic masses. Different types have about same distribution along colon.

Grading - poorly correlated in colonic tumors. Course indicates that tumors progressively become more malignant from cecum to sigmoid; cytology indicates that right-sided tumors are more anaplastic and would be graded III and IV. Only value of grading appears to be comparative grading within each area. Grade III cecal tumor cannot be compared with grade III sigmoidal tumor. As latter has poorer prognosis. It has been suggested that rich lymph supply of the left colon allows more widespread (questionable). Metastasis occurs through lines of lymphatic drainage and through blood. Next to local lymph nodes, liver most frequently invaded. No area is exempt - metastasis occur to bone, heart, brain, etc. Pathological material and surgical exploration shows metastasis in only 40 - 50%. End results show them present in higher percentage.

#### Secondary pathology - variable.

Two fairly different courses are produced: that in left colon and right. In cecum and ascending colon, large lumen and fluid content combine to prevent obstruction. Irritation induces diarrhea. Bacterial activity and good absorptive power lead to systemic toxicity manifested most strikingly by anemia (not due to bleeding as generally thought). Obstruction at any stage about 1/7 as common (1 to 65) in right half as in left. In another series of 115 cases, obstruction occurred in right side in only 1/14 (7%).

#### Obstruction

Descending and sigmoid colon, tube is small, content is semi-solid and tumors usually constricting. These factors lead to constipation and later to obstruction. Roughly, 100% show some degree of obstruction at some time or another. Carcinoma accounts for 90% of colonic obstructions. (5% acute without previous attacks); remainder show recurring attacks of increasing severity. From 20-35% reach medical care in stage of acute obstruction. In 1278 obstruc-

lesions of entire bowel, 485 (38%) were due to malignancy of colon. Infection and edema lead to complete obstruction, usually suddenly. Necrosis and sloughing cause spontaneous subsidence. Bleeding is common, trauma by feces (?).

#### Hemorrhage

Bleeding into bowel not in proportion to the degree of anemia. In right colon gross or occult blood found in 33%, whereas anemia is very frequent and may be extreme (toxic anemia). In left colon blood in lumen common (80 - 90%), gross bleeding frequent but anemia not as characteristic as lesions of opposite side. Average hemoglobin, right side 47%; left side, 66%.

#### Retention

Systemic changes from colonic obstruction usually absent. Chloride, urea, etc. changes seen in small bowel obstruction not present except in few instances of sudden obstruction with regurgitation into small bowel. Slowly produced obstructions well tolerated.

#### Peritonitis and degree of obstruction - definitely related.

Actual rupture of cecum (thinnest wall) by pressure of gas caught between obstruction and ileocecal valve well known. In one series of 118 cases (autopsy), perforation occurred in 33%. (Not an indication of percentage in clinical material). Frequently splitting of the muscle layers and herniation of mucosa occurs just as abdomen is opened and support of the parietal walls removed. Most often, however, manipulation attending exploration or operative procedure causes gross or microscopic tears. Peritonitis is result. Many post-operative infections are on this basis rather than spillage.

Inflammatory lesions - (described recently under chronic granulomas of small bowel) constitute about 10% of colonic masses requiring differentiation from malignancy. Caused usually by diverticulitis, gall-bladder disease, ulcerative colitis, non-specific granulomas of unknown origin, tuberculosis.

Study of post-operative deaths - shows several interesting features. It brings out two related facts (1) difficulty (or failure?) of early diagnosis and (2) hazards of treatment. In 118 deaths, analysis showed the following:

No operative procedure	56 (50%)	274.
Operative interference	56	
Palliative for obstruction	35 (62%)	
Resection	21 (38%)	

No metastasis (demonstrable)	44%
Resection, metastasis found at autopsy	43%

(Note the false impressions which can be obtained from statistics. This group deals only with autopsied cases and not with entire group.) 50% of deaths in which treatment was impossible is of interest. Disproportion between 18% resection and 44% resectability is due to interference by fatal obstruction. Interpretation of this group of statistics is to be guarded. Other clinics with patients who come from long distances (hence not acutely obstructed) report up to 70% operability. Actual figure probably lies between extremes.

#### Medical Aspects: Diagnosis:

The medical aspect deals with one objective -- making earliest possible diagnosis. Two features characterize this field: first, the vagueness of the early symptoms, and secondly, the possibility of actually making diagnosis if the patient presents himself and one is suspicious of the symptoms. Statistical studies, tables of symptoms from clinics, fail to show true status regarding diagnosis. It is generally accepted that 80 - 90% reach some degree of obstruction and about 35% are acutely obstructed. About 5% reach this crisis without previous symptoms. Another small group developed mass without symptoms (estimated 5%). There remains 90% in which symptoms were present for 6 to 8 months (average) in left-sided tumors and 12 months in right-sided tumors. 40 to 50% of these do not show metastasis but they still die of obstruction or peritonitis because of late diagnosis. Like all malignancy of the gastro-intestinal tract, the error lies in the failure of the physician first called? No data available for carcinoma of the colon on the delay from onset to consulting a doctor and in the delay between first visit and accurate diagnosis. (In carcinoma of stomach, it was pointed out that the patient saw a doctor within reasonable time and the delay occurred

after this first visit. Probably true in regard to colon?). The reason for the failure to suspect early symptoms is generally conceded to be due to extreme vagueness. Symptoms may be summarized as follows:

Toxicity (anemia  
(failing appetite, indigestion,  
( "dyspepsia".  
(tiredness

Irritation (pain, dull and indefinite  
of tumor (diarrhea (right colon espec-  
( ally)  
(blood in stool

Mechanical (Constipation, (left colon)  
effects of (Recurring attacks of crampy  
tumor ( pain

Of especial note are attacks of crampy pain because they are not only spontaneously relieved but also respond to treatment (soft diet, laxatives and enemas) which creates feeling of security and good therapy.

Dictum - from the studies of early symptoms are: any adult who has a change of bowel habit especially if it is accompanied by bloody stool (may be occult) or dull or recurring crampy pain should be subjected to roentgenoscopic study of the colon.

#### Roentgenological Aspect:

The methods of investigation and criteria of analysis not reviewed. Only one point in this regard is of general interest -- the preparation of the patient. Satisfactory examination cannot be made unless the colon is cleansed of feces, gas and fluid before investigation is attempted. The following procedure is recommended from the Mayo Clinic: (1) No supper or breakfast, (2) 2 oz. castor oil, night before, (3) saline enemas until bowel is empty. When there is reason to suspect a spastic element, tincture of belladonna M. 60 divided in 3 doses, 2 at 2 hour intervals on night before and the third in the morning.

The perfection of methods and analysis is evidence by the statement: "even when subjective or objective evidence from other sources is entirely absent or very indefinite, the properly executed roentgen examination can be expected not only to reveal but to identify the lesion". How

closely this is borne out by actual statistics is indicated by only a 3% error in 102 proven cases (Mayo Clinic). Jones is not as optimistic: he estimates 75% are correctly diagnosed by x-ray (includes rectal carcinoma).

Differentiation of granulomatous masses frequently can be made by the roentgenoscopic methods when all others fail.

#### Surgical Aspect:

Rankin divides the problem into three stages: (1) Decompression, (2) rehabilitation, (3) resection. The first two stages are cooperative medico-surgical problems. As previously stated a large majority of cases show some degree of obstruction (1/3 are in acute stages) and the relation of obstruction to infection has been stated. Decompression therefore is a factor in nearly every case. Many are anemic, weak and dehydrated and the correction of these factors is the problem labeled as rehabilitation. Under this cooperative preoperative management the Mayo Clinic group have brought the operability (resection) up to 58%.

Decompression is accomplished by soft non-residue diet, mild purgation by fluid extract of senna and constant saline enemas. Even some subacute and acute cases have been decompressed in this manner. The complete obstructions must be decompressed by operative means (open or catheter types of ileostomy, cecostomy or appendicostomy). Individual preferences for method and type seem innumerable. Extreme danger of manipulation due to infection through bowel wall makes the "blind", open, cecostomy appear preferable.

Rehabilitation consists of blood transfusions, high fluid intake, high caloric diet of low residue (fruit juice, eggs, butter, candy, rice) and the use of intraperitoneal vaccine. This is prepared from peritoneal exudate of patients dying of peritonitis and contains mixed streptococci and colon bacilli. It has been used in over 800 cases and it seems established. It is administered three days before operation. A reaction usually follows: malaise, headache and elevated temperature and pulse. This subsides in 24 hours. Results seem to confirm the claims made for its use: 222 cases - 11 deaths, peritonitis - 5%. 58 cases

without vaccine - 13 deaths, peritonitis - 22%.

The type of operation is extremely variable, dependent on (1) location, (2) nature of secondary mechanical changes (3) presence of local metastasis, (4) fixation of tumor in addition to the factors governing all operative procedures. Regardless of the type of operation or method of establishing continuity of the bowel, one outstanding factor governs all: danger of peritonitis. The controversial points regarding vaccine, aseptic types of closures, multiple stage operations and post-operative decompression center on these points. Of these debated points, two appear to be substantiated by demonstrable results: vaccine (is reviewed above) and multiple stage operations.

	1st Stage	
	Cases	Mort. %
Porges	82	41
Jelaffke	13	33
Finsterer	37	24
Cheever	50	24
Krecke	33	40
Konig and Dick	48	24

	2nd Stage	
	Cases	Mort. %
Porges	86	32
Jelaffke	22	36*
Finsterer	19	42*
Cheever	35	9
Krecke	41	30
Konig and Dick	33	21

	3rd Stage	
	Cases	Mort. %
Porges	4	0
Jelaffke	-	-
Finsterer	20	11
Cheever	-	-

Cases Mort. % 276.

Krecke	26	9
Konig and Dick	13	15

\* Includes extensive tumors not resectable in one stage. In general, two stage group includes cases of more extensive disease.

The immediate mortality is of course considerable. One cannot be sure (from literature) that mortality statistics are based on resections exclusive of palliative operations for acute obstruction or on all cases (probably former). The figures are intimately bound together with the operability percentage (low operability, low mortality). On the whole, the operability is not changing (exceptions).

Konig and Dick	44%	Permman	38
Anschutz	50	Abrahamson	38
Porges	55	Turner	60
Kaufman	49	Mayo	58
Nordman	62	Finsterer	73 (re-
Brown	38	sections)	

Actual mortality statistics are:

Wolfer (1896)	54%	Krecke	29
Mickulicz	43	Haberer	26
Eiselsberg	48	Finsterer	25
De Bovis	38	Cheever	18
Porges	36	Mayo (1930)	11
Finkelstein	29	Mayo (1931)	9
Jelaffke	29		

The mortality for operations on the right colon is definitely higher than on the left colon. Mortality of resection in the acute stage is enormous and no data is published.

Note the drop in operative mortality since 1896.

End results are difficult to find. American follow-ups do not appear to have been published. Following data taken from German sources:

Surgeon	No. cases (Surviving Resection?)	3 yr. survi- val	5 yr. yr.	10 yr.	15-20 yr.
Finsterer	38	61%	54%	-	-
Porges	49	61	-	35	-
Mikulicz	34	38	-	-	-
Krecke	58	46	45	25	20
Perman	---	---	38	---	---
Turner	---	---	28	---	---

König and Dick (44% operability) give details of end results:

Years since operation	Number (total?)	No. Follow-up	Died Inter-current Disease	Died Recurrence	Well
13	30	6	4	6	7 (23%)
10	49	6	6	14	11 (22%)
7	58	6	6	19	14 (24%)
4	71	6	6	20	21 (30%)

Authors state that no case of recurrence after 3 years was observed.

#### Impressions:

1. The problem in control of cancer of colon is not roentgenological or surgical but is problem of correct early diagnosis.
2. Colon is functionally and developmentally a bilateral organ. The right colon is part of the alimentary tract, the left part of the excretory tract.
3. Differences in disease of the two sides depend on these functional differences.
4. Carcinoma of the large bowel comprises one-third of gastro-intestinal malignancies. The rectum is seat of half of these and the remainder of the colon is occupied by the other half with preponderance in the two ends.
5. The only etiological factor known is tendency of polypi to become malignant.
6. The types are scirrhous, polypoid and mucoid. Of these, the scirrhous is the constricting type.
7. The grading of colonic cancers is not satisfactory at present.
8. Metastasis are said to occur more readily as the location approaches the rectum. The local lymph nodes and liver are most frequently involved but any organ may be invaded.
9. In three independent series, 43%, 44% and 50% of pathological material (autopsies and operative) were free of

metastasis.

10. In general, the secondary pathological changes are toxicity (evidence by anemia) in the right colon and progressive obstruction in the left.
11. Obstruction of some degree occurs in 80-90% of all intestinal obstructions are due to colonic malignancy. 5% of these are acute without previous symptoms. About a third of malignancies reach the surgeon in the stage of acute obstruction.
12. Average hemoglobin of right-sided lesions is 47%; of left lesions is 66%. On the right side, the anemia appears to be of toxic origin; on the left, it is due to bleeding.
13. Changes in blood chemistry due to obstruction itself are nearly always absent.
14. Peritonitis is chief cause of death of all cases and is due to infection extending through the distended bowel. Actual rupture of the cecum may take place.
15. In a series of over 100 autopsies, 50% had no operative procedure and only 18% had resections. This illustrates the high number which never have a chance for cure.
16. 90% of cases present symptoms for 6-8 months (left) or 12 months (right).
17. The early symptoms are notoriously vague. They may be divided into those of toxicity, of irritation by the tumor and of beginning partial obstruction.
18. Adequate investigation of these symptoms gives a high percentage of correct diagnosis. The indefinite symptoms are passed by under another diagnosis. Medical treatment (soft diet, laxatives, etc.) relieves most of the early complaints.
19. X-ray diagnosis in experienced hands has reached a high degree of accuracy (up to 97%) even in the earliest lesions (polyps).

20. Surgical management consists of three stages: decompression, rehabilitation and resection. The first two are combined medico-surgical problems.

21. Operability (resection) under this method is high (50-60%) and equals the theoretical operability indicated by 40-50% presence of metastasis.

22. The outstanding danger in surgical technique is peritonitis mainly from migration of organisms through the bowel wall injured by distention.

23. Two developments appear to be significant: (1) use of intraperitoneal vaccine, (2) multiple stage operations. By the use of the former, mortality is reduced from 23% to 5%. By the latter, mortality reduced from 24% to 9% (Cheever).

24. The immediate mortality has shown a marked drop corresponding to development of technique. The best figures are 9% (Mayo Clinic). 10 - 20% is given as average mortality.

25. The operability has not changed much in recent years except in certain clinics following the program quoted above.

26. Five-year survivals are higher than in other types of gastro-intestinal malignancies. The range 25 to 54% (of resections surviving operation). 25-35% 10 year cures are reported. In a series of 104 cases no recurrence was seen after 3 years (subsequent deaths due to other causes).

27. General impression: Carcinoma of the colon can be diagnosed early but this is not usually done because of the vagueness of symptoms. The average case has a much better chance of cure than many other malignancies (excepting skin).

#### Carcinoma of Colon- Minnesota General Hospital:

No complete review or statistical study of our group of cases was attempted. The abstracts on file in the Cancer Institute records were studied in light of the impressions obtained from the literature referred to above. The following impressions and points of interest were obtained.

Total number on file - 40.

Division:

Cecum	14
Sigmoid	7
Hepatic flexure	6
Ascending colon	6
Splenic flexure	2
Descending colon	2
Transverse colon	2
Polyposis with malignancy	1

Note: Most of the rectosigmoid and low sigmoid cases are filed "rectum" (previously reviewed).

Age: Note that 2 cases occur between 20-30 and 4 between 30-40, 15% under 40 years of age.

Symptomatology: The outstanding complaint is pain. This can be divided into two types: "indigestion" pains (indefinite, vague, related to food) and obstruction pain. There is a definite preponderance of the indigestion type in the early history. Surprisingly few notes on change of bowel habit were found. (Reason?). Two cases were judged to be acutely obstructed without previous symptoms. Of the 26 cases exclusive of cecum, 12 had some degree of obstruction. Studies of hemoglobin in our group do not confirm the impression regarding toxic anemia in right-sided colonic malignancy. Thirteen cases had symptoms of six months or less; 24 (60%) had symptoms one year or less. Apparently our group is within the average duration of symptoms described above.

Diagnosis: The impression that the early symptoms are not properly investigated is perfectly borne out by a review of the history of our group. The local clinicians are not exempt from whatever criticism can be attached to this. In view of the small number of cases seen here first the presence of at least 2 missed diagnosis is of consequence. (One treated for "anemia", another for "indigestion"). Three cases had had recent appendectomies (elsewhere), one had had a hemorrhoidectomy.

Treatment: Throughout the operative records, the treatment of obstruction seems

to be the outstanding feature. Actual reactions are overshadowed by the treatment of the crisis. The mortality is correspondingly high.

**End Results:** Six cases living at present, 8 have not been heard from for some time, 26 known dead.

**General impression:** The results of our efforts are not encouraging because we are dealing with a high percentage of obstructed cases. Our diagnostic ability is not infallible.

### III. ANNOUNCEMENTS

#### 1. Pediatrics Meet

There will be a joint meeting of the regular bimonthly Pediatric Seminar and the Northwestern Pediatric Society on Thursday evening, March 16th, at 8:15 P.M., in the Eustis Amphitheatre. Members of the Northwestern Pediatric Society will have a dinner at the Minnesota Union preceding the program. The program will be given by the staff of the Department of Pediatrics. The following papers will be presented:

"Water Balance Studies in Diabetes Insipidus", Willis H. Thompson, Richard M. Johnson and Irvine McQuarrie.

"Congenital Chylous Ascites", H. E. Hilleboe and Mildred R. Ziegler.

"Study of Motor Automatism of Children", Max Seham.

"Observations on the Phosphatase Activity in Osteogenesis Imperfecta", Arild E. Hansen and Mildred R. Ziegler.

"Therapeutic Indications in Obstructive Laryngitis", E. C. Platou and H. E. Hilleboe.

"A Study of the Blood Plasma Lipids in Acute Infections and in Artificial Fever", A. V. Stoesser and Irvine McQuarrie.

"Growth in Area of Cutaneous Reactions to O.T. as Compared with M.A.-100", C. A. Stewart.

Everyone interested in invited to attend the meeting.

#### 2. News

"The New Deal" brought appreciation and thanks from the Medical Service. We actually put on some medical cases at Staff Meeting. In keeping with the times, they draw next week's place with Undulant Fever.\*\*\*\*\*He was sitting quietly awaiting his turn. When his name was called, he obediently gave all the required information to the Record Clerk in the Admission Division. He rebelled when his temperature, pulse and respiration was taken but was informed that everyone had to do it. He complained a little more when they took his blood for a Wassermann, cell counts, smear and hemoglobin. When he was told to go back and collect a specimen of urine, he refused point-blank. He explained that he didn't think all this was necessary as he was just bringing his little boy to the hospital.\*\*\*\*\* "Vasospastic disorders" began to float around the hospital after last week's meeting. The new terminology seems to fit well with many conditions of this type. In the current issue of Minnesota Medicine, it is used in connection with a case of malignant hypertension. Chief vasospastician Adson's best story was about the girl who lost the tip of her finger when she became angry with her mother \*\*\*\*\*Jig-saw puzzles have lost out and the diet business has taken its place. When you meet your best friend in the hall, he greets you with a tug at his vest or a wild grab at his trousers to show you how well he is doing. Safety pins are taking up the slack and the battle is on. It has been estimated that several hundred pounds were lost on our first ton in the last ten days. According to Louis Daniels it's following the president's request to stop hoarding. The diet list in this issue is for the benefit of those who have not yet started. Attention Paul Fesler\*\*\*\*\*The Emerald Club meets Friday at 6:30 P.M. at the Curtis. Reason--St. Patrick's Day, to tell each other how good we are--but it's not news.

3.

REDUCING DIET

Carbohydrate 40 Protein 70 Fat 12 (calories 550)

Breakfast

1. Very small glass of orange or tomato juice.
2. One-half small, thin slice, unbuttered bread or toast - 10 grams.
3. One whole egg, plus two egg whites, poached.

Luncheon and Dinner

1. Meat or fish from the following list - 120 grams (4 oz.): very lean tenderloin steak, very lean round steak, liver, dried beef, pickled tripe, lean roast veal, light meat of roast chicken, light meat of roast turkey, black bass, cod steak, haddock, smoked haddock, halibut, perch, wall-eyed pike, pickerel, brook trout, canned tuna fish (not in oil), canned crabs, lobster, canned lobster, canned shrimp. Note: All meats must be cooked without added fat.
2. 5% vegetables - 125 grams (4+ oz.). It is well to use some tomato or cabbage daily; or cucumbers, lettuce, spinach, asparagus, endive, sauer kraut, beet greens, Swiss chard, celery, Burssel's sprouts, young string beans, radishes, broccoli and mushrooms.
3. Cottage cheese made from skimmed milk - 75 grams (2½ oz.). May be served as a salad with few leaves of lettuce plus mineral oil dressing.
4. Skimmed milk - 200 grams (7 oz. or one glass).
5. 10% fruits - 150 grams (5 oz.). Oranges and grapefruit are best; or unsugared strawberries, blackberries, fresh peach or pineapple.

Directions: This is the entire food allowance for the day. You can divide the noon and evening portions as you see fit. Black coffee, bouillon and tea can be taken at any time as they do not contain calories. Be sure to eat up to the limit but do not exceed amounts stated.

In addition, take Adex tablets two, 3 times daily (a cod liver oil concentrate; any of the other concentrated oils can be used); Mead and Johnson's Bewwer's yeast tablets 2, three times daily; dibasic calcium phosphate one rounding teaspoonful, twice daily. The phosphate should be taken stirred up in one-half glass of water, the other tablets can be taken with the meals.

In purchasing meats, buy one-half pound portions as they usually cook down to about the proper amount. All prepared meats and fish in cans are estimated on basis of net contents.

Vegetable helpings are liberal portions.

One-half of a large grapefruit without sugar is approximately 150 grams; Cottage cheese 2 heaping tablespoonfuls.

Early, the weight loss will be rapid, chiefly due to water? Following this, it may slow down and there may be days when you do not lose. This should not make you worry as it will usually drop later. If nothing happens for at least two weeks and you have taken your diet without alteration, consult your physician for further directions.

In dividing the food allowance for noon and evening, some drink black coffee at noon and eat all of the food at night; others, grapefruit, thin broth and tea at noon, etc.

#### 4. Radiology Seminar

Value of Cholecystography  
in Diagnosis of Gall Bladder Disease by  
Dr. John B. Eneboe, University Hospital  
X-ray Department, Room M-515, Friday, March  
17, 4:45 P.M.

#### 5. Meeting

Date: March 9, 1933

Place: Interne's Lounge, 6th Floor,  
West Building.

Time: 12:15 to 1:40.

Program: Vasospastic Disorders.

Present: 110

Discussion: L. C. Fischer  
A. W. Adson

Theme:  
L.C.F.: Presented patient  
(see history). Hands are  
warm and discolored. Before operation he  
could hold his hands in cold draft and they  
would pain and turn blue. Had to be care-  
ful about getting in drafts. Joint pains  
persist.

A.W.A.: I was afraid I would  
be called on to say something and thought  
you would probably go into something I  
have forgotten. I want to congratulate  
you on the way you handle your program. I  
wonder whether color was to signify  
picture of Raynaud's disease. I think per-  
haps I should have to ask for one correction,  
page 262 quoted statistics on scleroderma.  
I think that should be for Raynaud's.

In reviewing our cases we noticed  
ulcer complications did not do as well as  
an uncomplicated group. All Raynaud's  
operations for disease of lower extremi-  
ties were extremely satisfactory. Attri-  
buted to development of surgical technic.  
In treatment of Raynaud's disease of upper  
extremities some patients come with dis-  
tinct ulcer on tip of finger. We tried  
out various methods of producing vasomotor  
dilation. It appeared that there was some  
complication which will be discussed later.

First let me discuss briefly the two

theories of vasomotor spasm. Raynaud  
held that vasomotor spasm was of  
central origin. Lewis attempted to  
show that Raynaud's disease is not of  
central origin but is one that effects  
peripheral artery and states in con-  
clusion that Raynaud's is disease of  
peripheral artery limited to that  
particular part of vascular system.  
If exposure to cold is only factor  
producing symptoms we should not find  
Raynaud's in patients living in the  
south (but we do). Cold plays impor-  
tant role. First fallacy in argument  
of Lewis. Lewis stated vasomotor  
paralysis should produce vaso-dilata-  
tion. Injected nerve but did not get  
it. Inject fingers always get vaso-  
motor dilatation. Second, if you take  
patient with Raynaud's disease, place  
him in hot room, he goes through color  
phases, asphyxia, syncope on emotional  
stimuli. Another argument against  
Lewis theory: if you do sympathectomy  
always get vasomotor dilatation. When  
you expose feet to cold you are not  
able to produce asphyxia as before  
operation. Another thing. Generally  
accepted that vasomotor center is  
situated in brain. Cushing's article  
in relation to ulcer shows that stimuli  
of vasomotor center produces vaso-  
constriction. It looks as if real  
factor is central in origin.

Why is it that the patient who  
has ulcer fails to get complete re-  
covery in all color phases of that  
finger following sympathectomy? Pro-  
bably due to associated lesions. Of  
course, Dr. Brown and I have worked  
together for several years and have  
naturally stimulated one another in  
the discussion of this disease. Let  
me tell the story of how we became  
interested in it.

Enervation of arteries is  
centrifugal. Original proposal to  
relieve spasm by stripping artery.  
We tried it in some cases including  
thromboangiitis obliterans without  
results. Also tried it in Raynaud's  
but result not satisfactory. About  
this time some Australians conceived  
idea of relieving spastic cases by  
doing a rami-sectomy.

First case traumatic head case in which spastic hemiplegia developed. After operation, vascular side forgotten (but note made). Interested in trying out operation. First side approach on child. In adult distance too great. I approached lumbar ganglion through midline. Simultaneously with our work Dr. Brown worked on vascular disease. Establishing as basis a small calory the unit of heat given off for area, one square inch for minute of time.

Raynaud's disease in asphyxia stage gave off less than .2. Dr. Brown gave his report at the Clinic. When he completed address it occurred to me that it might be good thing to stick feet of children in calorimeter. Did this more or less accidentally. When they ran the temperature on first youngster, Dr. Brown was pleased. We had increased child's skin temperature 300%. Rechecked calculations and still good. We did it on girl of 16 from Canada who was unable to walk. Saw girl 2 or 3 times.

While working on Raynaud's patients Brown tried treating patients with vaccine. Next, worked on anesthetics. Found if you anesthetized patient 10 minutes, produced vasodilatation. Finally I got case that had not gone too far. Patient had good result. Developed test for vasomotor response. We found that in only one instance disease progressed to ulceration on the other leg. I have seen patients with thrombo-angiitis obliterans, vasomotor phenomenon in hands (vessels open).

Started to use thorotrast, result marked. Occlusion in Raynaud's had not ascended as high as vessels capable of palpating. I have argued all along that in view of the fact sympathectomy checked it, disease must be primary vasomotor. Others argued that it could not be so because vessels are occluded. Raynaud's disease in females and Buerger's in males, but we find Raynaud's in male and Buerger's in females a little higher than quoted. Once we set up an opinion we try to make everyone conform to it.

Since thrombo-angiitis obliterans is held in abeyance or checked, we know that vasomotor spasm prevents process. It is possible that the two are interlocked and

that because migrating phlebitis is more common in laborers it may be partial explanation. How then is it possible for infectious process to be chief factor. I am not ready to state that the disease is not a primary vascular. Certainly if you can alter vasomotor tone you are going to alter course of disease.

Classification: Dr. O'Brien gives you elaborate classification. We have had it before. Gradually retracting classification to simpler one. In thrombo-angiitis group 3 types: (1) Compensated pain of feet, go to bed for short time, pain disappears. Possible due to excessive smoking. This is upper portion of scale (small group). Lower portion of scale progressive fulminating type of thrombosis, frequently associated with cellulitis. That group usually has so much change in vessels little to be expected from operation, first one foot, then other, and then one hand, and next hand.

First group we have treated by putting them to bed, they improve, go home, and ultimately return. It is in this group that you can do so much. Relief formerly 1 in 7, now 1 in 3. Before attempting to do sympathectomy in this group look for occlusion of dorsalis pedis, posterior tibial phlebitis and ulcer. We hospitalize them, place them on vaccine treatment. If the pain is relieved, the ulcer shows signs of healing and process becomes quiescent rather than progressive perform sympathectomy with instructions to the patient that if he shows symptoms in his fingers to have sympathectomy before disease progresses too far. The second group is midway between these two. Comment on neuritis. Studied number of nerves. Peripheral nerve investigated in thrombo-angiitis obliterans. In advanced cases show degeneration. Apparently blood supply involved which accounts for degenerative process and neuritis set up. Unfortunately pain not relieved by peripheral occlusion. Neuritic symptoms unfortunately difficult to treat.

With reference to hypertension,

we have been interested in hypertension (certain ones). Ordinary essential hypertension does not particularly interest surgeons. Hypertension appearing in youngsters, 9-10, interests us. Malignant hypertension runs course of 3 years and patient dies. Does not die from daily established pressure but from that sudden rise which causes rupture of cerebral vessels or rupture of retinal vessels (easily demonstrated with the ophthalmoscope). Learned from experience if you carry out cervical sympathectomy may prevent.

Examined patients after operation and months subsequently normal vessels will dilate to  $1/3$  or  $1/2$ . Carried out cervical work and nerve sections on the theory that sudden rise of pressure must come from a stimulus which produces peripheral contraction.

When you start with any investigation take worse cases first because they are going to die any way. Cases tried still more or less in experimental stage. Three years ago performed operation on all nerves from 6th dorsal to 15th. Unfortunately this patient upon whom we did laminectomy developed postoperative hemorrhage, wound opened, developed paralysis, young man 19, terrific pressure dropped to 170 and stayed there as long as in Rochester. I believe that in this malignant group we may be able to accomplish something. I have appreciated the honor of meeting with you today.

Gertrude Gunn  
Record Librarian

