

MINNESOTA RADIOLOGICAL SOCIETY

WINTER MEETING  
UNIVERSITY HOSPITALS  
UNIVERSITY OF MINNESOTA

CLINICAL - PATHOLOGICAL - RADIOLOGICAL CONFERENCE

Conducted by DR. W. A. O'BRIEN

Assisted by Drs. B. Pearson, C. Randall, R. Kouchy

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# Minnesota Radiological Society

WINTER MEETING  
University Hospital, Minneapolis  
Saturday, Feb. 13, 1932

LUNCHEON                      BUSINESS MEETING  
University Hospital 1:00 P.M.

PROGRAM  
Eustis Amphitheatre 2:00 P.M.

## CLINICAL-PATHOLOGICAL-RADIOLOGICAL CONFERENCE

Conducted by DR. W. A. O'BRIEN  
Assisted by Drs. B. Pearson, L. Randall, R. Koucky.

1. Benign Polyp of Stomach - Pathological Fracture of Humerus,  
Discussion by Drs. H. Reimann, L. Rigler.
2. Ewing's Sarcoma of Bones  
Discussion by Drs. W. Cole, C. Hansen
3. Multiple Myeloma with Intestinal Obstruction  
Discussion by Drs. O.H. Wangensteen, L. Randall,  
C. Hansen.
4. Carcinoma of Breast with Multiple Metastases  
Discussion by Drs. K. Stenstrom, O. Campbell,  
L. Rigler.
5. Carcinoma of Antrum with Peripheral Metastases  
Discussion by Drs. W. Peyton, K. Stenstrom

Recent literature on the Classification and Treatment of Bone Tumors.  
DR. W. A. O'BRIEN

Relative Value of Stereoscopic and Single Films in the Routine Examination  
of the Chest.

DR. FREDERICK B. EXNER

Studies on the Routine Examination of the Chest in Students

DR. HAROLD DIEHL

Abnormal Lobes of the Lungs

DR. L. G. ERICKSON

Observations on Intra-pleural Pressure in Massive Pulmonary Atelectasis

DR. RUDOLPH KOUCKY

Radiation Therapy of Neuritis

DR. JOHN J. ENEBOE

Fractures of the Sesamoids

DR. JACOB SAGEL

Methods of Radiation Therapy of Carcinoma of the Esophagus

DR. C. O. HANSEN

Intraperitoneal Herniae - Preliminary Report

DR. FREDERICK EXNER

The Use of Thorotrast in Roentgen Diagnosis - Preliminary Report

DR. L. G. ERICKSON

## INFORMAL BANQUET

Town & Country Club 6:00 P.M.

## ADDRESSES

CHOLECYSTOGRAPHIC STUDIES ON THE EMPTYING OF THE HUMAN GALL BLADDER  
DR. E. S. BOYDEN

THE CONTRIBUTIONS OF RADIOLOGY TO OUR KNOWLEDGE OF NORMAL HUMAN  
DEVELOPMENT IN THE LAST DECADE

DEAN RICHARD E. SCAMMON

EWING'S TUMOR (multiple endothelioma)

Male, 54, admitted to University Hospitals May 5, 1930, stating that for past 4 months he had noticed a painful, tender, swelling over outer end of left clavicle.

Sarcoma.

3- -30 - Consulted excellent orthopedist. X-rays were made and a diagnosis of osteogenic sarcoma made. Operation was attempted but on exploration it was found to be impossible. A small section was taken for biopsy and wound closed. No complications ensued and the incision healed rapidly. Biopsy diagnosis was osteogenic sarcoma. Owing to inoperability of lesion, patient was referred here for deep therapy.

Examination.

Well-nourished male, weighing 175 pounds. Pulse and temperature normal. Blood pressure 134/80. There is a fusiform swelling over outer half of left clavicle with a longitudinal scar about 6 cm. long over it.

Laboratory.

Blood - Hb. 60%, rbc's 3,400,000, wbc's 3,800, Pmn's 56%, L 30%, M4%.

Urine - 1+ albumen.

Treatment.

X-ray therapy was begun on May 5, 1930, using high voltage therapy (200 K.V.P.) through a 1 mm. Cu. filter. Four treatments were given on alternate days to anterior and posterior fields over the left shoulder. A total of 143% of the skin erythema dose was given to the skin in 10 days which gave 130-154% to the center of the tumor. This treatment was repeated with slightly heavier dosage (150% S.E.D. to skin), 6 weeks later. (The first series gave only a slight skin reaction.) There was complete relief from pain following these treatments and the patient thought the tumor was smaller although the decrease in size was not particularly marked.

X-ray Examination

X-ray studies were made of the clavicle and a diagnosis of osteogenic sarcoma was again made.

10-3-30 - The chest was found to be free of metastases and the tumor had

laid down considerable new bone and looked considerably improved as compared with previous examination.

The course of x-ray therapy was again repeated.

New Complaints.

11-14-30 - The patient, who up to now had no special complaints, noticed stiffness and pain in the lower lumbar region. X-ray disclosed metastatic involvement of the 2nd, 3rd and 4th lumbar vertebrae with compression of the body of the second. At this time Dr. L. G. Rigler suggested a possible metastatic lesion from the prostate which digital examination failed to substantiate. The diagnosis of osteogenic sarcoma was discarded. It was decided to give deep therapy to the spine and pelvis and readmit the patient to the hospital for more careful study of the prostate, and the kidneys (to rule out hypernephroma). X-ray therapy was carried out, 140% S.E.D. being given to the skin over the pelvis and lumbar spine in 4 treatments on alternate days through anterior and posterior portals, using 200 K.V.P. and 1 mm. Cu filter. The pain was relieved in about 3 weeks following this series.

Readmitted.

1-26-31 - Readmitted to University Hospitals. Careful examination of prostate revealed nothing, uroselectan pyelograms revealed nothing and a retrograde pyeloscopy of the left kidney showed a normal pelvis. X-ray therapy of the pelvis and lumbar spine was repeated due to moderate exacerbation of the pain. There was also some pain in the thoracic spine and this was treated.

More Involvement

The patient remained comfortable until May 1931, when the ribs became involved and there was a recurrence of pain in the lumbar spine. More therapy was given and a good response followed. In the latter part of August 1931, there was a recurrence of pain in the pelvis. At the same time there was slight unsteadiness in gait which was attributed to advance of the disease in the pelvis and some pain in the parietal portion of the skull with an indefinite swelling bilaterally over these areas.

Fracture

Treatments were begun again to the pelvis but on 9-14-31 while leaving his home to come over for a treatment he slipped, fell down 3 steps and suffered a pathological fracture of the right femur. He was removed to Ancker Hospital, St. Paul and died the following day. (20 months after disease onset, 16 months after start of treatment) Through the courtesy of Dr. John F. Noble, Pathologist at Ancker Hospital, the following autopsy report is presented.

External Appearance:

The body is that of an adult white male, measuring 172 cm in length. Estimated weight 175 pounds. The body is normally developed and well nourished. Postmortem rigidity is present and there is postmortem lividity in the dependent parts. There is no edema, cyanosis or jaundice. The pupils are round and equal. The nose and ears show nothing of note. At the outer end of the right eye brow there is a contusion 1 cm in diameter and over the malleolus prominence on the right side there is a recent abrasion measuring about 1.5 cm in diameter. There is a second abrasion just in front of the right ear and extending almost to the outer canthus of the right eye which measures 2.5 cm. in length and about 6 mm. in diameter. The right thigh particularly in the upper third is considerably larger than the left. There is definite shortening of the right leg. There is external rotation and abnormal motility of the right leg and there is crepitation in the region of the upper third of the right femur. There is a scar at the point of the left shoulder measuring about 8 cm. in length over the outer end of the left clavicle. The external genitalia and anus show nothing of note.

Abdomen:

On opening the abdomen the subcutaneous fat is found to be 2 cm in thickness. The peritoneal surfaces are smooth and shiny. There is a very slight excess of a clear serous fluid present in the peritoneal cavity. The appendix is atrophic and cord like. The liver is flush with the costal margin. The diaphragm arches to the 4th intercostal space on each side.

Pleural Cavities:

On opening the pleural cavities the right lung is found to be adherent posteriorly particularly over the lower lobe and there is a fibrous band extending from the lateral chest wall to the surface of the upper lobe. The right pleural cavity is empty. The left pleural cavity is completely obliterated by firm, fibrous adhesions. The left lung is adherent to the pericardium.

Pericardium:

The pericardial sac shows a slight excess of clear serous fluid. The heart measures 13.5 cm in width. Examination of the large branches of the pulmonary artery shows no evidence of thrombi or emboli.

Heart:

The heart weighs 565 grams. There is a slight thickening of the free edge of the aortic leaflet of the mitral valve with some atheromatous infiltration at its base. The aortic valves are slightly thickened at the bases of the cusps. The tricuspid and pulmonary valves show nothing of note. The descending branch of the left coronary shows definite calcification and thickening of the wall but no evidence of occlusion of the lumen. The right coronary artery shows only thickening of the wall. The myocardium on cut section is pale and swollen in appearance. The root of the aorta shows a marked degree of puckering and light yellow raised areas which are about 4 cm above the aortic valve. There are two places in which the intima of the aorta is definitely broken and there are definite areas of calcification. There is an atheroma which partially occludes the orifice of the right coronary.

Lungs;

The right lung weighs 1260 grams. The pleural surface is smooth save for tags of fibrous adhesions at the base. Crepitation is very much reduced in the apex and is absent in the lower lobe. On cut section there is a marked excess of blood and fluid and throughout the lower lobe there are small raised reddish grey areas of consolidation. No pus can be expressed from the lung. The left lung weighs 940 grams. There are

tags of fibrous adhesions over the posterior lateral surface of the lower lobe and at the apex. Crepitation is very much reduced throughout the lung. On cut section there is a marked excess of blood and fluid. In the lower lobe there are the same areas of consolidation as those described above, but to a less degree.

#### Liver:

The liver weighs 1814 grams. The liver is saved intact. From the surface it appears that the organ is slightly fatty but otherwise normal.

#### Spleen:

The spleen weighs 127 grams. The capsule is smooth and wrinkles easily and over the surface there is a blotchy greyish white area of hyaline serositis. On cut section the pulp is firm and the follicles are distinct.

#### Kidneys:

The right kidney weighs 152 grams. The capsule strips easily leaving a smooth surface. The parenchyma is light red in color and the markings are distinct. The pelvis and ureter show nothing of note. The left kidney weighs 130 grams. It shows a picture very similar to the opposite organ.

#### Gastro-Intestinal Tract:

shows nothing of note.

#### Bladder and Genital Organs:

The bladder shows nothing of note. The prostate is slightly larger than normal but on cut section shows no evidence of adenomata or malignant change.

#### Pancreas and Adrenals:

show nothing of note.

#### Aorta:

The aorta shows a definite degree of atheromatous streaking most marked in the upper thoracic area.

#### Spine:

Examination of the spine from the abdominal cavity shows a firm boney enlargement in the region of the last 2 or 3 lumbar vertebrae. Examination of the bodies of these vertebrae shows them to be honey-combed and the spaces are filled with a greyish gelatinous tumor mass which has apparently prac-

tically completely destroyed the 3rd lumbar vertebra.

#### Clavicle:

The clavicle was removed and beneath the scar described above the outer end of the clavicle is found to be enlarged and distinctly harder than normal. This sclerotic process is probably secondary to X-ray therapy for there is practically no recognizable tumor tissue in this region.

#### Head:

On opening the head the scalp is found to be infiltrated with greyish, soft spongy tumor tissue at one point in the left parietal area. Examination of the skull shows 4 or 5 areas varying in size from 4 cm in diameter to about 1 cm where the skull is completely destroyed by this tumor growth and from the surface of the skull small masses of friable tumor tissue are projecting. After removal of the skull cap two extremely large masses of tumor tissue are seen extra durally, the largest is on the right side and measures about 7 cm in diameter and the smaller one corresponding to it on the left side measures about 6 cm in diameter. The tumor tissue here shows about the same picture. Examination of the brain shows two extremely large depressions due to these tumor masses. The one on the right hemisphere involves the right frontal temporal and parietal areas and measures 10 cm in diameter. The other flattened area on the left side is 6 cm in diameter and is limited to the parietal and posterior frontal areas. Examination of the brain shows no evidence of metastatic tumor growth into the substance.

THE FEMUR is not opened up but apparently the fracture is pathological, secondary to tumor infiltration.

#### Diagnoses:

1. Ewing's endothelioma of left clavicle, spine, scalp, skull, ribs and right femur.
2. Pathological fracture of right femur.
3. Deformities (depression) of brain.
4. Acute bronchopneumonia.
5. Acute pulmonary congestion and edema.
6. Operation scar.
7. Superficial abrasions.
8. Sclerosis of left clavicle.
9. Pleural adhesions.
10. Cardiac hypertrophy.

11. Coronary sclerosis.
12. Cloudy swelling of myocardium.
13. Generalized arteriosclerosis.
14. Fatty liver.
15. Hyaline serositis of spleen.

damage to the skin. Knowing, of course, that further treatment would have to be given and we did not wish to handicap ourselves by having a damaged skin to treat through. Abstr. Hanson.

#### Microscopic:

Microscopic sections of the tumor shows it to be composed of rather uniformly sized cells which occur in definite sheets. These cells have poorly defined outlines with definitely slightly vesicular nuclei. The cytoplasm of the cells is basophilic. The arrangement of the tumor is that of an endothelioma or Ewing's tumor.

Diagnosis: Endothelioma of the Clavicle.

#### Comment.

This case shows many interesting points both from a diagnostic and therapeutic standpoint. The age, 54, is out of the common frequency group for osteogenic. The first appearance (clinically, roentgenologically and pathologically) did much to confuse the diagnosis. A study of the roentgenograms shows a type of tumor almost characteristic of true osteogenic sarcoma with radiating spicules, fusiform expansion of the cortex and destruction. The appearance of metastases in the spine should have given a stronger impetus to the correct diagnosis because multiple bony metastases are uncommon in osteogenic sarcoma but are more or less the rule in Ewing's tumor. The appearance of the metastases in the skull is an interesting feature as the necropsy findings showed the masses to be extradural and only secondarily involving the brain.

The response to x-ray therapy shows the value of palliative treatments in this tumor. By a series of treatments, the pain could be controlled and the patient kept fairly comfortable. It is interesting to note that the clavicle at necropsy showed no gross tumor. (Moderate fusiform swelling with considerable eburnation and new bone formation). While there was considerable disability, the patient was up and around and in good mental condition until the day before his death. Pain in the clavicle was never present after the second series of treatment.

Heavy dosage of high voltage therapy was used at all times with considerable attention paid to keeping the fields well planned to secure the least possible

## II MULTIPLE MYELOMA WITH INTESTINAL OBSTRUCTION. Path. Randall.

The case is that of a white female, 38 years, admitted to University Hospitals 3-3-31 and died 3-8-31 (5 days).

### Dyspnoea

July to August 1928 - Short of breath. Edema of ankles and legs. Tired. Pregnant.

### Delivery

8-3-28 - Delivered at full term. Edema persisted for several months after this. Has never felt just right since.

### Blow

Oct. 1928 - Hit over head by falling board. Not unconscious, not knocked down, did not have to stop work.

### Tumor

Dec. 1928 - Bone in area of skull where hit is becoming soft and swollen. Not tender or painful. (Noted by patient).

### X-ray

March 1929 - Went to Clinic where diagnosis of "blood tumor" was made. Given x-ray therapy to skull. Told to return for further x-ray treatment. This she did not do. Pains in both shoulders. General weakness. All her hair came out following x-ray treatment. Swelling of head went down and left large hole in skull, (gradually healed). Rough edges could be felt. Defect became smaller.

### Healed?

July 1929 - Defect in skull completely gone. Since having had x-ray therapy? frequently becomes nauseated and vomits!! Weakness persists but feels fairly well.

### Pain

January 1930 - joint pains. Pains in chest and legs. Pain is vague (not severe), intermittent in character. Dizzy spells come on suddenly. After sitting down these spells pass away. No diplopia. 3-4 attacks per week. Lasted to July 1930.

### Fracture

June 1930 - during a dizzy attack broke upper part of left humerus. Did not fall threw her arm outward and it broke. Was

treated for 6 weeks at the hospital. The arm healed and she has had perfect use of it since. Developed severe itching of back (lying so long in bed in hospital?)

### Albumin

Was told she had kidney trouble with albumin in urine. After treatment this cleared up and later examination revealed negative urine. B-Jones?

### Anemia

August 1930 - Malaise, weakness, anoxoria. Was told she had anemia and took liver extract. Could not tolerate liver extract and had to discontinue use

### Well!

Dec. 1930 - Began to feel better and thought she would get well.

### Pleurisy?

1-3-31 - Attack of influenza. Malaise. Pain in joints, knees and elbows, complicated by pleurisy? on left side of chest, which caused a great deal of pain on deep breathing. In bed 4 weeks.

### Worse

January to March 1931 - Gradually getting weaker, anoxoria, vomiting for several days prior to admission to hospital. No abdominal pain.

### Hospital

3-3-31 - Weakness, lost 35# in weight, nausea and vomiting, malaise.

### Physical Examination

B.P. 100/60. T 98, P 110. Woman 39 years old, lying quietly in bed, apparently in no great pain. Very emaciated and pale. No mental impairment. Skin: dry and warm. Wrinkled like old woman. Reddened ulcerated area 3 cm. in diameter over scapula. Also decubitus ulcer over buttocks. Nodes - slight right cervical adenopathy. Vascular system negative. Reflexes negative. Muscles weak and flabby.

Bones and Joints

Upper half of left arm showed diffuse, soft area (fracture). Slight limitation of motion of elbows. Slight pain on extension. Left arm cannot be fully abducted. Clavicles enlarged and nodular. Right 4th rib anteriorly is also somewhat larger. Skull: Over occipital region in midline there is area about 6 cm. in diameter in which normal contour of skull is lost and appears to be flattened. Loss of convexity in this region and softened areas. Mouth: much dental work has been done. Fetid odor to breath. Tongue coated. Lungs negative. Heart: Apex visible in 4th interspace. Heart not enlarged. Systolic murmur on both sides of sternum. P2/A2. Abdomen: Distended and tympanitic. Rigidity present. No masses. Liver and spleen not felt.

Laboratory

3-5-31 - Urine: 1018. Heavy cloud albumin (Bence-Jones). 3-3-31 - Hb. 56%, RBcs 2,950,000. WBcs 6,150. P 70, L 29, R 1. Slight anochromesia, poikilocytosis, anisocytosis and polychromatophilis. Group II.

Progress

3-3-31 - General diet. T 99.6. P 115, R 26. Able to walk with some assistance, upon admission. Very weak. Could not retain food, nauseated, vomiting of 100 cc. greenish color fluid. S.S. enema expelled with poor results. 9:30 P.M. sodium bicarbonate, gr. xx, luminal gr. 1½.

Acid

3-4-31 - Gastric expression (histamine mm. v.)

1st Spec.	67	- free Hcl	5	Total	32
2nd "	31		0		19
3rd "	54		0		18
4th "	53		5		29

X-ray

Multiple myeloma involving bones of pelvis, skull, chest and femora. (Pathological fracture pubis and ribs). Stasis (gas) in small bowel. Hb. 56%, RBcs 3,380,000. WBcs 12,750.

Stasis

3-5-31 - Takes no nourishment and very little water. Abdomen less distended than 3-4-31. No abdominal pain. Vomits dark green material. Enemas and turpentine stupes give little relief. Peristal-

tic rushes on auscultation. Vaginal examination negative. Rectal negative. Smear negative. B.U.N. 50. Spinal fluid: pressure 60/100. Negative. Blood Wasermann negative. Emesis several times of small amounts. 1,000 cc. 10% glucose intravenously. Eye consultation: Fundi essentially negative.

Obstruction

3-6-31 - Urine - sugar 4 plus (intravenous glucose). Albumin negative. Blood Chlorides: 550, B.U.N. 58.8, Co2 64. X-ray: marked stasis of gas in small intestine. 10:40 A.M. 2,000 cc. 5% glucose intravenously. Gastric lavage 600 cc. retention. 7:15 P.M. 2,000 cc. 5% glucose intravenously. Surgical consultation History of gas, pain in abdomen several days with vomiting. Visible and palpable peristaltic over abdomen. No pain at any time. X-ray: Gaseous distension of small intestine. No gas in colon. Expels enemas. No recent fracture of ribs (no tenderness) to give spastic ileus. Vaginal examination shows a fairly large fibroid uterus. Rectal with middle finger shows a moveable mass just barely felt. Impression: Mechanical obstruction (sub-acute) with moderate intestinal distension. Treatment depends on outlook. One course is to withhold things by mouth and give para-oral fluids then liquid and later soft diet with mineral oil. Other things being equal should have exploration now. T 100, P 120.

Expectant Treatment

3-7-31 - Warm turpentine stupe. 12:15 A.M. Emesis 200 cc. brownish fluid. 9 A.M. Gastric expression 400 cc. retention of brown fluid having foul odor. Lavage with sodium bicarbonate. Voided 425 cc. Very weak and nauseated. 10 A.M. 2,000 cu. 5% glucose in saline intravenously. Poor day to date. Nauseated and general malaise. Abdomen more distended. Vomiting increasing and becoming more foul in character. A few sounds are heard over abdomen this morning but none this afternoon. Slight gas pains in abdomen. Slightly tender area over right lower quadrant. B.P. 102/60. P 100, good. T 102 (R), P 140. 2:30 P.M. intravenous 2,000 cc. 5% glucose in normal saline. B.U.N. 60.7. F.S.P. 1st hour -5%, 2nd hour 0. 6:45 P.M. Gastric lavage of 200 cc. brownish fluid, sour odor, followed by sodium



bicarbonate. 7:05 P.M. morphine sulphate gr. 1/6, Atropine sulphate gr. 1/180.

#### Operation

3-7-31 - 7:20 P.M. to Operating Room in semi-conscious condition. Condition poor. Spinal anesthesia (spinocaine). Stopped breathing (artificial respiration), rallied. Exploratory laparotomy done. Small intestine is found (ileo-cecal valve up) to be greatly thickened. Generalized chronic fibrosis of mesentery (appendectomy and enterostomy done). Incision closed and given oxygen and cardiozol. Transfusion 750 cc. blood. Breathing labored. B.P. 100/110, P 130. Irrational and mentally hyperactive. 11 P.M. Condition same.

#### Exitus

3-8-31 - 2 A.M. B.P. 108/70. Body cold. External heat. Refuses oxygen. 3 A.M. B.P. 98/65. Restless and hyperactive. Chloral hydrate gr. xx. P 140. Unable to sleep. Large amount of drainage. Pulse weak. Respiration labored. 7:30 A.M. B.P. 80/54. Color poor. T 103 (R). 8 A.M. B.P. 70/48. Pulse weak. Body cold. 8:20 Condition poor. 8:45 A.M. Cyanotic. Pulse weak. Breathing ceased. Died suddenly.

#### Autopsy

(Partial). Only examination of abdominal contents allowed through operative incision. The body is that of a well developed, undernourished, young white female about 38 years old. Length 158 cm. Estimated weight 105#. Very poorly nourished (emaciated). Rigor present. Hypostasis purplish and posterior. No edema, cyanosis or jaundice. Pupils round, regular and equal. 4 mm. in diameter. Midline abdominal incision 18 cm. in length and puncture wound in right lower quadrant 2 cm. in length. In both incisions (2 small rubber catheters). Midline incision is opened and abdominal contents explored.

About 500 cc. bloody (clear) fluid, principally coming out from pelvis. Appendectomy and ileostomy had been done. Omentum adherent to several loops of bowel. Small intestine somewhat distended (not markedly so.) Large intestine collapsed and appeared normal. Small intestine is quite thickened. Walls showed chronic hypertrophy. No evidence of mechanical obstruction. Intestinal surface finely granular. No ulceration.

Villi hypertrophic.

Pelvic organs negative. Both kidneys were small. Cortex and medulla distinct. Showed cloudy swelling. Glomeruli not very distinct. No tumor. Spleen small. Number of stones in gallbladder wall thickened. A number of lower ribs could be palpated and were found to be fractured. Sections taken. Bone is soft and friable. Section of left ilium taken (quite friable).

#### Diagnoses

1. Multiple myeloma.
2. Chronic intestinal obstruction (hypertrophy) of small intestine (amyloid).
3. Ascites (bloody).
4. Cloudy swelling of kidneys.
5. Chronic cholecystitis and cholelithiasis.
6. Abrasion of left ankle and decubitus.
7. Appendectomy and ileostomy.
8. Operation wounds.

#### ABSTRACT

MULTIPLE MYELOMA. Abstr. Randall.

Ref. 1. Geschickter, C. F., and Copeland, M. M., Arch. Surg. 16, 807-863 (April) 1928.

Ref. 2. Hueter, C., Beiträge für Path. Anat. and Allg. Path. 49, 101, 1910.

Ref. 3. Meyerding, H. W., Radiology 5, 132, 1925.

Ref. 4. Coley, W. B., An. Surg. XCIII, 77, (Jan.) 1931.

Ref. 5. Ewing, J. Neoplastic Diseases (3rd Edit.) W. B. Saunders Co., 321-326, 1928.

1. Definition: Specific malignant tumor of bone marrow, arising probably from a single cell type (plasma?), with multiple foci of origin, uncommon metastases, albumosuria and fatal termination (with many variations from orthodox description.)

2. Historical: Dr. William McInture saw a highly respectable tradesman, aged 45, Oct. 30, 1845 in consultation with Dr. Watson. Patient's urine had been repeatedly studied by Dr. Bence Jones who suggested addition of alum to tonics in use to check exhausting

excretion of animal matter (now known as Bence-Jones protein). Later Dalrymple (Dublin Quart. J. M. Sc. June 1846) reported results of microscopic examination of two ribs. In spite of obvious priority: Rustizky (1873) (27 years later) gets credit for histologic description and Kahler (1889) (39 years later) for association of multiple tumors and albuminuria.

3. Age: 40-70 (80%) peak at 55, same age factor as metastatic tumors. Five cases under 35. A few in children (2 to 12 years).

4. Sex: Male (80-70-68%) Approx. M2-f1. Occurrence widespread (all countries, social status, any clime).

5. Frequency: .03% of all malignancy; 400 bone sarcomas (3% myeloma). Sarcoma (all types) constitutes 35% of malignancy, bone sarcoma 1%. Impression: probably not common. Mayo clinic 13 cases (1925). 15 out of 548,000 admissions (1930).

6. Cause: unknown. Suggestions: Trauma (20%) usually slight or "recall under questioning type". Infection (often associated in same age group) febrile course used as evidence? (See our cases). Familial - few cases. Constitutional - because of widespread beginning?

7. Onset: Insidious (75%) or abrupt. Usually pain (see our case). Trauma calls attention to bone lesion.

#### 8. Clinical:

A. Pain: usually starts as "rheumatism" wandering, intermittent, generally in back, (70%); ribs or sternum (20%); legs, arms or shoulders (5%); others (5%). Other types - neuritic (girdle or down legs). Aggravation on motion, pressure. Always subject to remissions and acute exacerbations. Sudden onset of pain may prostrate (beginning) after exertion or fall. Stages: 1. onset, 2. exacerbation, 3. recession, 4. remission, 5. extremis (average course 1-2 years.) During free interval (opiates no longer needed) think they are getting well. (See our patient). Then pain is extreme and death may be

unexplainably sudden. Results of therapy must be evaluated very carefully on this account (Coley's toxins and x-ray).

B. Tumor: sometimes initial finding; usually if not always multiple (425 cases - 420 multiple, 5 single, all doubtful). Ribs, sternum or clavicle and spine (90%). Skull, femur, pelvis and humerus - less frequent in order named. Of the original (90%), 40% have additional sites. No tumor in extremity (alone). Size pin point to hazel nut (tenderness, pulsation, lump, pathological fracture). May be diffuse absorption with minimal tumor formation (one of our previous cases). Original tumor if in spine is often obscured by (stiffness, kyphosis). Note: stiffness, pain, tenderness in spine, <sup>demand</sup> x-ray examination in elderly subjects. Other signs: parchment crepitation, spontaneous decrease, disappearance and reappearance.

C. Deformity: 60% thoracic - may involve pelvic girdle and extremities (pseudo-Paget). Special: sinking angle of Ludwig, wavy gladiolus, parasternal rosary, flattening of lumbar curve, telescoping kyphosis, scoliosis. Posture protruding abdomen, bulging lower ribs on pelvis, feet apart, shoulders back, deliverate walk (often bed patient), sometimes chin rests on chest, 'ulcer), tire very easily, teeth fall out, etc.

D. Fracture: 62%, (other frequencies (33% metastatic, 38% cyst), probably most frequent of all. Other diseases usually in long bones. Note: 50% in ribs in myeloma - often multiple. Some unite, others do not. No ground for belief fracture is primary.

E. Pulmonary: Chronic bronchitis and emphysema. Painful respiration contributory. Others dyspnoea, asthma, anginoid pains, pleurisy, often terminal pneumonia.

F. Neurologic: paraplegia with other neural disturbances (40%). Insidious onset - weakness, stumbling, bladder, myelitis,

flaccid, rarely unilateral, may recede. Others: diplopia, throat, radiculitis, etc. toxic neuritis? Psyche usually clear until near end.

3. Kidney: 70% lesions not well studied, e.g., chronic nephritis (others - tubular, acute) amyloid reported. Mixed with hypertension factor - Lesion usually interstitial (pyelonephritis) with patchy atrophy, exudate, atrophic and dilated tubules, albumin, decreased function, (cord kidneys?) glomerular changes?

H. Bence-Jones albumin: 60-80%.

Also found in other primary and metastatic bone tumors, osteomyelitis, leukemia, chloroma polycythemia, experimental aplastic anemia. Rare, if not unknown, outside bone disease. Cloud in urine appears 50°-60°C. (43°-46° C) dissolves (90°-100° C) reappears on cooling. Always do urinalysis in bone disease. B-J usually late, may be intermittent.

I. Blood: anemia (75%) (Count 2.0 to 3.0) whites usually normal, 25% increase. Myelocytes may appear. Low platelet count (hemorrhage and epistaxis).

J. X-ray: Multiple lesions trunk, skull and proximal skeleton. Bone destruction pea to orange, osteoporosis in some, mottling, punched out, fracture (not clean) expansion, deformity.

K. Biopsy: Bleeds freely, parchment shell, dark red or grey tissue. Cell type: oval or egg shaped plasma cells. Differ from blood cell in plasma stains (blood-blue, myeloma - not blue). Others show lymphocytes, giant cells. Myelocytes and myeloblasts (transition of above). Rich in vessels, hemorrhage, eosinophiles. Tumor fuses with surrounding tissue. Cells rarely if ever circulate? (Doubt about this).

9. Metastasis: usually local infiltration. Some show metastases to distant organs (multiple); every part of body may be involved. May be likened to lymphosarcoma (irregular sized cells). Most frequent site, if present - lymph nodes.

10. Gastro-intestinal: 20% diarrhoea, colicky pains (assumed to be terminal enterocolitis) usually achylia when studied, sometimes peptic ulcer, or metastases. Outstanding when present are nausea, vomiting and colicky pains. (Note early appearance in our case.) Most observers think this is due to cord lesion, i.e., nausea without vomiting, etc. But Ewing records amyloid finding in one case in small intestine and muscles of thorax, shoulder joint. (Ref. Hueter.)

#### REPORT

Askanazy, 58, male, typical multiple myeloma. Stubborn obstipation, abdominal tumor, melena, sudden death. Autopsy - typical myeloma. No amyloid in spleen, liver, kidney, heart or stomach. Limited to jejunum and ileum (thick wall) fine nodular masses (like ours), ulceration. Amyloid: perivascular in serosa, muscle (more circular) small plaques and diffuse masses caused thickness of wall, also in muscularis mucosa, ulcers (very little if any in mucosa proper). Jejunum most marked. Impression: Very few cases found in literature - preliminary search and review articles. In view of similar findings in our case (thickened bowel, obstruction) it seems likely that some of 20% showing gastro-intestinal symptoms may be amyloidosis of intestine. Note: In addition to orthodox causes (osteomyelitis, tuberculosis, syphilis) amyloid may be found in Hodgkin's disease, leukemia, goiter (Hunter W.C. and Seabrook, D.B., Arch. Surg. 20, 762-767 (May) 1930). Tongue and heart (idiopathic tumors), etc.

11. Course: 1-2 years - fatal. Longest 5½ years. Not influenced by therapy (See untreated course).

#### SUMMARY (MULTIPLE MYELOMA).

1. Frequency .03% of all malignancy; 3% of bone sarcomas.
2. Chief clinical findings are pain, multiple tumors, deformity, fracture, pulmonary, neurological changes, Bence-Jones bodies, anemia.
3. Most valuable diagnostic aids are x-ray and biopsy.
4. Cell type is plasma cell with variations.
5. Usual form infiltrates locally;

Others disseminate widely.

6. Kidney lesions have not been well studied.

7. Pathological fracture (trunk) is most common of all tumors.

8. Gastro-intestinal involvement occurs in 20%.

9. In our case it was due to amyloid infiltration of small intestine.

10. Course is characterized by remission (pseudo-cure) and exacerbations.

11. Disease is fatal (average 1-2 years).

12. Cause is unknown. (Trauma 20% is probably secondary).

13. Incidence by percentage of leading symptoms: a. Fatal course (100%), b. Skeletal tumors in trunk (90%), c. Age 40-70 (80%), d. Red cells under 4 million (77%), e. Males (70%), f. Lumbar pain (70%), g. Nephritis? (70%), h. Bence Jones bodies (65%), i. Pathological fracture (62%), j. Thoracic deformity (60%), k. Bronchitis (55%), l. Neural changes (40%), m. Rib fractures (32%), n. Myelocytes (25%), in blood, o. Gastro-intestinal symptoms (20%), p. Trauma (20%), q. Amyloidosis? (Our note).

Note: All references are excellent, especially Geschickter and Copeland. Bibliography 1845-1928. 322 references.

#### III. CARCINOMA OF BREAST WITH MULTIPLE METASTASES.

Path. Hendrikson.

The case is that of an adult, white female, 65 years of age, admitted to University Hospitals 5-20-31 and died 5-21-31 (1 day).

12-?-29 - Dyspnea on exertion.

10-?-30 - Nocturia and frequency with "creamy" urine at times.

#### Pain of metastases?

12-1-30 - Pain in right breast, low in the back, and in right knee.

#### Lump in Breast

12-30-30 - Patient noticed lump about 1½ inches in diameter in right upper quadrant of right breast. Constipated.

1-21-31 - Physician consulted. She was told that she had carcinoma.

1-24-31 - Consulted another physician and again was told that she had carcinoma

of breast. Advised to enter University Hospitals.

#### Three Weeks (Dispensary)

1-30-31 - (Disp.) Physical examination: Head and neck negative. Chest - right breast contains large, hard lump with marked retracting nipple. Large axillary lymph nodes are palpable. Sinus in lower rib in mid-axillary line. Heart - negative. Lungs - apparently normal. Abdomen - negative. Back - marked tenderness over lumbar spine and right kidney region, as well as over right hip down to right knee. Impression: Carcinoma of right breast and axillary gland involvement. Pain in lumbar spine and right hip may be due to metastases. Referred to tumor Dispensary with same diagnoses with suggestion that metastases may also be present in lungs. Advised to have x-ray. Laboratory: Urine - negative.

#### Hospital

Advised to enter Hospital and did so the same day. On entry, she states that her appetite has been poor for 1 year and her stools were clay colored for 3 days. Physical exam. same as above. Mass stated to be 3 to 5 cm. in diameter. No supraclavicular nodes are palpable. Blood pressure 104/74. Has lost 30# in past 2 weeks. Right knee, especially patella, is tender on palpation. Tenderness is also over sacrum and 4th and 5th vertebrae. Laboratory: Blood - Hb. 90, wbc's 12,850, P 76, L 23, M 1, NPN- 34.5,

2-3-31 - X-ray of right knee showed slight hypertrophic arthritis.

#### X-ray

2-4-31 - Advised to have x-ray therapy. X-ray of chest and pelvis revealed osteoclastic and osteoblastic carcinomatous metastases to pelvis and femora with a possible metastases to lungs.

#### Treatment

2-5-31 - 40 gold implants of radium emanation of 1 mc. each inserted. Total dose 5280 mc. hours.

2-11-31 -- 3-2-31 - 150% of a skin erythema dose to right breast and 60% to 4 fields of pelvis in 8 treatments.

2-8-31 - Discharged from Hospital.

#### Treatment

2-11-31 - Readmitted to University Hospitals, for the deep x-ray therapy.

3-3-31 - Discharged again with instructions to return to Tumor Dispensary.

#### Chest findings

5-6-31 (Disp.) Losing weight. Becoming progressively weaker. Still constipated. Raises bloody sputum and pus occasionally. Coughs. Has a rattling noise in left chest. Is short of breath.

#### Progressive metastases

5-20-31 - Readmitted to University Hospitals. Physical examination: Head - left ear drum is retracted. Heart - rate 90, blood pressure 104/55; rhythm irregular at intervals with occasional premature beats. Lungs - asthmatic rales over entire areas of both lungs. Gurgling rales over both bases. Dullness over both bases, posteriorly. Patient is very dyspneic and all accessory muscles of respiration are being used. Peculiar oscillating vocal fremitus like a crepitation is felt over the left base in axilla. Extremities - Edema of ankles and feet. Adenopathy - very large, irregular mass felt in right inguinal region but none felt elsewhere. Reflexes - right knee jerks absent, left sluggish. Both ankle reflexes absent. Ankle clonus absent. Abdominal reflexes and Babinski absent. Breasts - no evidence of primary tumor. Diagnosis: Carcinoma of right breast with metastases to lungs, right inguinal glands and pelvis. Cardiac decompensation. Patient is admitted to Medical service for what was considered cardiac decompensation. Right chest tapped in 9th interspace and 1200 cc. of transudate removed with relief. Eye grounds examination reveals no abnormal changes.

#### Unusual

X-ray of chest, pelvis and upper femora reveals right pleural effusion, a linear type of metastases to the lungs and osteoclastic metastases to pelvis, lumbar spine and femora.

#### Worse

5-21-31 - 500 cc. of fluid removed from left chest and 150 cc. from right chest. 7:30 P.M. - Patient is very dyspneic, pale and perspiring profusely. Sits on edge of bed with no covering over her. Says she is very hot although it is a very cold day and both windows are wide open. Lungs have no rales.

Pleural cavities are apparently free of fluid. There are, however, asthmatic sounds over both chests. Portable x-ray plate shows a fairly large amount of pneumothorax on right side with partial collapse of right lung. A moderate amount of fluid is still present. There is a partial obliteration of the left costophrenic sinus due probably to some fluid. The markings in the lung fields are markedly exaggerated as noted before.

Examination of cords shows no evidence of obstruction.

#### Exitus

Adrenalin M x (H). 8 P.M. - Caffeine gr. viiiss (H). Temperature 97. Very dyspneic. 8:30 P.M. - respirations are slow and shallow. Patient expired.

#### Autopsy

The body is that of an adult, white female, about 55 years of age, weighing approximately 135#. She is well-developed and well-nourished. Rigor is present. Hypostasis is purplish and posterior. There is no edema. Pupils are equal and regular, measuring 5 mm. in diameter. There are puncture wounds in both antecubital spaces. There is a brownish, mottled discoloration over the outer surfaces of the right breast. An almond-size, firm mass can be felt in the deeper tissues with some difficulty as the whole breast is slightly indurated compared with the left breast. A few navy bean-size nodes can be felt in the right axilla. The breast is examined from the under surface and a typical scirrhous carcinoma with finger-like projections into the surrounding tissue, measuring approximately 1.5 cm. in diameter, is found in the upper right quadrant near the outer margin. On dissecting the axilla, navy bean to almond-size, firm lymph nodes are found.

The fat on the anterior abdominal wall is 2 cm. in thickness. The appendix is small, whitish, atrophic, subcecal and free. The diaphragm is at the 5th rib on the right and the 5th interspace on the left. Whitish, slightly elevated patches, 2 to 5 cm. in diameter, are seen on the outer surface of the liver. On removing the chest plate, a few adhesions are present between the lung and the lateral surface of the pleura.

The LUNGS are grayish dappled with black. Along the mediastinal surface, a grayish streak radiates from the mediastinum towards the apices. The glands of the mediastinum form a mass about the large vessels and a chain of glands can be felt coming downwards along the course of the vessels towards the root of the heart.

The LUNGS are removed intact and are not weighed. A section is made towards the mediastinum from the lateral surface of each lung and the surfaces made by cutting show a firm infiltration along the bronchi and vessels radiating outward 6 to 7 cm. from the hilus towards the outer surfaces on both sides. The lymph glands are flat dappled by a few whitish areas. There are split-pea to bean size, black lymph nodes along the margin of both bases some of which contain a whitish area on cut section.

The SPLEEN weighs 175 Gm. and is grayish-purple. The trabeculae are prominent. There are no signs of carcinomatous metastases.

The LIVER and PANCREAS are removed intact to serve as a specimen because of the large nodes in contact with the head of the pancreas along the hepatic artery and portal vein which give the impression of a carcinoma at the head of the pancreas when the finger is placed through the foramen of Winslow. The nodes vary in size from those 3 x 5 cm. to those .5 cm. in diameter and are very firm and adherent to the surrounding structures.

The GALL-BLADDER is small and contains a light brownish fluid which passes downwards through the ducts on pressure over the fundus.

There are no signs of metastases in the GASTRO-INTESTINAL TRACT. However, the nodes along the spinal column are firm and are whitish-gray in color on cross section. There are walnut-size to navy bean-size nodes in the inguinal region which are also firm as though indurated with the carcinoma.

The ADRENALS appear normal.

The LEFT KIDNEY weighs 150 Gm., the RIGHT 140 Gm. There is one metastatic nodule, 4 mm. in diameter, near the upper pole of the left kidney. The surfaces made by cutting are slightly paler than usual. The kidney margins are normal. The bladder appears normal.

The AORTA shows no degenerative stages.

The uterus, tubes and ovaries show no abnormal changes.

The LYMPH NODES have been described above.

The organs of the HEAD and NECK are not examined.

#### Diagnosis

1. Scirrhous carcinoma of breast.
2. Metastases to right axilla, lungs (infiltrative bronchovascular), region of pancreas, lymph nodes, kidneys, bone (osteoclastic and osteoblastic), and right inguinal gland.
3. Pneumothorax (clinical).
4. Brownish pigmentation of right breast region.
5. Puncture wounds.
6. Pleural adhesions.

#### Comment

Ill-health (cachexia) may have preceded discovery of primary tumor in breast by patient. Note: Pain in breast, back and right knee, early in illness.

Course: In spite of fact that patient reported rather promptly after discovering tumor, course was rapidly down hill and multiple metastases were seen.

Lung findings are unusual. The first records of physical examination of chest show no change. At this time, (x-ray) metastases to lungs were suggestive. The tenderness over lumbar spine, right kidney region and right hip down to right knee indicated bone tumor which was demonstrated by x-ray. Note generalized metastases without apparent involvement of supraclavicular nodes. Weight loss was 30# in two weeks. Tenderness about knee suggestive of hypertrophic arthritis. Given prompt radiation treatment which apparently did not alter course. When she returned 5-6-31, raising bloody sputum, coughing, positive chest findings, shortness of breath, edema of feet and ankles (which apparently disappeared), finding of large inguinal mass as result of secondary extension from bone or direct to node. Pleural effusion of bloody type is again suggestive of malignancy. Infiltrating mass in mediastinum with linear radial extension into both lung fields is probably result of direct extension

through chest plate then on into lungs. Finding of tumor in liver shows downward spread. Very difficult in looking back on the case to tell when the tumor really started. Would indicate difficulty in health education as to possibility of prompt report when tumor discovery is made.

## ABSTRACTS

### METASTATIC CARCINOMA OF BREAST

#### 1. Reference

Cancer of the Breast, Hanley, 2nd edition, Hoeber, 1922.

Two theories of cancer dissemination from breast (embolism and permeation). Author believes centrifugal spread of growth is through lymph channels to skin, subcutaneous fat, deep fascia, muscles and bone. Examination of tissue by serial sections shows continuous tumor growth. Absence of continuity in some probably due to degenerative changes. It is possible to extend thru lymph channels to axillary and supraclavicular nodes, chest wall, mediastinum, along fascia to liver and peritoneal cavity. Modern operations are based on this conception. Considers invasion of bone may be accounted for by permeation. Attempts to prove theory by statistics and serial sections of lymphatics.

Comment: While permeation may account for much of extension seen in carcinoma of breast, it is difficult to rule out embolic process or direct extension. Most observers take middle ground.

#### 2. Reference

Copeland, M. M., Radiology XVI 198-210 (Feb.) 1931.

Report of 334 cases of osseous metastases (J. Hopkins) according to primary: 100 breast cases (5.2%) instead of (50%) because study represents one examination only. Bone involvement when present similar in location to reports elsewhere. No relationship to side involved. Did not bear out strict permeation theory.

Table I - Metastatic Bone Lesions  
Incidence of Cases - Five-year Cures

<u>Primary Malignancy</u>	<u>No. Cases</u>	<u>Osseous # Cases</u>	<u>Metastases %</u>
Breast carcinoma	1914	100	5.2
Prostatic "	1040	134	12.8
Stomach "	537	7	1.3
Colon & rectal "	497	3	0.06
Melanoma	169	3	1.77
Uterine carcinoma	86	5	5.6
Hypernephroma	63	22	34.9
Ovarian carcinoma	60	1	1.6
Testicular sarcoma	42	1	2.4
Lung carcinoma	24	4	16.6
Ovarian sarcoma	15	1	6.6
Thyroid malignancy	15	6	4.
Testicular carcinoma	13	1	7.7
Undetermined malig.	..	37	..
Nasopharyngeal carc.	..	1	..
Squamous-cell "	..	2	..
Soft-part sarcoma	..	2	..
Bladder carcinoma	..	1	..
Esophageal "	..	1	..
Ileac sarcoma	..	1	..
Liver carcinoma	..	1	..

#### 3. Reference

Lenz, A. M., and Fried, J. R., Annals of Surgery, XCIII, 278-293 (Jan) 1931.

#### General

Authors state patients alive when investigated or those dying accidentally or from intercurrent diseases, illustrate only single chapter in life history of breast cancer and do not give true picture of disease as a whole. (Note: See Johns Hopkins statistics, 5 or 50% bone metastases.) In Montefiore Hospital, New York, during past ten years, many patients reach there in terminal stage of disease. Clinical course, reconstructed, from patients' history and consultation with records.

#### Material

168 cases of carcinoma of breast with metastases to various parts of body were studied from time of discovery of tumor to death. Nearly half had skeletal metastases, proven roentgenographically or at autopsy. More than half of these had involvement of lumbosacral spine and about one-third of skull. Of the latter, more than half gave neurologic signs of brain involvement and of the former, 15 cases were thought to have spinal-cord

metastases. No cases of spinal-cord involvement were observed in absence of disease in lumbosacral spine. This is probably true of brain. Of the 85 cases of metastases to skeleton and central nervous system, 67 were verified histologically; 32 of these were examined post-mortem. 60 of 85 cases could be grouped according to histological evidence of malignancy. Of 85 cases nearly 66% had radical mastectomies; 15% were not operated upon; 3% had simple mastectomies, and 6% had only biopsies. Radiotherapy was withheld in some because of advanced state of disease.

#### Age and Sex factor.

80 women and 1 man. Age of patients when tumor appeared varied from 22 to 75 years, under 30 (5%), 30-40 (30%), 40-50 (37%), 50-60 (19%), 60-70 (8%), and above 70 (1%). Primary tumor arose in right breast 43 cases and left breast 38 cases. Information regarding clinical or microscopical involvement of axillary lymph nodes so unsatisfactory that it was decided to leave this factor out of consideration.

#### Anatomical Distribution

Pelvis 62%, Spine 59%, Femur 54%, Ribs 39%, Skull 35%, Humerus 27%, Scapula 16%, Clavicle 14%, Tibia 3%, Sternum Radius, Ulna, Hands, Fibula and Bones of Feet 1% each. (Note: Most of cases had multiple metastasis so same case appears under several headings.)

#### First Site of Involvement:

As suggested by pain and later confirmed Roentgenographically. Sacro-lumbar spine 37%, femur 16%, pelvis 14%, skull 13%, dorsal spine 5%, ribs 5%, humerus 4%, scapula 2%, clavicle 1% and tibia 1%. (Note: Anatomical distribution of metastases correspond to findings of others except Hanley. Hanley shows higher percentage of sternal and rib involvement (probably closer to facts than above) and less distant involvement (which is probably not so true).)

#### Grading:

Grade I,	26 cases,	avg. duration of		
		life in months	...	50.2
Grade II,	26	"	"	...23.5
Grade III,	5	"	"	...17.3

(Note: Gradings correlate very nicely with length of life.) Survival after onset of skeletal metastases, 50 cases.

Grade I,	23 cases	survival period		
				15.1 mos.
Grade II,	22	"	"	" 8.0 "
Grade III,	5	"	"	" 9.0 "

#### Summary

1. 168 cases of metastases to various body from carcinoma of breast are studied
2. 48% had skeletal metastases, 15% brain, and 8.7% spinal cord involvement.
3. Life expectancy was markedly shortened with increasing malignancy according to grading methods as to time intervals between (a) discovery of tumor and onset symptoms in skeletal metastases, (b) survival period after discovery of tumor, and (c) after symptoms of skeletal metastases.
4. Age, apparently, had no influence upon the survival period (most cases occurred between 40 and 50).
5. Pain was first sign, 75% of cases. Roentgenographic evidence varies from a few weeks to one year following this.
6. Pathological fractures (26%) usually terminal.
7. X-ray and radium therapy are useful agents in control of pain.
8. In few cases it produced remarkable temporary regression and in a few cases of invasion in central nervous system caused definite palliation.

#### 4. Reference

Carnett, J. B., and Howell, J. C., Annals of Surgery, XCI, 811-833 (June) 1930.

#### General

In six-year period (1924-1929) 267 patients with breast cancer were registered in Radiological Department of Philadelphia General Hospital. The great majority were in late stages, being inoperable or having recurrence after operation. Many succumbed from extensive visceral metastases before sufficient time elapsed to develop bone metastasis. In this group there were 2 patients with acute carcinoma. 204 patients had more or less extensive x-ray examination of skeleton. 49.5% of 101 cases gave definite evidence of bone metastases.



Age and Sex Factor

100 women and 1 man. Distribution:  
 Skull 14, cervical vertebrae 10, thoracic  
 vertebrae 41, lumbar vertebrae 44, pelvic  
 bones 45, femora 32, leg bones 7, foot  
 bones 4, shoulder girdle 54, forearm  
 bones 6, bones of hand 4, and ribs 35.  
 Cervical vertebra probably smaller than  
 real involvement because of technical  
 difficulty? Metastasis were clastic and  
 blastic types.

Comment

Authors differ from blood stream  
 embolie and Hanley theory. 30 cases dy-  
 ing of intercurrent disease before cancer  
 ran course, showed extensive evidence of  
 intra-abdominal lymphatic permeation  
 (over 80%). Fairly constant finding is  
 enlargement and induration of lymph nodes  
 along abdominal aorta, common iliac  
 arteries and pelvic regions. Authors  
 believe they occur first in mesojejunum  
 and think they result from permeation  
 (which differs from Hanley's trans-  
 coelomic transplantation theory). Authors  
 are, apparently, very much impressed  
 with permeation idea and seem to feel it  
 probably explained all metastases.  
 Believe only reason that lower bones are  
 not involved (distal portion) is disease  
 kills before cancer has chance to invade.  
 We cannot predict which one or more of  
 the lymphatic routes to skin and fat, to  
 bones, or to thoracic or abdominal  
 viscera, permeation will elect to follow  
 in any given breast case but once we  
 obtain evidence of permeation having  
 started on one or more routes we can  
 make a reasonably accurate prediction  
 of the metastatic deposits that will  
 follow and this we could not do if blood-  
 stream were the main factor in dissemina-  
 ting cancer cells.

IV. CARCINOMA OF ANTRUM WITH PERIPHERAL  
METASTASES. Path. Pearson.

The case is that of a white male, 47  
 years, admitted to University Hospitals  
 1-28-31, died 3-10-31 (41 days).

Sinusitis

July 1930 - Complained of pain in eyes,  
 especially left. Diagnosis of sinusitis  
 by physician.

Submucous

August 12, 1930 - complains of pain in  
 left antral region. Slight toothache.  
 Submucous resection performed.

Granulation Tissue

September 12, 1930 - Excess granulation  
 tissue removed from antrum.

Gumma?

10-1-30 - Tumor appeared in roof of  
 mouth. Two physicians (consultation)  
 diagnosed gumma. Blood Wassermann  
 negative. Given 4 arsenic and 2 mercury  
 injections without effect on tumor.

10-24-30 - Referred to University  
 Dispensary. (Eye Department) - diagnosis  
 dacryocystitis (left side). Mercurio-  
 chrome 2% injected. Hard mass in palate  
 (left side).

Biopsy

Biopsy - squamous carcinoma.

Pain

12-12-30 - Complains of slight pain in  
 lumbar region. Also vague pains over  
 abdomen, not related to food or bowel  
 movements. Urine negative. Hb. 86%.  
 WBCs 7,600, Pmns 70, E 4, L 20.  
 Wassermann - State Board and Larson ne-  
 gative. Smear (urethral) occasional  
 pus cell.

Rapid Growth

10-30-30 - Rapid growth of tumor for  
 past 6 weeks. Left antrum, nostril and  
 palate filled with tumor. Nodes on  
 both sides of neck involved. 14% skin  
 erythema dose to region of left face  
 and neck in 4 treatments (8 days).

X-ray

10-28-30 - X-ray of sinuses showed a  
 very marked pansinusitis, on left side  
 involving especially sphenoids and  
 ethmoids. Some thickened mucous mem-  
 brane in right maxillary also present.  
 Definite evidence of malignancy cannot be  
 made out. Conclusion: Pansinusitis  
 left, thickened mucous membrane (right  
 maxillary).

12-2-30 - X-ray: Plates of sinuses  
 made and compared with those taken 10-28-  
 30. Marked decrease in density in all  
 left paranasal sinuses indicating absorp-  
 tion or removal of pus. There is,

however, some evidence of thickening of mucous membrane in left maxillary sinus, and similar thickening in the right maxillary sinus as previously reported.

Conclusions: Marked improvement of pansinusitis, previously reported.

#### Spine

12-16-30 - No definite evidence of metastasis in lumbar spine. There is some increase in density along anterior superior margins of lumbar vertebrae, somewhat more marked in 5th lumbar vertebrae.

Probably represents a beginning hypertrophic change. Conclusions: Slight hypertrophic arthritis of lumbar spine.

#### Back

12-18-30 - Dispensary note: No evidence of metastases in lumbar spine. Sodium salicylate gr. x. given t.i.d. and heat prescribed.

12-22-30 - Still complains of pain in lower back region. Not much relief from salicylate. Aolan 5 cc. intramuscularly, and diathermy over back. Prostate enlarged but shows no infection.

12-26-30 - Patient feels better. 8 cc. aolan injection.

12-30-30 - Patient feels better. 10 cc. aolan injected.

#### Worse

1-3-31 - Pain in back worse. Aggravated by motion. Aolan 10 cc. injected intramuscularly.

1-5-31 - Patient strapped. If no relief, application of plaster jacket suggested.

#### Cast

1-12-31 - X-ray Diaphragm, mediastinum, heart and pleura normal. Lungs show no evidence of disease. Ribs show no evidence of disease. Conclusion: 1. negative chest. 2. Negative ribs. Plaster cast applied with moderate relief for short time.

#### Hospital

1-28-31 - Admitted to University Hospitals. Physical Examination shows a fairly well developed and nourished middle aged male complaining of pain in back. Examination of nose showed nasal congestion, mucopurulent slightly blood-stained bilateral discharge from sinuses. Old scar on roof of mouth on left side. Chest negative. B.P. 146/97. Pulse 84. Prostate enlarged. Complains of excruciating pain in lumbar region. Codeine sulphate gr. i given.

#### Pain

1-29-31 - Case removed. Complains of pain in back. Codeine gr. i given q.i.d. Unable to void. Catheterized. Laboratory Hb. 101%. WBCs 8,350, P 77, L 18. Eye Consultation: Fundi no changes. Eye movements not normal.

#### Cord

Neurological consultation: Cranial nerves are negative. Knee jerks plus 2 bilateral. Ankle jerks plus 1 bilateral. Right positive Babinski, questionable left. Tendon pain and muscle pain is slightly reduced bilaterally. Strength decreased about 50% in lower extremities. Vibration sense decreased bilaterally. Abdomen much distended and tympanitic. Abdominal reflexes present. -1 upper. Mid and lowers bilaterally absent. There is hypalgesia and slight hypaesthesia below the region of the 6th thoracic segment anteriorly and posteriorly.

Opinion: Cord compression 4th to 6th thoracic vertebrae.

#### Retention

1-30-31 - Complains of severe pain in back. Codeine sulphate gr. i x 3. Elixir I.Q.S. i dram t.i.d. Unable to void. Catheterized 950 cc. obtained. Nasal irrigations with normal saline b.i.d. begun.

1-31-31 - Complains of severe pain in back and soreness in right scapular region. Codeine gr. 1 given 4 times. Unable to void. Catheterized 900 cc. obtained. Cascara 4 drams given. Noble's enema with good results. Urine: numerous WBCs. Spec. gravity 1014. P and T normal.

#### Distension - Tumor

1-31-31 -- 2-3-31 - Unable to void and has to be catheterized. Complains of severe pain in back. Codeine gr. i. given q.i.d. Abdomen distended. Magnesium sulphate 1/2 oz. b.i.d. for 1 day. Biopsy of antrum taken - diagnosis carcinoma. Medical note shows that there is small mass in right lower thoracic region.

2-3-31 - Complains of severe pain in back. Codeine gr. i given 4 times. Viosterol 10 drops b.i.d. Urethral smears negative.

2-5-31 - Severe pains in back. Codeine gr. i x 5 given. Some difficulty in breathing. Unable to void. Has to be catheterized. Abdominal discomfort.

S.S. enema given. Fair results. Medical consultation: Extremely tender over left 6th rib in anterior axillary line. Question of metastases should be considered and metastases of spine should be considered as cause of bladder trouble.

#### X-ray

X-ray of thoracic vertebrae and right scapular region: Distinct hypertrophic change in lower dorsal vertebrae with some slight compression of bodies of 9-10-11th dorsal vertebrae and slight rarefaction. Some obliteration of spinal canal in region of 8th to 10th dorsal vertebrae. Density which suggests a soft tissue mass. Metastases to bodies of vertebrae themselves is very doubtful, but soft tissue mass may represent a large metastasis with secondary pressure on cord.

#### Tumor

There is no definite evidence of metastases in ribs. Some deviation of the posterior pleura on left is made out in region of soft tissue mass, suggesting possibility that it has invaded thorax.

Conclusions: 1. Soft tissue lesion in region of the spine. 2. Secondary atrophic and hypertrophic changes in the bodies of the vertebrae. Deep x-ray given.

2-6-31 - Abdomen distended. Noble's enema and hot turpentine stupes given with slight relief. Complains of pain in back. Codeine sulphate gr. i. given q.i.d. Urèthral smears negative. Unable to void and has to be catheterized.

#### Pyuria

2-8-31 - Complains of severe pain in back. Codeine gr. i x 6. Urine - full of pus cells. Ammonium chloride gr. xv, urotropin gr. x given q.i.d. Unable to void and catheterized. Has fecal incontinence. P and T normal.

2-10-31 - Complains of severe pain in back and abdomen. Codeine gr. i given t.i.d. Morphine sulphate gr. 1/4 x 2. Urological consultation: Urinary retention due to compression myelitis from metastatic lesion of spine. Prognosis bad. Suggest: Catheterization t.i.d. or vasectomy with indwelling catheter. 2. Urinary antiseptics. 3. Force fluids. 4. Opium suppositories prn for bladder distress. Poor prognosis contraindicates other measures. Patient to deep x-ray. Catheterized and bladder injected with 1/1,000 silver nitrate. P 114, T 100.4.

#### Chest Tumor

2-14-31 - Complains of severe pain in back, legs and burning around the rectum. Cannot void. Catheterized and boric acid solution instilled. Morphine sulphate gr. 1/4 x 5. Sod. bicarbonate gr. xx 4 x daily. Medical note: Patient now has 2 firm, rounded swellings each about 7 x 4 x 2 cm. on both lateral surfaces of the chest. Cause constricting pain of marked severity. Urine: 1008 spec. gravity. Very little pus.

#### Legs

2-18-31 - Complains of pain in back and legs. Morphine sulphate gr. 1/4 x 5. Opium suppository. Bladder irrigated. 1:10,000 silver nitrate. Urine: faint trace albumin, numerous pus cells. Swelling of upper left nasal region increasing almost closing left eye. Constipation requires Noble's enema.

#### Chest

2-19-31 - Pain in chest. Morphine sulphate 1/4 x 5. Opium suppositories. Dichloramine T to abrasion on back. S.S. enema with fair results. To deep X-ray. P 108, T 99.6.

2-26-31 - Complains of severe pain in back. Morphine sulphate gr. 1/4 given 5 times daily. Opium suppositories. Bladder irrigation of 1:10,000 silver nitrate. Urine: albumin plus 1 Microscopic negative.

3-1-31 - Voided 250 cc. (voluntary) Complains of pain. Morphine sulphate 1/4 given 6 times daily. Atropin sulphate 1/150. Opium suppository. Bladder irrigated. 1:10,000 S.N. WBCs 3,400.

3-8-31 - Patient appears drowsy. Complains of a great deal of pain. Morphine sulphate gr. 1/4 and magnesium sulphate 1 cc. both q.i.d. Opium suppositories given 3 times. Bladder irrigated with boric acid solution. WBCs 22,950. Urine trace of albumin. 5 pus cells per h.p.f. P 130, T 105.

#### Exitus

3-10-31 - Complains of being tired. Difficulty in swallowing. T 106, pulse weak, and irregular. Metrozol 1 ampule given. 11:30 A.M. died.

#### Autopsy

The body is that of a well developed, well nourished male, 47 years old, 187 cm. in length, weight approximately 180#. No cyanosis, edema or jaundice.

Hypostasis purplish and posterior. Decubitus ulcer about 4 cm. in diameter over sacrum slightly to left. Pupils 5 mm. each. Mass lateral and to left side of nose, upper pole situated at about level of lower lid of left eye and extending caudalward for about 4 cm. to region of nasal fold. Laterally extends about 3 cm.

On reflecting skin and muscle of chest wall, small tumor mass approximately 3 cm. in diameter is exposed at level of 5th rib. This mass is soft and adherent to sternum as well as overlying skin. On lateral side of thorax in anterior axillary line about the 9th to 11th rib on both sides, there is an oblong mass with long axis in line with the general contour of ribs, right measuring 9 x 5 cm., left 7 x 4 cm. respectively. These similarly were densely **adherent** to ribs and to the overlying muscle of chest. On cut section the 3 masses have common characteristics of being soft, white, homogeneous and mucoid-like.

When anterior portion of thoracic cage is elevated, mass in midsternum is seen to have perforated sternum and is adherent to pericardium at base of heart. It is also seen that lateral masses are continuous with similar masses most prominent in region of 9th ribs on both sides, extending along ribs to spinal column. These vary in size from 4 cm. in diameter to 1 cm. and are bluish in color. There are other similar masses scattered throughout chest, but not as numerous or as extensive as region described. On bisecting ribs in region of mass, it was noted that mass is firmly adherent to periosteum. It also communicates through costal interspaces. On further inspection, it is seen that periosteum is elevated, both anteriorly and posteriorly about 7 mm. and this space is occupied by similar tumor mass as well as radially constituted fibrous tissue strands. Normal red bone marrow is replaced by tumor mass.

The fat over abdominal wall is 2 cm. thick. When the peritoneal cavity is opened, it shows a normal glistening surface. APPENDIX is subcostal and free. Liver extends 7 cm. in midclavicular line and midsternal line. Anterior surface of liver shows hyaline patches.

The PLEURAL CAVITIES show moderate anthracosis of lungs. No adhesions and no fluid. The PERICARDIAL SAC is described. It is adherent to tumor mass in its upper portion but is easily freed. There is a

moderate amount of clear fluid.

The HEART weighs 340 grams. There is moderate amount of fat over right ventricle. The valve edges are free and normal. Both CORONARY ARTERIES have origin above right cusp of aortic leaflet. There is no sclerosis present. The ROOT of the AORTA was normal.

The RIGHT LUNG weighed 300 grams, the LEFT 290 grams. There is moderate emphysema and anthracosis present. No tumor mass is found.

The SPLEEN weighs 150 grams. The pulp is red and trabeculae prominent. The LIVER weighs 1650 grams and shows numerous hyaline patches on anterior surface. The liver is examined very carefully for metastases and two are found: (subcortical) on the anterior surface, and one in region of porta hepatis. Each measured about 1 cm. in diameter. The GALLBLADDER and DUCTS are normal. The STOMACH and adjacent glands are normal except for one enlarged prepyloric gland.

The PANCREAS weighs 275 grams and presents very firm mass of tumor infiltration in midportion. The head and tail seen normal except for a small portion of tail which was adherent to right adrenal. Cut section shows mucinous and homogeneous picture previously described. The ADRENALS are normal except the left (upper pole is imbedded in tumor mass).

The LEFT KIDNEY weighs 175 grams, the RIGHT 200 grams. The capsules strip easily. Left kidney had numerous deep irregular scars in upper pole. The right kidney also had a few but they were not as prominent. Cut section shows cloudy swelling. The URETERS are normal. The BLADDER is trabeculated and shows small submucosal hemorrhages throughout. The middle lobe of PROSTATE is enlarged. A portion of spinal column is removed, including thoracic portion of 6th, 7th, 8th and 9th. To left of spinal column at this point there is a soft mass about 12 x 4 cm. closely adherent to bodies of vertebrae. The spinal cord is removed and shows infiltration of tumor at rootlets. In center of each vertebral body there is a greyish area of tumor mass present? Not confirmed.

There are a few enlarged mesenteric LYMPH NODES and involvement of retro-peritoneal nodes to region of iliac vessels. On cut section these show a similar consistency to other tumor masses. Organs of HEAD and NECK are not examined. Minimal amount of sclerosis of the AORTA is present.

#### Diagnosis:

1. Primary carcinoma of left antrum, with local extension and infiltration.
2. Dacryocystitis left (clinical)
3. Metastatic carcinoma of ribs, sternum, and thoracic vertebrae (para).
4. Compression myelitis of 4th-6th thoracic vertebrae (clinical).
5. Metastatic carcinoma of midportion of the pancreas.
6. Metastatic carcinoma of liver.
7. Metastatic carcinoma of retro-peritoneal, and mesenteric lymph nodes.
8. Hemorrhagic cystitis.
9. Hypertrophy and trabeculation of bladder.
10. Hypertrophy of middle lobe of prostate.
11. Anomalous coronaries.
12. Cloudy swelling of liver and kidneys.
13. Old atrophic scars in left kidney (arteriosclerosis).
14. Moderate emphysema and anthracosis of lungs.
15. Arteriosclerosis (minimal).

ABSTRACT - TUMORS OF ANTRUM, Metastases of group and other tumors arising in head and neck to regional nodes and structures below clavicle. Abstr. Pearson.  
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#### Tumors of Antrum:

1. Incidence: 1.8% of all cancers (Schreiner) 2.53% - tumors of nasal origin (Ewing) Older series .021% (Schmidt 1900), Epithelioma of antrum 1.4%, adamantine epithelioma, 3% (Schreiner), Very rare (Phillips)  
Comment: Stated frequency about 2%. In advanced tumors in this region origin is difficult to establish and frequency may be greater.
2. Etiology: a. Complex embryology (many tumor types). b. anatomical factors (tendency to inflammation) (Quick). c. malignant degeneration of polyp. d. epithelial rests (tooth sockets). e. Cysts. f. Trauma (Thompson). Comment: retention cysts cause pressure necrosis leaving irregularly epithelial lined cavities. Cystic osteoma predisposes. Benign polyps (recur degenerate) (Schreiner).
3. Types: a. Papilloma (benign, malignant) show growth, recur. b. Basal cell - may resemble thyroid gland, mucoid, show growth, recur, belong to dental group. May invade bone and nodes. c. Cylindric cell - (common), bulky rapidly growing, eroding, ulcerating, recurs after removal. Comment: tumor described by Ewing as adenocarcinomatous or large sheets or polyhedral. Also seen in other sinuses. Very few reports by others who state squamous is common type. d. Squamous - Ewing says rare except from invasion from without or metaplasia. Most report it as commonest. e. Round cell - carcinoma. f. Dental. g. Sarcoma. Comment: Older series stressed sarcoma as commonest, probably confusion with undifferentiated carcinoma (see our case). Ratio carcinoma to sarcoma (2-1). Davis 1920, 39 cases: squamous 19, cylindric 7, round cell sarcoma (carcinoma?) 5, spindle cell sarcoma

2, chondrosarcoma 2, malignant melanoma 2, papilloma 3. New 1929: 129 cases: squamous 82, sarcoma 9, lymphosarcoma 4, fibrosarcoma 4, osteosarcoma 1, adenocarcinoma 6, undetermined 6, others 13. Schreiner 10. 1929 - 45: epidermoid 38, giant cell 2, myxosarcoma 3, spindle cell sarcoma 2. Note: invasion may take place from regional source ethmoids involved so often origin here is questionable. Very necessary to determine type for prognosis.

4. Sex: 45 (Schreiner) 25 males, 20 females. 5 males, 6 females (Peyton, Minn.)
5. Age: 9 - 80, commonest 50-70, but may occur at any age.
6. Symptoms: (Hansen). a. Latent Stage: neuralgic pains, itching, burning, pressure or weight, serous to purulent discharge, epistaxis, polypoid growths at nasal orifice, loosening of teeth in dental group. Frequently visit dentists for treatment in this stage. b. Deformation of maxilla: swelling of sinus walls, projects outward or into nares with more marked symptoms. c. Invasion Stage: destruction of walls, hemorrhage, ulceration, involvement of skin, pharynx, orbit, skull, nodes, viscera, etc.

cluding early distant growths. Diagnosis of gumma made without evidence. As general rule a poor diagnosis.

Distant Metastasis: 39 consecutive autopsies on tumors of head and neck (exclusive of cranium) 1918-31 (U of M Hospitals)

<u>Type</u>	<u>No.</u>	<u>Metastases</u>	
		<u>Cerv.</u>	<u>Visc.</u>
Carcinoma of antrum	4	2	2
" cheek	1	1	0
" ear	1	1	0
" gum	4	4	0
" larynx	7	2	0
" lip	3	2	0
" neck	1	1	0
" orbit	1	0	0
" palate	1	0	0
" pharynx	2	2	1
" tongue	5	4	0
" tonsil	2-32	2-31	0-3
		<u>Metastases</u>	
	<u>No.</u>	<u>Cerv.</u>	<u>Visc.</u>
Hemangioma of lip	1	1	1
Melanoma of ear	1	1	1
" eye	1	0	1
" neck	1	1	1
Mixt tumor of neck	1	1	0
Sarcoma of lip	1	1	1
" neck	1-7	1-6	1-6

7. Metastases: a. Nodes angle of jaw and expansion of aponeurosis of sternomastoid muscle. 38 epidermoid, 20 with, 18 without, (Schreiner) 64 cases, 19 with, 45 without, (Windmuller) 51 cases, 19 with, 38 without (Winiwarter) reported by Ewing. Comment: 40% regional metastases when first treated. b. visceral (see special notes).

Comment: Carcinoma of antrum 4; metastases below clavicle 2; carcinoma of pharynx 2; metastases 1. Note high incidence of local metastases (carcinoma) local and general in other forms 7-6-6.

8. Treatment: resection of maxilla (high primary mortality, cautery, surgical diathermy, and radium (ligation of carotid). Delay: average 8 mo. two-thirds by patient, one-third by referring physician. Extraction favorite type of previous treatment. (Peyton).

Broders (1920) 449 operations on squamous carcinoma of lip-metastases to cervical nodes 105 (23.3%) none 344 (76.6%). Also found 1 metastases to liver and 1 to lungs (.95%) each.

Rupert (1930) made detailed studies of 20 epidermoid carcinomas of head and neck (solid viscera sliced 1 cm. in thickness) bloc of neck, mouth, mediastinum, fixed and then cut in five sections. Results:

9. Results: 10% 5 year cures in all. 20+% in selected cases from radiation (best treatment). Comment: Note all features presented by our case in-

		Metastases	
		to local	
		<u>nodes</u>	<u>viscera</u>
lower lip	5	1	2
anterior tongue	3	3	2
base tongue	2	2	1
tonsil	1	1	0
soft palate	1	1	1
nasopharynx	1	1	0
pharyngeal wall	2	2	0
hypopharynx	3	3	2
bronchiogenic	2	2	2
Total:	20	16	10

Kettle (1916) autopsies on advanced carcinoma of tongue found 4 secondary growths in lungs, 2 in liver, 1 stomach, 1 axillary nodes.

Rowntree (Williams) 1927, 127 post-mortems on tongue cases - neck nodes 127. Others: lungs 11, liver 8, larynx 4, kidneys 4, adrenals 3, heart 2. Other nodes, pericardium, thyroid 9.

Darrance, G.M. and McShane, J.K. (1928) 164 cases, 15 autopsies (none below)

Comment: If all carcinomata of head and neck are included (basal which rarely metastases) the frequency is probably low. Most series report few autopsies on group probably because of low hospitalization. Note number when painstaking (mutilating) examinations are done (50%) in small series. Also higher incidence in certain locations (tongue pharynx) and probably antrum. Broders series illustrates reverse of cancer of breast (1/3 without 2/3 with) lip. (1/4 with 3/4 without) but glands should be removed routinely because of high metastases in incomplete treatment. Striking is distant deposit (distant) without local extension in all groups. Green (1922) 84 cases, 3 died of metastases (distant) without local (2 to liver, 1 to abdomen).

#### Summary:

1. Tumors of antrum constitute about 2% of all malignant tumors.
2. Exact frequency difficult to state because of difficulty of determining origin of late growths.
3. Cause is complex embryology (rests) and tendency to chronic inflammation (polyps).

4. Carcinoma is more common than sarcoma (2-1) recent figures.
5. May arise elsewhere (regional) in jaw and ethmoids (20-50%).
6. Sex is unimportant (small series)
7. Age factor (9-80) more common after 50.
8. Chief symptoms are pain, swelling, discharge, bleeding, node involvement. (Resemble intractable severe sinusitis).
9. Lymph nodes at angle of jaw are involved when first seen (40%).
10. Distant metastases may occur (even in absence of local involvement).
11. Radiation (radon) (cautery, surgical diathermy ligation) is best form of treatment.
12. End results (10-20+%) 5 year cures are reported. Average delay 8 months (Minnesota).
13. Old axiom "Tumors arising above clavicle never (meaning rarely) go below clavicle" may have to be revised.
14. If all tumors (epidermoid) are included figure is probably low? because of basal group.
15. Carcinoma of tongue, pharynx and probably antrum? are frequently seen in distant places.
16. Other groups (sarcoma, melanoma, hemangioendothelioma) are usually widespread.
17. Carcinoma of lip is found in nodes (23.3%) Should be removed routinely.
18. Suspect carcinoma of antrum more often and earlier diagnoses will be made (biopsy).
19. Biopsy should be repeated if diagnosis of chronic inflammation is made from edge of growth.
20. Clinical diagnosis of gumma (without biopsy or serology) is probably based on obsolete teaching (syphilis, the great mimic).