VOL. II THURSDAY, APRIL 23, 1931 NO. 27

GENERAL STAFF MEETING
UNIVERSITY HOSPITALS
UNIVERSITY OF MINNESOTA

CONTENTS

PUBLICATION OFFICE: UNIVERSITY OF MINNESOTA

ANNOUNCEMENTS

1. Clinico-Pathological Conference Friday, April 24, 1931, 11:00 A.M. Todd Amphitheatre. Case: Valvular heart defects (aortic and mitral) adherent pericardium, enormous hypertrophy - 1200 grams without any pericardial sac. An excellent opportunity to observe effect of this type of lesion on heart, patient (symptoms) and ability to work (social). Attendance at these meetings leaves much to be desired.

2. Publications of staff members were requested some time ago, See (Vol. II, No. 15, Pages 1-2). At this time of year when President's report is being compiled it would be an easy matter to send copy of list to Miss Gunn. Very few reprints have been received. Our purpose was to call attention to articles as they appear - a copy of article (reprint) for central reference. Your co-operation is requested.

3. Editors and physicians of Polk County, Wisconsin, meet, eat at Osceola, Thursday, April 16. Speakers: Meyerding, O'Brien. Theme: Relationship between Medical and Editorial Associations. Of interest - group of fourteen physicians with part time lay secretary (full-time clinic business manager) attempting social integration with community life. Accomplishments: apparent solidarity of group in social and medical matters, county contract for care of indigent sick (of non-teaching interest), co-operation with University Hospitals for "teaching cases". Discussion of purpose and ethics (manners) of medical news (births, deaths, illness and accidents), plan of closer cooperation in health education, cooperation with state program for immunization against diphtheria (selection of own physician, fixed fee $2.00). Other meetings to follow (courts, attorneys, judges, welfare workers, dentists, farmers' representatives, etc.)

Impression: Excellent. Note: Lag of 10 years between scientific discovery and application; 30 years between "social discovery" and application. Contacts in University life between various groups probably of greater social importance than faculty contacts? Polk County aggressive, alert, active body of medical men trying field laboratory experiment are to be commended. Are you socially minded? Immunity can not be claimed by our group in this matter?

4. Tuberculosis problem is essentially one of youth (12-20). One-fourth of all children under 15 have been infected with tuberculosis (not all). As a general rule no serious damage results but medical authorities believe presence of early infection increases susceptibility to disease. Heavy demands of adolescent period are menace. Only tuberculin test (if positive) followed by x-ray can tell story. Yearly examinations by competent physicians of youth of land is one answer - prompt examination of all persons when warning signs appear is the other. Through activity of Tuberculosis Associations information about tuberculosis is now commonplace (only motivation is lacking). Citizens Aid Society - group of socially conscious men and women of financial competence and splendid foresight - are interested in applied social science (Citizens Aid Building), malignancy (Cancer Institute), and tuberculosis (Surgical and Laboratory building). Glen Lake Sanatorium. Minnesota's Contributions to tuberculosis problem are many and mighty; e.g., Slater (Worthington) opening wedge in National campaign as result of surprising tuberculin studies in childhood; J. A. Myers and C. A. Stewart, childhood tuberculosis; F. E. Harrington - Lynnhurst School, and many others. This meeting is our small contribution in arousing interest in problem.

II. CASE REPORTS:

1. MILIARY TUBERCULOSIS. Path. Hendrickson.

The case is that of a white girl, 15 years of age, admitted to the University Hospitals 4-1-31, and died 4-7-31 (6 days).

Sick

3-1(?)-31 "Influenza" after having been sickly for about a year. Only slight cough, very weak. In bed two days, then up and down two weeks.

3-15(?)-31 Went back to school. Still weak and pale. Stayed in school only two days because of weakness. Up and down.

3-25-31 Physician was called. Unable to diagnose condition.

Mental

3-27-31 Talking queerly. No response to questioning. Becoming progressively worse.

Hospital

4-1-31 She was admitted to the University Hospitals. Physical examination: Comatose white girl with stare does not respond to questions. Head - Eyes: Pupils dilated. React to light. Mouth open. Tongue parched covered with exudate and dried blood. Tonsils are very large and covered with much mucopurulent discharge. Neck - some rigidity. Chest - Transient fine rales in left axilla, otherwise negative. Breath sounds loud and clear. Heart - rapid, forceful, regular beating. Abdomen - slight tenderness in right lower quadrant. Extremities - No reflexes obtainable. Babinski negative. Kernig's positive. Blood pressure 106/76. Genitalia - Vestibule slightly reddened. One finger inserted cautiously into vagina. Hymen absent. Cervix points downward and backward. Body not outlined. No masses felt. No additional findings on recto-vaginal examination. Laboratory: Urethral smear showed occasional pus cells. No gonococcic. Urine showed few rbc's and wbc's. Hbg 76; wbc 7,750; rbc's 3,900,000. Spinal Fluid 480 cells; pmn's 60%; lymph 40%. No bacteria. No tubercle bacilli ?. N.P.N. 25.6. Manteaux negative.

Diagnosis

X-ray of chest-- characteristic of diffuse miliary tuberculosis involving both lungs from apex to base. The nodules are rather larger than is usually the case but some coalescence is no doubt taking place.

Takes a few sips of water. Answers "yes" and "no" to questions. 1500 cc. hypodermoclysis &S enema with good results. Temperature 101.8 to 103.2.

Very sick

4-2-31 Sips orange juice. Some difficulty in swallowing. Breaths through mouth. Responds fairly well at times. Eyes stary when awake. Involuntary urinations. Asked a question. Knows what is said. 700 cc. normal saline by hypodermoclysis. Moans frequently. Temperature 103.6; pulse 120.

4-3-31 Pulse good quality. 100 cc. fluid orally. Responds. Involuntary urination and defecation.

4-4-31 Nails cyanotic. Moans. Caffeine Sodium benzoate gr. vii (H) three times. Marked change in pulse which became weak and irregular. Perspires profusely. Does not respond. Breathing labored. Color fair.

4-5-31 The condition is the same. Still involuntary. Takes fluid fairly well. Seems weaker. No medications. Temperature 103.8; pulse 140.

4-6-31 Respirations rapid. Pulse weak and rapid - 150. Cheyne-Stokes respiration. Involuntary.

Exitus

4-7-31 Weaker. Moans great deal. Temperature, rectally, 105; respiration 48; pulse 144. 6:30 A.M. Cyanotic. Rattle in throat. Weaker. 7:00 A.M. Pulse imperceptible. Breathing labored. 8:06 A.M. expired.

Autopsy

Length, 55 cm. Weight, approximately 90#. The body is that of a well developed, poorly nourished, white female. Rigor is present. Hypostasis is purplish and posterior. There is no edema, cyanosis nor jaundice. The right pupil is 5 mm. and the left is 3 mm. There are puncture wounds in the inner surfaces of both thighs and the outer surfaces of both arms. The fat on the anterior abdominal wall is 1 cm. in thickness.

There is no fluid in the PERITONEAL CAVITY and on close examination no tubercles can be found anywhere on the peritoneum. The diaphragm is at the 4th rib on both sides. The APPENDIX is 6 cm. long and hangs free.

The PLEURAL CAVITIES are lined by smooth and glistening pleura. Free of adhesions. The PERICARDIAL SAC is normal and contains about 10 cc. of straw-colored fluid.

The HEART weighs 200 gm. The valves are normal. The foramen ovale is closed. The coronary arteries are normal. The ROOT OF THE AORTA is normal.

The LEFT LUNG weighs 475 Gm. and the RIGHT weighs 525 Gm. On palpation, it gives the impression that the parenchyma is filled with millet seed to split-pea size tumors. On the outer surface of the left lung some of these stand out above the surface but do not involve the visceral pleura. On surfaces made by cutting, the parenchyma is found to be thickly studded with thick, gray tubercles 1 to 3 mm. in diameter. All of the surfaces give a uniform appearance. The mediastinal lymph nodes are very markedly enlarged but caseation is not found.

The SPLEEN weighs 130 Gm. The capsule is smooth and glistening and no tubercles are visible through it. The surfaces made by cutting are firm, purplish-red and show light gray patches, .5 to 2 mm. in diameter. These may be hypertrophied malpighian corpuscles or miliary tubercles.

The LIVER weighs 1150 Gm. It is adherent to the diaphragm through its upper surface. On surfaces made by cutting, there are a few scattered 1 to 2 mm. size gray patches.

The GALL BLADDER is distended. The pressure over the fundus shows a yellow content to pass through the bile duct.

The GASTRO-INTESTINAL TRACT shows no sign of tuberculosis nor abrasions on the outer surface.

The PANCREAS weighs 100 Gm. and appears normal.

The ADRENALS are normal except for a slight postmortem autolysis of the medulla.

The LEFT KIDNEY weighs 150 Gm. and the RIGHT weighs 150 Gm. The capsule strips fairly easily exposing the same type of tubercles as seen elsewhere except that on surfaces made by cutting a few are found to have caseous centers. The lower third of the right ureter is slightly dilated. There is no sign of hydronephrosis.

The BLADDER is distended but otherwise normal.

The GENITAL ORGANS. The uterus is small and two large hazel-nut size tumors at the fundus give it the appearance of bicornate type. However, upon opening the lumen these are found to be two separate abscesses filled with a yellowish-green pus of the consistency of thick mayonnaise dressing. The right tube which is only slightly enlarged contains a similar substance. The ovaries appear normal.

The HEAD on exposing the brain there is a slight flattening of the convolutions and there are patches of miliary tubercles 1 to 3 mm. in diameter over the base and upper surfaces.

Diagnosis:

1. Miliary tuberculosis of lungs, kidneys, meninges and liver.
2. Pyometrium (Mucus?)
3. Pyosalpinx, right.
4. Clouding swelling of liver and kidneys.
5. Emaciation.
6. Adhesive peri-hepatitis.
7. Puncture wounds.
8. Dilation of lower third of right ureter.

Comment:

Note: 1. female 15 (age group 12-20 - more females). 2. indefinite illness one year, febrile prostrating illness without obvious cause (influenza?) 3 weeks. 3. on entrance shows cerebral localization (stupor, rigidity) few chest signs, apparent extra cerebral emphasis in pelvis (genitalia and right lower abdominal quadrant). 4. absence of tubercle bacilli in spinal fluid is unusual? 5. Manteaux negative is expected? 6. X-ray is chief diagnostic aid - clinical notes do not show character of breathing to be consistent; i.e., Staff - Cheyne-Stokes (terminal), breathes through mouth, Nurse - stertorous, labored, rapid, labored (32,36,38,44,42,48,60,32,42,44, 48). No note of cyanosis until end (nails) then generalized. Question is raised - are tachypnoea and cyanosis the clinical equivalents of positive x-ray signs when latter is not available and patient presents foregoing picture; i.e., profound prostration, high fever (102-105), rapid pulse (100-160). 7. Coalescent foci in lung made localization of Ghon tubercle impossible. (Note x-ray report). 8. Tubercles were grossly visible in lungs, spleen, liver, kidney and meninges. 9. The change in uterus and adnexa is interesting (see clinical signs) 10. Proper technique of handling brain is followed - fixation and then painstaking search for tubercles (see abstract). 11. Absence of epidemiological data due to social factors (adopted child, poverty) but all contacts should be studied for source.

III. ABSTRACT: Pathogenesis of tuberculosis, miliary tuberculosis, tuberculous meningitis. Abstr.Henrickson.

An inquiry concerning the role of allergy, immunity, and other factors of importance in the pathogenesis of human tuberculosis, Rich, A. R. and McCordock, H. A., Johns Hopkins Hosp. Bull. 44, 273-423, 1929.

1. An extensive article detailing authors' experiments on infection of about one thousand animals and minute studies of tissues from two hundred autopsies on cases of human tuberculosis (7 weeks to 73 years) with review of various views in the literature on 17 questions which are asked and answered concerning natural species resistance and susceptibility, differences in virulence of different strains of tubercle bacilli, individual differences in resistance, nature of virulence, acquired resistance, mechanism of acquired resistance, mechanism of allergy, fluctuations in allergy, effects on the bacillus of residence in the allergic, immune body, relative importance of virulence, resistance, allergy and size of infecting dose, final outcome of tubercle formation (which shows successive stages of resolution in some) outcome of allergic inflammatory reaction, pathogenesis of miliary tuberculosis, childhood and adult infection, pathogenesis of pulmonary lesions, meninges, serous cavities, (of which only two will be reviewed here)

2. Miliary tuberculosis - Question: Is miliary tuberculosis always produced by sudden rupture of focus into large blood or lymph vessel? Answer: No. The difference between a few and many visceral tubercles in hematogenous spread is one of degree and represents essentially the same process. The term miliary tuberculosis used in the clinical sense is one thing and the finding of visceral lesions is another but both represent variations of the same condition. A sudden acute massive miliary tuberculosis is undoubtedly associated with sudden eruption of caseous focus into a macroscopic vessel. But the more insidious form enters thru smaller vessels (microscopic lesion), colonise here and there in tissues with special tendency to perivascular localization which in turn disseminates through adjacent vessels - causing new foci to arise until the frank picture of miliary tuberculosis is produced (Note - slower evolution of our case). Authors show photographs of such vascular lesions (microscopic) believe intimal tubercles in large veins are result of hematogenous spread.

3. Definition of miliary tuberculosis: result of septicemia with tubercle bacillus. Rupture of large focus not always found. Reasoning - a pin prick may cause pyogenic septicemia. Weichert's (1883) work was followed by erroneous conception tubercle bacillus acted differently than other organisms (no infec-

tion thru minute portal) tubercle bacilli can be cultivated from blood of patients in miliary tuberculosis and sometimes from progressive lesions of any organ without "miliary tuberculosis". If showers of organisms are injected (any kind) tendency is to find them cleared out of blood quickly. Constant presence indicates one or more constantly discharging foci. Also failure to recover from miliary tuberculosis in such high percentage is due to constant re-infection?

4. Question: Do the different sizes of tubercles indicate successive showers? Answer: No - rare if it ever occurs. One organ may show various sizes but may be roughly grouped (I, II, III, IV.) Not a good argument as picture may be produced by single (blood) injection. Involvement of thoracic duct is probably secondary to septicemia. Septicemia particularly common in children because of lack of immunity.

5. Pathogenesis of lesions in meninges. Types: a. Focal disseminated tubercles. b. localized caseous plaques. c. exudative meningitis (diffuse, localized). d. proliferative meningitis (diffuse, localized). Lesion grossly characterized by thick gelatinous exudate in meshes of pia-arachnoid especially about base of brain with very minute cheesy nodules abundant along courses of vessels. Microscopically exudate is abundant, sero-fibrinous and cellular (mononuclear), with necrosis of exudate and of the infected blood vessel walls (allergic reaction). Proliferative changes may follow (as result of time factor usually slow), including regular tubercles (which precludes idea process is entirely allergic) as only possibility of cause of allergic inflammation would be large number of bacilli. Against theory is absence of meningeal involvement in cases with marked miliary spread elsewhere. Disease is difficult, if not impossible to produce by intravenous injection. Many other visceral lesions may result (only a few tubercles in brain or meninges). Same result in normal and allergic animals by other investigators. But disease can be produced by injecting bacilli directly into subarachnoid space. Observation: 40 brains from human cases were cut into thin slices. Found multiple caseous tubercles from several mm. to 1 cm. in size in 38 of 40. In two only part of brain was available. 7 were free from generalized spread elsewhere and 6 brains were from pulmonary tuberculosis (without meningitis). Origin of meningeal involvement is through subarachnoid space. (without encapsulation, through ventricles, usually former). But some may arise directly in meninges (caseous masses on surface or sulci forming plaques). These occur in absence of usual meningitis but may cause exudative process elsewhere in meninges. One case came from involved vertebrae. May develop in spinal cord or middle ears? In turn miliary tuberculosis may result from involvement of brain and meninges (feeding focus). Authors believe same is true of all serous cavities (pericardium, peritoneum, pleura).

Summary:

1. Rich and McCordock have written extensive article on pathogenesis of tuberculosis which should be read by all interested in subject.

2. Miliary tuberculosis is not always produced by rupture of single large focus into macroscopic blood vessel (but may be).

3. Difference between "disseminated visceral tubercles" and "miliary tuberculosis" is only quantitative.

4. Insidious form of miliary tuberculosis (commonly seen) is due to microscopic vascular spread, tendency to perivascular localization and reinfection.

5. Miliary tuberculosis results from tubercle bacilli septicemia.

6. Tubercle bacilli do not behave any differently than other organisms (e.g., pin-prick pyogenic septicemia).

7. May be found in blood stream in all forms of disease especially miliary tuberculosis.

8. Different sizes of tubercles do not necessarily indicate successive showers? (one intravenous injection may cause them).

9. Tuberculous meningitis may show focal tubercles, caseous plaques, exudative and proliferative changes.

10. Microscopic picture shows allergic inflammation followed by proliferative changes and tubercle formation.

11. Meningeal disease very difficult to produce by blood vessel injections (although other organs may show them in large numbers).

12. Can be produced by injections into subarachnoid space.
13. Brains from human cases were cut into thin slices and multiple caseous tubercles were found in 38 of 40 (in substance).
14. Also seen in absence of meningitis (in ordinary pulmonary tuberculosis).
15. Origin of tuberculous meningitis is thru subarachnoid space, ventricles or bone, ears?
16. May arise directly in meninges in some in which case it goes through formation of caseous tubercles as in brain.
17. Miliary tuberculosis may result from involvement of brain or meninges.
18. Authors believe mechanism is same in serous cavities.

IV. CASE REPORT:

BILATERAL PULMONARY TUBERCULOSIS (Thoracoplasty). Path. Pearson.

The case is that of a white female 35 years of age, admitted to the University Hospitals 11-28-30 and died 3-15-31 (108 da).

Pneumonia?

Nov. 1928 - Patient had an attack of pneumonia which persisted until March 1929 She was in bed for 3 weeks. Both lungs were clear after the attack. After the attack of pneumonia the patient became very tired and had a nervous breakdown and was unable to sleep.

March 1929 - Patient quit work because of cold.

Positive sputum

April 1929 - Patient had a chronic cough. Consulted a physician who tested her sputum and found Tbc. bacilli. Has been in bed most of the time since.

Pleurisy

Nov. 1930 - Patient lost 4# in this month. Past history: Pneumonia in childhood, and in 1910, 1920 and 1929, and pleurisy with each attack. One child died of meningitis at age of 7.

Hospital

11-28-30 - Admitted to University Hospitals. Physical examination: head and neck negative. Chest: impaired resonance over the entire left side of the chest. Decreased breath sounds over the left side except 5th rib about 2" from the sternum where bronchial breathing was heard. Large gurgling rales through the entire left side, anteriorly. Decreased tactile fremitus on the left side, compensatory breath sounds on the right with no rales on this side. Laboratory: Few RBcs in the urine; many WBcs. Hb. 85%, WBcs 11,450, Pmns 78, L 20.

X-ray

12-1-30 - Showed the whole left lung is extensively involved in a fibrotic nodular process with a very large cavity in the upper lobe involving almost the entire lung from the apex down to the 2nd rib anteriorly. The cavity is chiefly posterior, however. There is a moderate involvement of the right base suggestive of more recent infection. Some diaphragmatic pleurisy on both sides present, but both diaphragms move quite freely. There appears to be a slight area of pneumothorax at the left base. Conclusions: 1. Pulmonary tuberculosis, far advanced with massive cavity, left. 2. Recent tuberculous infection in the right base. 3. Diaphragmatic pleurisy (bilateral).

Cough

12-2-30 - Patient coughs some. Cod. sulphate gr. 1/2 prn. for cough. Luminal gr. SS given daily. Mineral oil 1 oz. b.i.d. Sputum sent to State Board. Tbc. bacteria present. Wassermann negative. T 101, P 108.

12-4-30 - Patient coughs some. Medications are continued. Urine negative.

12-6-30 - Coughs some. Cough mixture of 1 dram given prn. Pneumothorax 250 cc. air injected. T 100.4, P 110.

Pneumothorax

12-8-30 X-ray: Single plate of chest was made and compared with those taken on 12-1-30. There has been only a slight collapse of the left lung field by pneumothorax, the findings in general being much the same as of the last examination. T n, P 100.

12-9-30 - Pneumothorax 100 cc. air given. Patient coughed considerably after the pneumothorax. T 99.2, P 100.

X-ray:

12-10-30 - Patient has considerable cough. Previous medications continued. X-ray: Single plate of the chest was made and compared with that taken [illegible] There has been a slight increase in pneumothorax on the left side with a

slight increase of the collapse on this side. The findings otherwise are the same as the previous examination. T 102, P 100.

Thoracoplasty (first)

12-13-30 - First stage thoracoplasty was performed. Postoperative condition was fair. 12:10 P.M. - 2,500 cc. 5% glucose with normal saline per vein. P 120, R 40. B.P. 98/50. 4:30 P.M.-500 cc. 10% glucose per vein. Adrenalin 10 mm. given. 5:30 P.M.-600 cc. whole blood given per vein. 9:30 P.M. - Intravenous 2,000 cc. 5% glucose per vein. Emesis of green fluid 200 cc. 11:45 P.M. OM.S. gr. 1/6. Proctoclysis 1000 cc. Emesis 50 cc. green fluid. Patient coughs some.

Reaction

12-14-30 - Seems drowsy. 12:30 A.M-Bl.P. 78/54. Ephedrine gr. 3/4 given. Hypodermoclysis 1000 cc. 1:10 A.M.-B.P. 92/50. 3 A.M.-B.P. 80/50. 1 cc. surgical pituitrin given. 4 A.M.-B.P. 90/50. Adrenalin mm. v given. 8:30 A.M.-M.S. gr. 1/6 given. Atropin gr. 1/180 given. Pulse weaker. 800 cc. blood per vein. Cod. gr. 1/2. x 4 is given. M.S. gr/1/6. P to 120, T to 102.

12-15-30 - The patient coughs some. Feels a little weaker. Pulse is good. Given cough mixture 1 dram. Cod. sulph. 1/2 gr. x 3 for cough. M.S. gr. 1/6 for pain. P 120, T 102.

Coughs again

12-20-30 - Patient coughs a great deal. Cod. gr. 1/2 t.i.d. Cough mixture 1 dram x 5 given. Insulin 5 units b.i.d., Elixir I.Q.S. drams 1 t.i.d. 5 minutes before meals. M.S. gr.1/6. Hb. 81%, WBcs 12,850. P 92, T 101.8.

12-22-30 - Patient coughs less. Blaud's pills gr. x. given. Cod liver oil 1/2 oz. Insulin xv units given. Cough mixture 1 dram b.i.d. Elixir I.Q.S. 1 dram t.i.d. ac. Cod. sulph. 1/2 gr. Mineral oil 1 oz. Patient complains of some pain in the rectum. Examination shows external hemorrhoids, fissures in ano. Belladonna and opium suppositories given. Fissure painted with 10% silver nitrate. X-ray: Single plate of chest compared with that of 12-10-30. Resection of the upper 6 ribs on the left side in their posterior portion is shown with moderate collapse of the thorax on this side. The cavity has collapsed down somewhat since the last examination. Otherwise there is no appreciable change. Conclusion: Thoracoplasty, 1st stage with slight collapse. TBc. present in the sputum. P. 106, T 101.4

Pain

1-5-31 - Complains of pain in the lower part of the incision. Crusts removed and 70% alcohol dry dressings applied. The lower end of the incision is inflamed. Continuous hot packs to the lower part of the incision. Blaud's pills gr.v. Cod. liver oil 1/2 oz. Insulin v units. Elixir I.Q.S. 1 dram. before meals. Whiskey 2 drams. Codeine gr. 1/2 x 2. Amytol gr. iii given. P 100, T 100.2.

Alcohol injection

1-6-31 - Complains of severe pain in incision. Paravertebral injection of alcohol of the 2nd to the 6th left dorsal nerves. Patient had nausea immediately following the injection of novocaine. Had comolete retention of urine thereafter. P 108, T 101.4.

Neurological

1-10-31 - Patient is catheterized t.i.d. 10 cc. 2% mercurochrome instilled in the bladder. Complains of left leg feeling numb and unable to move it. Neurological note: Alcohol injection on 1-6-31 because of severe pain which had been present for 36 hours. On 1-7-31 had urinary retention. On 1-9-31 had pains in the heels and discovered that she could not move the left leg as well as formerly. Today the other leg is also partially involved. Examination shows negative cranial nerves. Negative upper extremities except for rather active biceps reflex bilaterally and sensory disturbances as noted below. Abdominals are absent except for a very slight right upper. Babinski bilaterally positive. No clonus. Patient shows extreme suggestibility and therefore sensory examination is unsatisfactory. Alcohol injection probably coincidental and without any etiological relationship. Diagnosis: 1. Acute myelitis (either toxic or associated with Tbc. or due to other bacterial cause. 2. Pott's disease with involvement of the cord.

Negative spine

1-13-31 - Patient complains of severe pain in left leg, not being able to feel as much as formerly. X-ray: Dorsal and

lumbar spine shows no evidence of abnormality. Conclusion: Negative dorsal and lumbar spine. WBcs 14,500. Urine negative. P 120, T 101.

Wassermann positive

1-20-31 - Patient coughs less. Involuntary urination. Complains of pains over the pubic bones. Spinal fluid Wassermann positive. Blaud's pills gr. v x 2. Elixir I.Q.S. 1 dram t.i.d. before meals. Cough mixture 1 dram. Codeine gr. 1/2. Pyramidon gr. v. Amytol gr. ivss. P 100, T 100.

Coughs

Patient coughs hard with no relief from cough mixture. Involuntary urination and defecation. WBcs 13,200. Urine spec. grav. 1006. 8-10 WBcs in urine. X-ray of chest: Single plate of chest compared with those taken 12-22-30. There has been a slight increase in collapse with a cavity in the left upper lobe. Otherwise there is no appreciable change. P 100, T 101.

Neurological note:

2-10-31 - There is a considerable return of motor function in the lower extremities as compared with former examinations. Reflexes are hyperactive in lower extremities, particularly on the left. Left Babinski positive, right probably normal. Abdominal absent except for slightly present upper. No definite sensory changes. Patient is incontinent. Has a lateral nystagmus, especially to the left. Same opinion as formerly. Some recovery of functions. No special recommendations.

Coughs

2-17-31 - Patient coughs a great deal. Not much relief from cough mixture. Blaud's pills. Whiskey 2 drams given. Cog. gr. 1/2. Cough mixture 1 dram. Amytol gr. iii. X-ray: Plate of chest compared with that taken on 1-26-31. The collapse of the upper thorax was about the same as at the last examination. Considerable regeneration of the ribs has taken place. There is some suggestion of a slight increase in infiltration in the central portion of the right lung field. Blood Wassermann State Board negative. Hb. 62%, WBcs 12,450. P 120, T 101.

Bladder

2-24-31 - Catheterized t.i.d. Complains of pain in the bladder. Medications continued. Urine: spec. grav. 1010. Many WBcs. P 120, T 100.2. Permanent catheter inserted.

3-10-31 - Coughs a great deal. Usual medications continued. Dichloramine T and Balsam of Peru to the decubitus ulcers Urine: spec. grav. 1010. Trace of albumin 6 WBcs per h.p.f. Sputum: Tbc. present 3 occasions. No Tbc. in urine. H. 68%, RBcs 3,650,000. WBcs 8,700. P 124,T 98.8

Worse

3-13-31 - Patient has some difficulty in breathing. Complains of pain in back and shoulders. Coughs some. Codeine discontinued. M.S. gr. 1/4 t.i.d. X-ray : Single plate of chest compared with that taken 2-17-31. Appearance of the left side is about the same as at the last examination. There seems to be a slight increase of the infiltration on the right side. P 138, T 100.6.

Exitus

3-15-31 - Patient is very restless. Talks incessantly. Given oxygen 1 minute at a time for short intervals with very little relief from the dyspnea. M.S. gr. 1/4 given. Atropin 1/100 for pain. Patient is in a semi-stupprous condition. Pulse is imperceptible. Patient has a great deal of mucus in the throat. M.S. gr.1/4 and atropine gr. 1/100 with slight relief. 9:30 A.M.-Patient died.

Autopsy

The body is that of a fairly well developed, poorly nourished and emaciated white female, 173 cm. in length, weighing approximately 80#. Hypostasis is purplish and posterior. There is a decubitus ulcer 5 x 5 cm. in the region of the left trochanter. Also one 1 x 1 cm. in the left pinna. An operative scar 6 x 4 cm. in the region of the 2nd and 3rd ribs in the posterior axillary line, old amputation of the 2nd finger of the right hand. There is slight cyanosis, no jaundice, and no edema. Pupils are 5 mm. each and regular.

The peritoneal fat is scanty in amount. The liver extends 7 cm. below the costal margin in the midsternal and midclavicular lines. The peritoneum is normal and glistening. The APPENDIX was 6 cm. long

x 1/2 cm. except for the distal third which was 1 cm. in diameter and was acutely inflamed and adherent to the coils of the small bowel. The tip showed beginning gangrene. When the distal end was cut, across the lumen contained a thick, yellowish pus.

When the PLEURAL CAVITIES were opened, it was shown there was a partial collapse of the upper portion of the left lung. The PERICARDIAL SAC was opened and found to contain a small amount of clear fluid.

The HEART weighed 250 grams. All the chambers were normal. The valves were free and normal. There was no coronary sclerosis. The ROOT of the AORTA was normal.

Both LUNGS were removed together and both weighed 1300 grams. The LEFT LUNG was densely adherent to the pleura so that the apical portions could not be removed. The left lung was also adherent by old fibrous adhesions but could be readily separated. No fluid in the pleural cavities. The upper portion of left lung contained an old cavity 5x5 cm. When the left lung was cut it showed, in addition, numerous small cavities 1-2 cm. in diameter scattered throughout the parenchyma but more prevalent toward the hilus. The right lung similarly cut and showed more recent cavity in apex 5x5 cm. The remaining lung shows numerous grayish areas of exudative tuberculous infiltration about 4-1/2 cm. in diameter, especially prominent about the hilus.

The SPLEEN weighed 175 grams and was firm and reddish flesh-like consistency. Some areas of the spleen were pale and gray. The LIVER weighed 1475 grams and showed a slight amount of passive congestion and cloudy swelling. The GALLBLADDER and ducts were normal. The GASTRO-INTESTINAL TRACT is normal in its entirety except for the appendix which has been described, cecum and ascending colon. The CECUM was the seat of many small, whitish tubercles about 1 mm. in diameter which were evident submucosally, but which had not progressedsufficiently to ulcerate or to be seen on the cerosal surface. On the anterior and lateral portions of the lower cecum, there were small areas 3 x 3 cm. in diameter which were markedly injected and showed infiltration of tubercles, and of which section was taken for further study.

The PANCREAS weighed 175 grams and was normal. The ADRENALS were normal. The LEFT KIDNEY weighed 175 grams, the RIGHT 250 grams. The capsules stripped easily revealing smooth sufraces. The URETERS were normal. The RIGHT KIDNEY was much larger than the left, and showed some congestion, in the pyramids of both poles. The BLADDER was the seat of profuse edema and hemorrhagic cystitis and heavily trabeculated. The trigone was edematous and hemorrhagic. The UTERUS and TUBES were normal. The organs of the HEAD nad NECK were not examined.

The Spleen, liver and kidneys were stained for gross amyloids but did not show any. Sections of the 3rd, 4th and 5th thoracic vertebrae were removed and examined, but showed no evidence of tuberculous infiltration or compression myelitis. Section of the cord appeared microscopically normal.

Diagnosis

1. Bilateral, advanced, pulmonary tuberculosis with cavitation.
2. Recent tuberculous infiltration, left (exudative).
3. Healed 1st stage thoracoplasty, left (3 mo.)
4. Bilateral pleural adhesions.
5. Acute suppurative appendicitis (beginning gangrene), Tuberculosis.
6. Beginning (TBc) infiltration of the cecum and ascending colon.
7. Cloudy swelling of the kidneys and liver.
8. Slight passive congestion of the liver.
9. Probable toxic myelitis.
10. Edema and trabeculation of the bladder.
11. Hemorrhagic cystitis.
12. Decubitus ulcer of the left thigh and the left pinna.
13. Open operation incision of the left chest.
14. Old amputation of the 2nd finger of left hand.
15. Cachexia and emaciation (extreme).

Comment:

Female tuberculosis patient with story of frequent childhood pneumonic infections and pleurisy; death of one child of meningitis, typef Stated duration of disease 2 yrs., bacilli positive about 18-20 months. Note fibro-ulcerative disease in lung chiefly affected and infiltration (probably exudative?) in opposite base. Patient referred for

pneumothorax; did not respond well. Cough very troublesome, not much improved by first stage thoracoplasty. Developed sharp severe pain and was given alcohol injections. At same time developed signs of transverse myelitis, (toxic?) with sphincter involvement. As disease progressed process in lung increased (x-ray). Microscopic sections show caseous and proliferative changes on operated sides; chiefly exudative in opposite lung. Postmortem lesion in appendix resembled orthodox appendicitis (grossly), shows tuberculosis part of right lower quadrant intestinal disease (not an operative contraindication?). Basal and hilar disease (rather than apical) in opposite lung is considered to be a more definite operative bar in the literature. If Bull's method is used in classifying deaths (8-wk. interval) this case would tend to fall into the "immediate group".

V. ABSTRACTS: Surgical Treatment of Tuberculosis. Abstr. Pearson.

Ref. 1. Alexander, J. Surgery of Pulmonary Tuberculosis, Lea and Febiger, 1925. 2. Archibald, E. W. - Lewis Practice of Surgery, F. W. Prior, 5; 1931. 3. Bull, P. N., Acta. Chir. Scand. LXVI, 553-568 (Jan) 1931. 4. Carter, B. N., Arch. Surg. 22, 289-306, (Feb) 1931. 5. Edwards, A. T., Brit. Med. Jour, 2, 602-605, (Oct) 1928. 6. Chandler, F.G., Brit. Med. Jour. 2, 605-607 (Oct.) 1928.

1. Historical: Jas. Carson (1822) suggested pneumothorax. Farlanini (1882) did pneumothorax, de Cerenville (1885) rib resection and cavity drainage (first to remove chest wall). Quincke (1888) did some operation also recommended for non-cavity types. Advised for hemoptysis but did not do one. Called operation extra pleural thoracoplasty. Brauer (1907) realized same degree of collapse necessary as in pneumothorax. First done with Fredrich, Dec.11, 1907. First experimental work for paravertebral resection done by Boiffin and Goudet (1895). One patient used cadavers. Wilms (1911) using their experiments demonstrated clinical value. Lower mortality than Brauer and greater healing effect. Reported 23 cases in 1914 - no operative deaths from own method. Sauerbruch (1909) did first paravertebral resection by accident. No report. Greatest contribution is two stage method. Since then many have been done and indications are well known. Other Procedures were done (bone graft, alternating costectomy, sympathetic removal, etc.)

2. Pathological Anatomy and Physiology.
Rest of lung is essential; compression reduces bronchial secretion, lymph flow and promotes fibrosis. In old operation (and sometimes in more recent) complications may ensue (chest wall and mediastinal flutter, paradoxical respiration and pendulum respiration). Effect on lesion is not only local but general (toxemia). Blood supply change is debatable (more or less blood?). Detailed pathological studies have been made on effects in tissues. Rales may be heard for some time after successful compression (air thru detritus in bronchi). Cavities whose walls are not too stiff are approximated (fill in). Lymph stasis is dependent on respiratory movement; dilations result in compressed lung (stasis). Lung shrinks but pull usually is not too great (mediastinum and chest wall). In exudative and caseous lesions thoracoplasty is not of value because fibrosis is probably not initiated (only stimulated emphasizing need for selection). Immediate reduction in size is passive (narrowing and shortening of chest). Latter is due to continued formation of fibrous tissue. (Varies with duration rather than degree of compression). Good type of case is one showing mediastinal pull to lesion(e.g. never operate if trachea is in midline) equals part of operation as only chest wall has to come in to complete it. Effect on good lung is development of compensatory hypertrophy (as much as 50% or larger). If seat of activity may disseminate process.

3. Indications and contraindications:
Cases with moderately or far advanced types of chronic disease of fibro-ulcerative type (with or without hemoptysis, cavitation or empyema) with lesion chiefly confined to one lung, with fairly good general resistance (heart, etc.) and in which all other treatment including sufficiently long sanatorium regime and pneumothorax have failed. Relative number is not great but constitute fairly large group in aggregate (~~300,000~~ 500,000 (U.S.))

cases with 5% suitable cases is 15,000). Estimates: Saugman and Mediner (4-8%) Jehns (5%) Ziegler (-20% of 600 patients) Probably 3-5%. Number with unilateral disease is probably 10%. Usually done 3-6 years after onset of disease, when no further progress is to be expected and patient is beginning to lose ground, but must be done as early as possible (more danger in delay than operation itself like malignancy). True operative mortality (in 49 hrs.) 1.5% (Sauerbruch). Mortality increases later in proportion to pulmonary disease. Left sided results are better than right - (a) 100 patients (57 left - 40% final cures 17% final deaths) (43 right 32.5% cures, 32.5% deaths). Stocklin. (b) 63 left (14% dead, 22% cured), 54 right (37% dead, 11% cured) - Brunner. (c) 56 left (3.5% deaths) 36 right (19.4% deaths) P.Bull. (d) Left - 18 positive results, 11 negative; right - 6 positive results, 7 negative - Jacobeus and Key. Reason given: Usually because of counterpressure on heart? Other factors are type of lesion. Productive lesion - 67 cases, 10% died. Exudative - 43 - 43% died - 116 cases (Sauerbruch). Large amount of sputum not a contraindication. Hemoptysis usually treated by pneumothorax and phrenectomy, e.g. 42 with hemoptysis (preoperative) 4 bleed for a time, 2 died of pneumonia (contralateral). Very difficult to predict behavior of contralateral lung disease (makes selection difficult) Brauer 10-15% show progressive lesion, Sauerbruch 12-24%; only operates when affected lung is entirely destroyed (contralateral compensation effected). Also contraindication in "good" lung is bronchiectasis, asthma (one of our cases) extensive adhesions, etc. May test with preliminary phrenic operation (about 50-50) with better results when negative. Other contraindications are heart disease, bone or joint disease, kidney involvement, amyloidosis, psychoses, etc. (not intestinal if chronic non-ulcerative?) Larynx may improve. Note Active disease in other lung away from apex is contraindication. Tuberculous empyema (indication) mixed infection (against).

4. Results: (a) Alexander (collection) 1159 cases - cured (36.8%) improved (24.4%) - 61.2% for both, unimproved 5.25%, operative deaths 14.1% (direct or indirect) advance of disease in other lung (19.4%) death total (33.5%).

Summary: Cured and improved (2/3) not improved or dead (1/3).

(b) Bull (Norway) May '14 to May '28 - author and 12 other surgeons. Local anesthesia (7.8%) general (6.4%) deaths inconclusive as too many factors enter. One stage operation 175 patients (28 deaths - 16%) two stage 211 (14 deaths - 6.6%). Anything up to 8 weeks is operative death. Tandberg (103 one stage - 7.8%) indicating probably technical difference (surgeon). Time interval (2-3 weeks) End results 401 Norwegian cases - 44 died 11%. Complete thoracoplasty 386 cases - 43 (11.4%). Partial 15 cases - 1 death - 6.7% + Deaths - 7 days (5.5%); 14 days - (8.5%); 28 days (9.5%); two months (11%); 3 months (13.5%); 6 months (15.75%) 12 months (18%) Note: should record mortality this way. Summary: Risk for men is greater than women, 3 times worse on right side than left, one stage twice as dangerous as two stage: worst combination - male, one stage, right lung. No claims should be made for 2 years. Author groups patients and results as follows: 328 patients (1914-26) reexamined in 1928 (not including last 2 yr.) alive 187. Class I alive, working, bacilli free - 123 (37.5%). II. alive, partly able to work, bacilli positive - 44 (13.4%). III. not able to work, bacilli positive - 19 (5.8%). IV. Alive but results uncertain - 1 (0.3%). Not traced 4 (1.2%).

(c) Archibald - 149 cases: early deaths Posterior - 104 cases death 1st week (2 cases) partial posterior 13 cases 2nd week (5 cases) One in 3rd week - another in 7th week - total 9 deaths (7.7%). Late deaths 1st year 5; 2nd - 6; 3rd -1; 5th and 6th 2; Total 15 plus 3 others (apicolysis) - 18 (15.4%). Results: 1 year group (88 cases) practical cures - 33%; greatly improved 32%; improved 8%; operative deaths 6.8%; progress of disease deaths 19.3%.

(d) Carter - 53 cases in 6 years: 103 operations - 3 (1 stage), 45 (2 stage), 5 (3 stage). 83.01% are alive; 16.9% have died. Results: Apparently well 33; improved 5, unimproved 1; too early to classify 3; dead 9. Years: No. and apparently well - 1921 (1-0); 1925 (3-3); 1926 (13-9); 1927 (11-9); 1928 (9-8); 1929 (14-8). Report indicates good selection of cases and technique. Attitude toward problem expressed as follows: "The desire to extend the indications for

operation is unusually strong in the case of these patients whose only hope lies in surgical collapse of the lung, and physicians are tempted to take desperate chances. In doing so, I feel that it simply makes the patients end more painful and tends to discredit the operation".

(e) Edwards - 59 cases; alive and well 22 (37.3%); alive and much improved 10 (17.0%); slightly improved 2 (3.4%); no change 2 (3.4%); doing well 10 (17%); died within 3 weeks, 4 (6.8%) later 9 (15.1%). Most of progressive tuberculosis.

Summary:

1. Medical treatment of tuberculosis (bed rest, pneumothorax); surgical (phrenic nerve exeresis) Wilms-Sauerbruch, Thoracoplasty (division of ribs close to articulation, resection of portion of first rib, resection of longer portions than Wilms advised fitting amount of rib section to individual case). Also apicolysis, etc.

2. Priority for pneumothorax Farlanini (1882) thoracoplasty, de Cerenville (1885), Quincke (1888) for development of operation - Boiffin and Goudet (1895) Brauer (1907), Sauerbruch (1909), Wilms (1911).

3. Effect of successful operation on lung is reduction of bronchial secretion, lymph flow and obliteration of some cavities (if not too thick walled).

4. In lungs already the seat of fibratic processes the condition is promoted.

5. No evidence to show fibratic processes are initiated.

6. Effect on blood flow is debatable.

7. In addition to local effects, systemic results are seen (lessened toxemia).

8. Following complications may develop (less in more recent operations), chest wall and mediastinal flatter, paradoxical respiration and pendulous respiration.

9. Through improved operative technique immediate fatalities are (48 hr.) now about 1.5%.

10. Rales may be heard for some time after successful compression (detritus in bronchi).

11. Thoracoplasty is not of value in exudative or caseous lesions with minimal or no fibrosis.

12. Immediate effect is passive; remote due to fibrosis (duration rather than degree of collapse in well selected cases).

13. Older dictum is "never to operate with trachea in mid-line" indicating selection of type with "pulling fibrosis".

14. "Good" lung undergoes compensatory hypertrophy (as much as 50%).

15. Basal and hilar lesions (recent or old) in "good lung" are contraindication to operation more than apical lesions (greater amplitude).

16. Cases with moderately or far advanced fibro-ulcerative lesions (chiefly unilateral) who have reached the limits of medical cure and are in fair shape are to be selected for operation.

17. The number is relatively small (about 5%) averages given (3-20%).

18. Operation usually done from 3-6 years after onset of disease.

19. Left sided lesions have better possibility of cure than right (use of heart for compression).

20. Females have better outlook than males

21. Hemoptysis is often favorably benefited.

22. Large amounts of sputum are not a contraindication.

23. Condition of "good lung" is most important factor in prognosis (against asthma, bronchiectasis, extensive adhesions, other tuberculous disease, except larynx and intestine?, heart disease, amyloidosis, exudative, caseous, basal and hilar lesions, mixed infectious empyema).

23. Results vary with operator and selection of cases - large series from all sources (cured or improved 2/3, not improved or died 1/3).

24. Deaths up to 8 weeks should be considered operative (Bull).

25. Type of anesthesia is not significant

26. One stage operation is more dangerous than two stage except in certain hands.

27. End results should not be classified until after two years.

28. Immediate mortality varies from (7.7 to 13.3%) late (15-20%).

29. Most of the deaths are due to disease itself especially late deaths.

30. Patients require expert care and selection and continued cooperation between medical men and surgeons before and after operation.

31. A definite standard of classification of end results should be adopted.

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Note: Lesions from Case I are hyperplastic, caseous, hard and soft tubercles. Many lesions seem near blood vessels (some opening into lumen). Tubercles vary in size and appearance. Brain will be shown.

Results at University Hospitals
(O. H. Wangensteen.)
Patients (thoracoplasty) 50 operations 110+. Results: 7 dead during University Hospital stay (No follow-up available afterward).
Causes of death:

1. Pituitary tumor, hypertension (on table).
2. Asthma, right heart failure, flutter of mediastinum (3rd day).
3. Suicide (6th day).
4. Tuberculous empyema - two stage (5 weeks after treatment started).
5. Progress of disease (1st stage) (3 Mo.).
6. Progress of disease (2 stage) (2 Mo.).
7. Progress of disease - general amyloidosis, empyema, adrenal (6 wks.)

Before present series: one death - empyema hemorrhage (after two stage).