VOL. IV THURSDAY, NOVEMBER 17, 1932 NO. 6

GENERAL STAFF MEETING
MINNESOTA GENERAL HOSPITAL
UNIVERSITY OF MINNESOTA

CONTENTS

I. Effects of Vitamin Deficiencies (Courtesy C.M.Jackson, Dept. of Anatomy)

Name of vitamin	Chemical Characters	Richest sources	Results of deficiency
A "Antikeratic"	Fat-soluble Heat-stable (Carotin = provitamin A)	Cod liver oil; milk and dairy products; egg yolk; glands (especially liver); green leafy vegetables	Xerophthalmia; epithelial metaplasia; growth failure; emaciation; loss of vitality; sterility; urolithiasis; increased susceptibility to pyogenic infections (especially of visual, respiratory, digestive and genitourinary tracts), and (possibly) to neoplasms.
B (B_1) "Antineuritic"	Water-soluble Heat-labile	Yeast; whole grain cereals; fresh fruit and vegetables; egg yolk; glandular organs	Polyneuritis and (probably) human beriberi; paralysis; digestive disturbances; cardiac weakness; emaciation; growth failure; anemia; impaired lactation.
C "Antiscorbutic"	Water-soluble Heat-labile (Hexuronic acid?)	Citrus fruits; tomatoes; some other fruits and vegetables; sprouted grain	Scurvy; growth failure; lowered vitality; capillary degeneration; hemorrhages and anemia; impairment of teeth; skeletal, muscular and visceral degeneration; secondary infections.
D "Antirachitic"	Fat-soluble Heat-stable (Ergosterol = provitamin D)	Irradiated ergosterol; cod liver oil; egg yolk; irradiated foods; milk and butter	Rickets and osteomalacia; disturbance of calcium-phosphorus metabolism and ossification; dental caries; weakness and predisposition to infections.
E "Antisterility"	Fat-soluble Heat-stable	Wheat germ oil; whole grain cereals; green vegetables; muscle; glandular organs	Sterility, due to gonadal degeneration in male and imperfect placentation in female; embryonic death and resorption; muscular dystrophy; paralysis in young.
F (G, B_2, P-P) "Antipellagra"	Water-soluble Heat-stable	Yeast; liver; lean meat; milk, eggs; wheat germ; green vegetables	Pellagroid disorder in animals and (probably) human pellagra; dermal, digestive and neural lesions; weakness and growth failure.

II. ANNOUNCEMENTS

1. Seminar, Preventive Medicine & Public Health.
4:30 P.M., Staff Room, Students' Health Service.

Nov. 18 - Dr. Radl: Sanitary survey of Minnesota General Hospital.

Nov. 25 - Mr. Christenson: Parasites of man of importance in Minnesota.

Dec. 2 - Mr. Zinter: Certain relationships between physical education and health.

Dec. 9 - Dr. Boynton: The health of teachers.

Dec. 16 - Dr. McKinlay: Silent rheumatic carditis.

2. Community Fund Drive Is On:
We ask your cooperation in simplifying collections. Giving ideas; 1% of annual salary in higher groups; one day's salary in lower; a small contribution by others. Let us all give this time. Please ask questions if in doubt. 100% solicitation: 100% cooperation.

III. CASE REPORT

CHRONIC ARTHRITIS, PELLAGRA

Case is that of white, adult male, 45 years old, under observation at Minnesota General Hospitals at following times: University Out-Patient Department 4-27-31, Hospital 6-17-31 to 10-1-31; 2-13-32 -- 3-1-32; 6-29-32 -- 7-19-32 (death).

Bachelor

Social history: Patient bachelor. Previously worked as baker. Following onset of arthritic symptoms, retired from this occupation. Lived alone, first with brother, then for two years prior to death lived in northwoods with 2 men in a cabin. Used no tobacco or alcohol. Habits considered good.

Previous illness

1907 - Typhoid. 1914 - Gonorrhea. 1917 - Frequent colds, tonsillectomy. 1921 - Operation for varicose veins.

Arthritis

1919 - First observed pain in back. Through intervening years to time of admission, (1931) back pain present intermittently and gradually became worse. Pain extended into other joints, particularly knee and hip. Pain in back persisted as most severe. Tried various forms of medication. Took mud baths, consulted chiropractors, etc. 1929 - gave up occupation as baker because of inability to get around.

Diarrhea

1930 - First developed diarrhea. Fall 1930 throughout subsequent winter until time of appearance at Out-patient Department, had rather severe attacks of diarrhea, 7 or 8 bowel movements daily. Other complaints: swelling of both ankles, note especially toward evening. Occasional heart burn after foods, such as cabbage. Nocturia 3 - 4 times a night. Memory slightly impaired during past year.

Physical examination:

Difficulty in walking because of pain in lower extremities. Erect posture except for knees and hips (markedly flexed). Average intelligence. Poor memory. Skin - normal. Lips - slightly pale as well as fingertips. Scars on inside of thighs from old operations for varicosities. Ankles slightly enlarged. Gums and mucous membrane normal. Several discrete nodules in inguinal region. Heart, lungs, abdomen, rectal - normal. Extremities - right ankle swollen, spasticity of muscles, diminution of motion in all joints of lower extremities. Reflexes - increased knee jerks, abdominal decreased, no Babinski, cremasteric present.

Laboratory

Urine - negative. Blood - Hb. 73%. State Board Wassermann and Larson - negative. Patient unable to come to Out-patient Department for treatment because of financial condition, therefore admitted to hospital.

Admitted:

6-17-31 - History same as previously noted. Diarrhea: continued until

June and then ceased. Physical examination: Same as above.

Laboratory

Urine - negative. Hb. 88%, rbc's 3,800,000, wbc's 6,150, Pmn's 69%, L 29%, M 2%. P.S.P. 65% at end of 2 hours. N.P.N. - 35%. Mantoux - 3+. Stool (several) - showed + benzidine test. Spinal fluid - clear, colorless, pressure 80/110, 0 cells, Nonne, Noguchi and Wassermann negative, colloidal gold 2221111100. Gastric expression (histamine) - no free Hcl in 1st and 2nd specimens, 13° third. Biopsy of inguinal node - hyperplasia.

X-ray

Chest, spine, ribs, pelvis, ankle, right temperomandibular joint: Negative ribs. Calcified tubercles, left base. Bilateral sacro-iliac arthritis. Destruction of symphysis pubis, probably arthritic. Spondylitis of lumbar and thoracic spine, possibly Marie-Strumpel type. Secondary periostitis of calcaneous and tibia. Negative temperomandibular joint. Chronic arthritis, cervical spine. Colon (barium enema) negative. Electrocardiogram - P_2 and P_3 exaggerated, tendency to right preponderance.

Progress (injections)

7-14-31 - Started on streptococci injections (intravenously), given 100,000,000. Killed bacteria.

Diarrhea again.

7-16-31 - Developed again. Cramps in abdomen. 5-10 bowel movements daily. Stools contain mucus. Continued to 8-1-31.

Discharged.

10-1-31 - During admission, patient received long series of intravenous streptococcic vaccine. Definite improvement in joint condition took place.

Diagnosis:

Chronic arthritis. Colitis, mucous type.

Readmitted

2-13-32 - Interval history - improvement continued for some time.

Pain. Continued in both mandibular joints, especially right, and back of neck. Arthritis in lower extremities definitely improved.

Diarrhea. Severe attacks since discharge. Passed 6-10 stools daily. Contained no blood or undigested food but slight amount of mucus.

Weight loss. Lost 12-1/2 lbs. since discharge.

Physical examination

Rather emaciated. Skin - loose and flabby, no other abnormalities. Neck - enlarged cervical lymph nodes. Mouth and throat - gums in fair condition, pharynx injected, tongue shows no ulcers or sores. Lungs, heart, abdomen, rectal - negative. Extremities - swelling of both knees and left ankle with some tenderness over these points, no redness or marked limitation of motion present; limitation of motion of left hip.

Laboratory: Urine - negative. Hb. 86%, wbc's 5,000. Pmn's 60%, L 40%. Stool - negative for blood. Wassermann - negative.

Neurological examination

Negative neurologically. Eye grounds - negative. Cannot elicit anything abnormal psychiatrically from interview except that patient is mentally retarded. Attended school as far as 3rd grade. Cannot do simple arithmetic. Suggest I. Q. examination. Behaves like average patient.

Injections. 3 more injections of intravenous streptococcic vaccine given.

Discharged. 3-1-32.

Readmitted

6-29-32 - Interval history. Diarrhea. 2 weeks after discharge, diarrhea developed. Stool - extremely foul odor, light yellow in color, contained some blood.

Hallucinations and delusions

3- -32 - Behaved queerly (according to brother). Subject to hallucinations and delusions which continued to time of readmission.

Skin lesions

3- -32 - Developed crusting lesions on nose, around mouth; soon thereafter lesions on back of both hands. Lesions developed as vesicles, became crusted, crust could be pulled off leaving bleeding surface. Soon after,

developed sores within mouth and bleeding gums. Condition cleared up somewhat 5-15-32.

Intern's note. In view of above history, pellagra must be considered strongly.

Laboratory

Urine - negative. Hb. 72%, wbc's 7,050, Pmn's 59%, L 41%, N.P.N. 28 Mg. Wassermann (blood) - State Board and Larson negative. Spinal fluid - 10 cells, colloidal gold 1222210000, protein test not done because of bloody fluid, State Board 4+, Larson negative. Repeated - Wassermann, St. Board 2+, Larson 1+. Significance?

Progress. Patient disoriented as to time and place. Choroidoretinitis, left eye. Deep reflexes 1+. Right pupil slightly oval.

Skin consultation (Pellagra)

Dilated follicles filled with sebaceous material. Several superficial erosions in mouth. Conclusions - cannot dispute diagnosis of pellagra at this time.

Mental

6-30-32 - Patient got out of bed and fell on floor. Talks irrationally at times. Restraints required. Disoriented.

7-1-32 - Talks irrationally.

7-2-32 - Incontinent. Otherwise condition same. Given bismuth and neosalvarsan.

7-6-32 - Condition unchanged.

7-8-32 - Seems weaker.

7-13-32 - Developing decubitus ulcers. Incontinent. Bed wet most of time.

7-14-32 - Going downhill.

7-18-32 - Weaker.

Exitus

7-19-32 - Pulse imperceptible. Does not respond. Respirations shallow. Expired at 12:50 P.M.

No permission for necropsy obtained. Example of type III case (see abstract) although primary type (social history) must be considered. Three cardinal signs of pellagra present (diarrhea, dermatitis, stomatitis), also C.N.S. changes?, psychosis, mild secondary anemia and achlorhydria (or diminution of acid). No record of liver or yeast therapy?

IV. ABSTRACT:

PELLAGRA.

Ref.: Boggs, T.R., and Padget, P. Pellagra, Analysis of 102 cases, Johns Hopkins Bull. 50:21-31-1932.

1. Introduction.

Pellagra constantly present is apt to escape attention. Those who see material of large public clinic drawn from less favored elements of population will be convinced that this disease still plays appreciable part in annual morbidity.

2. History.

Condition has been recognized clinically for 200 years. Our predecessors thought it due to some bad or toxic element added to food. Infectious theory of origin never gained any great headway and was soon displaced by Goldberger's (1926) demonstration that pellagra was deprivation disease, due to insufficient vitamins of B group in diet (P-P factor).

3. Material.

Study based on all cases of pellagra seen on Medical Service of Baltimore City Hospitals from Jan. 1, 1911 to Dec. 31, 1930. In 16,572 admissions of a general medical character, there were 102 cases of pellagra, a gross incidence of 0.68%.

4. Etiological classification.

Three types recognized: (1) Simple pellagra, (2) post-alcoholic, and (3) pellagra arising as complication of preceding disease.

Simple pellagra: Probably due solely to dietary deficiency, conforming to classical type of disease. Of these, there were 31.

Post-alcoholic variety: Seem definitely based on alcoholism, in that cases developed toward end of prolonged debauch, or, occasionally after continuous intake of distilled liquors. In pre-prohibition days, there were 24 cases of pellagra admitted. After prohibition in corresponding length of time, there were 78 cases. (8 to 34% increase in alcoholic variety). During same time, incidence of other types of

pellagra had risen only slightly. Total of 40 cases in this group.

Symptomatic pellagra. Type occurs in course of some other disease of a chronic nature associated with general debility. In this group, there were 31 cases distributed as follows:

Pre-existing psychosis	11
Pre-existing diarrhea	3
Hemiplegia with bulbar symptoms	3
Cachectic states:	
Carcinoma of gastro-intestinal tract	4
Diarrhea from disease of rectum	4
Chronic nephritis	2
Pulmonary tuberculosis	2
Cirrhosis of liver	1
Staphylococcus septicemia	1

5. Age.

20-30 is maximum age incidence for females, males show fairly equal distribution between 30 and 60.

6. Sex, race, occupation, social status, residence.

Revealed nothing.

7. Seasonal variation.

Marked, sharp rise of incidence during months of May and June. This is somewhat in contrast to autumnal recrudescence emphasized in older writings.

8. Summary of principal clinical features.

		%
a.	Complaint on admission:	
	Dermatitis	44
	Not related to pellagra	20
	Diarrhea	16
	Stomatitis	10
	C.N.S. changes	8
	Other	2
b.	History of previous attacks	14
c.	History of dietary deficiency	9
d.	Distribution of skin lesions:	
	Dorsum of hands	100
	Perineum in women	67
	Face and neck	24
	Elbows	18
	Perineum in men	17
	Feet	9
e.	Other lesions:	%
	Diarrhea	77
	Stomatitis	75
	Diarrhea & stomatitis	60
	Psychosis	50
	Spinal cord lesions	45
	Psychosis referable to pellagra	25
f.	Laboratory:	
	Gastric achlorhydria	90
	Mild secondary anemia	81

9. Comments by Author.

44% complainedof skin lesions (actually present in 100%). No relationship between presenting symptom and etiological type of disease. A history of deficient diet obtained in only 9 cases, but author felt this low figure due to low position of patients in social and intellectual scales, and to linguistic difficulties.

Distribution of skin lesions quite typical. In all cases dorsum of hands involved. High percentage of perineal lesions emphasized, particularly in women.

Stomatitis frequently complicated by supervention of Vincent's Angina, which greatly increased extent and severity of buccal lesions. Occasionally, Vincent's lesions invaded other mucous membranes.

Involvement of spinal cord in general resembled that of subacute combined sclerosis of pernicious anemia although showing more tendency to involve posterior columns. Degree of involvement varied from diminution or loss of knee-jerks, with subjective numbness and tingling, to severe combined sclerosis amounting to paraparesis or paraplegia with ataxia, paraesthesias and partial anaesthesia. Sphincter weakness or paralysis may occur in such cases. No instances of lower motor neurone lesions. Little variation between incidence of neurological findings in 3 types of pellagra.

Information concerning psychoses difficult to evaluate. 50% of patients showed definite characteristics but only 25% pellagra was thought to be origin of psychosis. In many, pellagra developed as complication of mental disease, in others psychosis appeared to be of typical alcoholic type. Psychosis of pellagra is of acute

hallucinatory type at onset, and later tends to develop paranoid trends, with delusions supplanting hallucinations. Development of paranoid trends is of grave prognostic significance.

Anemia usually of moderate degree and secondary in type, with hemoglobin ranging around 75%, erythrocytes did not vary much from normal, and in only 2 cases was eosinophilia noted. 90% showed gastric achlorhydria and remainder showed definite diminution of acidity.

10. Diagnosis.

If typical manifestations not present, caution must be observed in making a diagnosis. When characteristic lesions are present on hands, recognition of disease presents little difficulty. Dermatitis is like sunburn of severe type and involves dorsum of hand and on wrist is often continued around to plantar surface like encircling strap. Accompanied by vesicles or bullae, which are apt to become pustular. Skin may crack with slight bloody oozing. After healing, there is corresponding area of pitmentation, which persists for weeks or months. Chronic cases show peculiar roughening of knuckles. Similar lesions occur on nose, chin, forehead and cheeks, less frequently on elbows, forearms, knees, shins and dorsum of feet. Desquamation always follows lesions.

Perineal and vulvar lesions develop in more severe cases. Demonstration of cord changes, slight or severe, evidence of residual glossitis, and determination of achlorhydria are of value as additional presumptive evidence in such cases not showing typical manifestations.

11. Treatment.

Author's experience of treatment is considered typical of that recorded throughout literature. In 1928, following experimental work on liver diet and establishment of disease as a dietary deficiency, liver diet was instituted. Results of liver diet compared to results before administration of liver are as follows:

Without Liver Diet

	No. of Cases	%	Average Hospital Stay
Died	24	69	28 days
Recovered	9	26	56 "
C.N.S. residual	2	5	40 "
Total	35	100	

With Liver Diet

	No. of Cases	%	Average Hospital Stay
Died	7	20	8 days
Recovered	25	70	32 "
C.N.S. residual	4	10	29 "
Total	36	100	

Liver extract used in only a few cases found fully as effective as liver itself. Dry brewers yeast has been used successfully elsewhere. Many of patients are exhausted or lethargic or have extreme pain in taking food. Justifiable to use tube for feeding to save life.

Dermatitis treated symptomatically with caution to avoid oily or greasy applications. Dusting talcum or other powder give much relief. The bullae are opened and treated with 5% solution of gentian violet and left uncovered. Perineal lesions should be cleaned by douches.

Stomatitis treated by sodium perforate as paste or stronger solutions of potassium permanganate. Authors feel neoarsphenamine is unsafe.

Diarrhea requires active measures. Bismuth, opium in large amounts necessary. Authors found that diarrhea responds almost specifically to liberal doses of hydrochloric acid. True even when no gastric achlorhydria is present. In extreme cases, 1 gram of calcium chloride intravenously has been necessary. As yet this procedure has not failed to prove effective.

No satisfactory treatment of cord changes found. Patients seem to respond to some extent to long continued use of hydrochloric acid, and this drug is recommended. Large doses of liver, so far, have been without apparent benefit.

Psychoses entirely hopeless. Occasionally, improvement takes place as other signs of disease clear up.

Anemia usually disappears on liver diet.

12. Alcoholism and pellagra.

Disease well recognized but there has been much speculation concerning relationship. Three theories advanced. (1) Pellagrous manifestations may be result of deleterious elements present in liquor. Suggestion of alcoholic pseudopellagra have not been substantiated by author's experience. (2) Simple withdrawal of food, so common in alcoholics on a spree, is etiological factor. This is not entirely explained because there is a definite group of cases of individuals who never go on a spree, but are accustomed to large daily intake of alcoholic beverages. (3) Seems more plausible to author that either alcohol destroys the pellagra-preventing factor in gastro-intestinal tract, or that gastro-intestinal tract is so altered by large amount of alcohol that it is incapable of assimilating pellagra-preventing factor. This theory is in line with observation of condition in association with debilitating diseases known to produce a disturbance of metabolism. There is a relatively large group in which the food intake is quite inadequate usually because of the inability to assimilate food. Author had a case of inoperable carcinoma of stomach who developed pellagra while taking liver diet, which had been given to keep control of his anemia.

Authors emphasize occurrence of pellagra as complication to cachectic states because it has been previously noted, it is unquestionably more common than is usually recognized.

13. Conclusions.

(1) 102 cases of pellagra presented.

(2) 31 simple variety, 40 post-alcoholic, and 31 arising as complications of some other disease.

(3) Alcoholic variety became more than 4 times as common since enactment of Prohibition.

(4) No difference in clinical features between 3 types of pellagra.

(5) Disease seems most common in spring months, occurring in adult life.

(6) Chief complaints on admission, dermatitis, diarrhea, stomatitis.

(7) Distribution of skin lesions 100% on dorsum of hands and found in 67% on perineum in women, stomatitis in 75%, diarrhea 77%, spinal cord lesions 45%, psychosis 50% but probably referable to pellagra in only about 25%, gastric achlorhydria 90%, remainder showed diminution of acidity.

(8) Typical skin lesion is a vesicle or bulla which becomes pustular and crusted, usually leaves bleeding surface followed by pigmentation after healing takes place.

(9) In chronic cases, peculiar roughening is present on skin over knuckles.

(10) Stomatitis may be secondarily infected and produce severe ulcerative lesions; other mucous membranes may be involved.

(11) Spinal cord lesions resemble subacute combined sclerosis of pernicious anemia.

(12) Liver diet is recommended with symptomatic treatment of other manifestations.

(13) Mortality under liver treatment dropped from 69% to 20%.

(14) Central nervous system changes including psychoses do not respond favorably to the liver treatment.

(15) Attention is especially called to the development of pellagra following alcoholic disuse and following cachectic states.

V. CASE REPORT

NON-TROPICAL SPRUE

Case is white adult male, 45 years old, seen at Minnesota General Hospital 7- -28 to 9-13-28; 2-17-30 to 3-31-30; 6-17-30 to 8-6-30; 9-17-30 to 2-24-31; 12-10-31 to 1-7-32. Also observed in Out-patient Department in intervals between admissions to hospital and continued under observation to 8-15-32.

Another Bachelor.

Unmarried farmer, Swedish extraction. Never away from north central region of United States. Never a robust child but always in good health. Nothing to

indicate any unusual dietary problems. Pneumonia at 4, arthritic symptoms at 10. 1925, bilateral inguinal hernia.

Stomatitis

1920 - Observed soreness of tongue, while intermittent it was severe enough to make him select bland foods.

Diarrhea

1926 - First gastro-intestinal symptoms. Noted urge to defecate at 3 or 4 o'clock in morning. Stools - larger than normal, semi-solid, almost colorless, not frothy, no blood or mucus. General condition remained stationary during this year.
1927 - Stools gradually increased in number, usually 2 early movements daily. Abdominal discomfort. Appetite remained undisturbed. Felt weaker. Loss of 10 kilograms in weight. No nausea or vomiting.

Paresthesia

Numbness and tingling of hands and feet became fairly noticeable. Observed this to be present more or less constantly for about 4 years.

Admitted

July 1928. Physical examination: Not acutely ill, poorly developed, subnormal constitution, poor posture, weighs 49 kilograms, responds sluggishly, listless. Pulse 60-90. Dry skin. No pigmentation. Mouth - atrophic papillae of tongue, no ulcerations. Heart, lungs, abdomen, extremities, neurological - negative.

Laboratory (Anemia and Achlorhydria)

Urine - normal on various occasions. Hb. 64%, rbc's 2,870,000, wbc's 5,000. Marked poikilocytosis and anisocytosis with many macrocytes. Gastric expression - no free Hcl. Stool - light, undigested particles of food.

X-ray

Gastro-intestinal - Some hyperperistalsis and at times spasticity of pylorus. Some relaxation of pylorus also takes place. Duodenal bulb is rather small but otherwise normal. Marked narrowing of 2nd and to some extent of 3 portion of duodenum and suggesting some type of stenosis. Diverticulum of jejunum.

Progress

Placed on liver extract. Gained 5 kilograms in weight. Blood in stool. Bulky stools persist. 2 capsules liver extract, 4 times daily. Rbc's - 5,700,000. Hb. 85%.

Discharged. 9-13-28 - Diagnosis of pernicious anemia.

Readmitted.

2-17-30 - During interval, took one-half pound of liver daily with some irregularity toward end. Continued to feel well. Epigastric pain relieved by eating. Intermittent recurrence of nausea and vomiting. Bowel movements persisted, numbering 2 to 5 daily, of same character as above.

Physical examination. Vague mass, 3 cm. below right costal margin, not tender or movable.

Laboratory. Gastric expression (after histamine) - free Hcl present in 40 minutes.

X-ray

Gastro-intestinal - marked change in appearance of stomach. Distinctly dilated. Marked hyperperistalsis. Marked stenosis of pylorus. Duodenal bulb is extremely small, irregular, marked stenosis of 2nd, 3rd portions of duodenum which increased considerably since last examination. Appearance suggests rather extensive ulcerated process of duodenum with marked peri-duodenal adhesions.

Operation

3-10-30 - Typical posterior gastro-enterostomy. Anastomosis made transversely along greater curvature. Findings - large duodenal ulcer extending over almost entire first portion of duodenum, narrowing it very much. Second portion of duodenum seemed normal. Lesser peritoneal sac showed signs of recent inflammation by adhesions.

Discharged. 3-31-30 - Convalescence uneventful. Diagnosis - duodenal stenosis with partial obstruction.

Interval history. Although slight gain in weight, did not improve much. No vomiting. Losse bowel movements persisted.

Tetany developed

May 1930 - Had attack of severe, painful, tetanic contractures with flexion of forearms, hands and legs. Fingers flexed over thumb. Similar attacks occurred at intervals of 5 days, lasting 30 minutes to 3 hours. Slight edema of legs.

Readmitted. 6-17-30 - Physical examination: No new findings except for Chvostik's and Trousseau's signs. Abdominal - deep reflexes absent except during attacks of tetany. Slight pitting edema of lower legs. No calcium studies made.

Treatment

Placed on calcium lactate and parathyroid extract. Attacks of tetany are controlled. Weight increased from 38 to 41 kilograms. Edema diminished. Fair appetite. Addition of hydrochloric acid has no apparent effect.

Discharged. 8-6-30.

Readmitted

9-17-30 - Tetany recurred, coming on daily lasting from one-half hour to one hour. Edema markedly increased. Considerable abdominal distention. Stools remain unchanged in character but increased in number, being light, bulky, semi-solid, when frequent they appear watery.

Physical examination. No changes.

Laboratory

Stool - undigested particles of food, globules of fat, stercobilin present, blood absent. Gastric analysis - hydrochloric acid present after injection of histamine, total acidity - 14 to 36, total chlorides - maximum 331. B.M.R. - -19%, -21%. Glucose tolerance test - normal. Blood calcium - lowest value 5 mgs.; with intake of calcium lactate which kept patient free from tetany, the serum calcium found between 7 and 9.8, inorganic serum phosphorus 4.2. Plasma protein - 6.48, total protein - albumin 3.16, globulin 3.32, fibrinogen .72, euglobulin .56, pseudoglobulin 1.48. N.P.N. - 35 mgs.

X-ray

Gastro-intestinal - shows gastro-enterostomy functioning fairly well. Considerable barium passing through pylorus. Stenosis of duodenum again shown. Third portion of duodenum shows some dilatation. Some regurgitation present in 2nd and 3rd portions of duodenum. Colon (Barium enema) - shows extreme redundancy of colon. No evidence of organic condition. Pelvis, skull, femur - shows some decalcification of pelvis. Questionable significance. Gall-bladder - unsatisfactory examination. No shadow of gall-bladder can be made out because it is not functioning.

Discharged. 2-24-31

Diarrhea

12-10-31 - Physical examination - approximately same as previously noted. Diarrhea continues as before. Tetany manifested whenever calcium lactate and parathormone omitted and easily controlled by these 2 drugs.

Pancreatic insufficiency?

12-15-31 - Given Schmidt's test. Small piece thymus tied in cheese cloth, imbedded in gelatine given. Cheese cloth recovered in stool. Examination - nuclei appear normal. No evidence of nuclear digestion. Only gauze recovered.

Staff note: Opinion of head of Department of Medicine - Chronic infection of pancreas, giving patient pancreatic insufficiency.

Blood picture remains fairly constant throughout. Some increase in size of red cells and polychromatophilia with variation in size and number of platelets. Hemoglobin ranges from 64 to 90, depending upon type of treatment given. Liver therapy, raw linseed oil in massive doses, iron ammonium citrate, high vitamin diet, high protein, low salt, sugar free diet, high fat diet, raw calf liver diet with liver extract alternated for various test periods. Readings compared - no particular significance of findings recorded.

Discharged. 1-7-32 - Condition approximately unchanged.

Died

11-2-32 - Letter from Dr. J. E. Magle, Worland, Wyoming (condensed). "Writing in regard to A____ J____, who died under my care during the past week. I saw this patient during the

month of August and gave him bi-weekly injections of parathormone. About 2 weeks previous to his death, he developed a diarrhea which I was unable to check. He failed rapidly and died in about 2 weeks. The tetany was not very much in evidence as the end approached. I did an autopsy on him but unfortunately not until the body had been embalmed several hours. I was unable to make out much change. The gastro-enterostomy seemed all right and to be functioning. The pylorus was very rigid and permitted the little finger to be passed through only with difficulty. Dense adhesions surrounded the first portion of the duodenum. I was unable to find a lesion in either the stomach or duodenum although the walls of the latter were very much thickened. The pancreas was very pale, the body of which was very indurated and hard (normal?) . On section, I was unable to note anything unusual. The spleen was very small. The liver, on section, was very pale and small. The remainder of the autopsy was negative."

Comment:

Chief findings indicate non-tropical (tropical) sprue. Diagnosis of duodenal ulcer questionable; same for pancreatitis? Most intense changes in tropical? sprue found in duodenum and jejunum. Wall is apparently thickened (due to thick mucus coat). Sections in typical cases show cellular infiltration in and about mucosa (granulation tissue), compressing glands of Lieberkühn, causing atrophy of secreting cells, overproduction of mucus cells with formation of mucus cysts. In old cases atrophy may be extreme, superficial ulcers (rupture of mucus cysts) present, colon changes not so common. Ref. Ashford, B.K., Oxford Medicine, Vol.V - 631-655-1922.

VI. ABSTRACT:

NONTROPICAL SPRUE WITH DUODENAL INVOLVEMENT AND TETANY.

Ref.: Radl, R.B. and Fallon, M., Arch. of Int. Med. 50:593-604 (Oct.) '32.

Report consists of case outlined above with discussion of diagnosis and treatment.

Introduction

The number of cases of nontropical sprue that have been reported, both from Europe and America, is sufficient to make condition well recognized. Some cases correspond to the picture of tropical sprue, others are less well defined.

Clinical course.

Typical picture is illustrated by case reported. There is dyspepsia, flatulence, capricious appetite, constipation alternating with voluminous liquid or semi-liquid stools which are often foamy and light colored, stomatitis, anemia (pernicious type), muscle cramps, loss of weight, low blood pressure, mental depression. Secondary symptoms may be present such as edema and tetany with low blood calcium. Onset is usually insidious and slow. Question of differential diagnosis is emphasized. The resemblance of nontropical sprue to pernicious anemia is very close. The blood picture in the two diseases may be almost identical (Sept.1931) volume of Folia Hemat, contains a German article giving detailed criteria, differential diagnosis from blood picture between pernicious anemia, sprue and pellagra. The differences are very slight and the necessity of correlating the blood picture with the clinical findings is emphasized). General debility of patient. The condition of the stools, absence of cord symptoms and the less complete response after liver point toward the diagnosis of sprue. Development of tetany in this patient apparently is not based on the presence of pyloric stenosis because it became very much more marked after the performance of a well functioning gastro-enterostomy. Berglund had observed cases of severe tetany, in pancreatic insufficiency.

Monilia infection. Monilia psilosis was isolated from the stools but the significance in regard to the etiology is questionable. Authors state that the condition on the whole is resistant to different forms of therapy. Tetany was not controlled by the diet and large doses of calcium lactate and parathormone were repeatedly necessary. No improvement under

liver extract with restriction of fat, such as reported in the literature.

VII. ABSTRACT:

CALCIUM AND PHOSPHORUS METABOLISM IN A CASE OF NONTROPICAL SPRUE WITH ASSOCIATED TETANY.

Marble, A. and Bauer, W., Arch. of Int. Med., 48:514-532, '31.

These authors report a case of nontropical sprue associated with tetany practically identical with the case reported from University of Minnesota. Particularly interested in the calcium and phosphorus metabolism made extensive studies corresponding to periods of treatment with liver therapy. Their patient differed in that he obtained a remarkable improvement on liver therapy (in doses even smaller than used in our case).

Patient admitted to hospital with tetany, a serum calcium of 6.7 mgs. and serum phosphorus of 1.28 mgs. Excretion of calcium approximately equivalent to the intake. With an intake of 4.48 grams, the fecal phosphorus was 4.07; intake of 3.72 grams, fecal calcium was 3.58 grams. The urinary values on the other hand were extremely low. The urinary phosphorus being .21 in the first instance and .07 in the second. These findings on admission were interpreted as indicating that the calcium was not absorbed in the intestinal tract which accounted for the low serum values and therefore for the low excretion in the urine.

Accompanying this, there was considerable decalcification of bone (see our case) indicating that bone calcium was called upon to compensate for failure of absorption of calcium. The condition differed from parathyroid tetany in that this latter disease is characterized by low value for serum calcium and high value for serum phosphorus, normal excretion of fecal calcium and phosphorus and decreased excretion of urinary calcium and phosphorus and normal density of bone. In other words, the absorption of calcium from the gastro-intestinal tract in the latter condition is normal. Authors emphasize that corresponding with the improvement of the general condition on liver therapy the calcium metabolism and calcium values became normal. Excretion of fecal calcium and phosphorus greatly reduced. The urinary calcium and phosphorus changed so that there was a positive balance of 5 to 8 grams and at the same time the serum calcium rose to normal limits, 8 to 10 mgs. The serum phosphorus rose to 4.15 mgs. The tetany was completely controlled.

In addition to the studies of calcium metabolism, the metabolism of the fixed base was also studied. At the time of admission, the total base was found to be 124 mgs. This was regarded as the lowest value ever reported in the literature. The value was consistent with the severe dehydration present. With the improvement of the general condition under liver therapy and the absorption of water the serum base became normal. Authors emphasize the relation of tetany to sprue. They review the literature and collect 50 cases of such association. It is suggested that tetany is due entirely to failure to absorb calcium. The failure to absorb calcium is due to one or both of two conditions. Achlorhydria according to experimental evidence decreases absorption of calcium On the other hand, the presence of high fat content in the stools causes combination with calcium to form an insoluable calcium soap which is subsequently excreted. Both of these mechanisms function to reduce the absorption of the calcium. The workers are satisfied with the simple statement that many men have demonstrated that sprue like pernicious anemia is a deficiency disease.

Summary

(1) Incidence of notropical sprue apparently is more common than generally appreciated. (2) Etiology of disease is uncertain. It is thought that the disease may be a dietary deficiency. Disturbance of absorption is also presented as a possible etiological factor.

(3) Disturbance of digestion is primarily a disturbance of fat digestion with secondary failure to absorb calcium.

(4) Onset of disease is insidious. The course is slow and prolonged.

(5) Indefinite gastro-intestinal symptoms are diarrhea with large liquid

or semi-liquid stools, foamy and light colored, glossitis, low blood calcium, anemia (pernicious type).

(6) Differentiation between sprue and pernicious anemia on blood picture is extremely difficult.

(7) Monilia infection is an etiological factor but probably of no significance.

(8) There is usually achlorhydria such as present in the other deficiency diseases of this type.

(9) Tetany is a common complication and arises from failure of absorption of calcium rather than disturbance in calcium metabolism within the body as in parathyroid disease.

(10) Response to liver in sprue is variable. Many of the case reports indicate a favorable response. With improvement of general condition, there usually is a spontaneous improvement of tetany.

(11) In the case reported from Minnesota General Hospitals, the question of pancreatic disease is discussed.

(12) The disease resembles pellagra in many ways. There is gastro-intestinal disturbance, achlorhydria, diarrhea, anemia (pernicious type) and usually a favorable response to liver therapy in both diseases.

History and literature abstracts
by R. Koucky

VIII. PERSONALS

1. 60-cent x-rays. According to Time, XX (Nov.14) 1932, J. Arthur Myers, M.D., University of Minnesota Medical School, declared that if every case of incipient tuberculosis in children could be discovered doctors could ultimately wipe it out. Henry Collier Wright, President of the Queensboro Tuberculosis Association, heard Dr. Myers say this. He told it to Tinkerer Frank J. Powers, (one of the three Powers brothers who own and operate the Powers Photo Engraving Company).

Last year, New Haven Department of Health and Board of Education found that 215 out of 563 children in one grade school had traces of tuberculosis (positive tuberculin?). Out of the 215, 71 (13%) definitely had the disease. X-ray films cost New Haven $3 a pupil last year. As the result of a new invention by Frank Thomas Powers, 20,000 New Haven children can now be x-rayed at a total cost of $0.60 each.

A new x-ray machine which automatically focuses the x-ray on the subject to be examined and adjusts the x-ray current has been devised. Powers x-ray pictures are not quote so clear as standard films. A new process of making photographic paper in long rolls similar to wrapping paper has been devised, snipped off in lengths as they are exposed and sent to the developing tank. The Powers machine can be sent around the country, and school children examined once a year with a process that takes only a few hours. It is hailed as a significant advance in the control of this disease.

J. Arthur Myers, born Croton, Ohio, Nov. 25, 1888, B.S. Ohio '12, M.S. '13, Ph.D. Cornell '14, M.D. Minnesota '20, started career as Instructor of Anatomy in Missouri '13-'14, Minnesota '14-'18, Internal Medicine '20-'23, now Professor of Preventive Medicine, University of Minnesota. Nationally famed for persistent development of idea of pathogenesis of tuberculosis, he has written extensively about the disease, made thousands of addresses, hewed to the line. Idea adopted as result of intensive studies of school children in the Lymanhurst School for Tuberculous Children of Minneapolis (12 years). Opposed within ranks of tuberculosis specialists and accused of pendulum thinking, impractical suggestions, his ideas are now being accepted by public health officials and many others. We hope to discuss this problem at one of the December meetings at which Dr. Myers' ideas will be presented.

2. More Honors.

Jennings Crawford Litzenberg, President, Minnesota Academy of Medicine, President American Association of Obstetricians, Gynecologists and Abdominal Surgeons, refused presidency of Central Association of Obstetricians because of presidential load, (General Staff Meeting Bull. IV, 6 (Oct. 6) '32), recently

nformed that at the annual meeting of he American College of Surgeons, Thursay, Oct. 20, 1932, he had been elected a ember of the Board of Governors of the ollege, for 3 years. Heartiest congratulations.

3. Henry Ludwig Ulrich and Hobart Ansteth Reimann, Department of Medicine, attended meeting of the Central Society for Clinical Research, Friday, Nov. 4, 1932, at Chicago,-and Minnesota Society of Internal Medicine (with other staff members), Mayo Clinic, Rochester, Minnesota, Monday, Nov. 14, 1932. Report splendid meetings and high interest.

4. Meeting.

Date: November 10, 1932.

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

Time: 12:15 to 1:15 (on time again)

Program: Pathogenesis, Symptomatology, Diagnosis and Treatment of Cause and Effects of Over- and under-secretion of Anterior Pituitary Lobe Secretion.

Present: 90

Discussion: Grace Gardner,
Leo G. Rigler,
L. C. Fischer,
Leo Zon,
A. T. Rasmussen.

Theme: First patient was feminine type. Chief x-ray finding was osteoporosis (hyperparathyroidism?). Only 13% of cells of anterior lobe are basophilic. Acidophilic cells produce growth hormone, basophilic cells sex hormone. Erdheim - frequency of adenomas (10%) not substantiated by others, probably best explained by finding basophilic cells wandering into posterior lobe. (Rather common finding). No adenomas in 285 glands. minutely studied. Somnolence instead of "hibernation" to describe mental status of these patients because no changes observed during hibernation; none in pregnancy. Mixed type of tumors may result from infiltration of one or other cell types into opposite component. Hypophysis not essential to life. Second case rather easily explained by absence of dominant secretion of anterior pituitary lobe occurring later in life because of slow growth of cyst. Other endocrine glands of series become relatively inactive. The first case probably best explained by hypersecretion causing hypersecretion of pituitary parathyroids, adrenal cortex with secondary sex changes (to male). The presence of osteoporosis in both cases is of interest; second case difficult to explain on simple basis. It might be due to hyperparathyroidism as only active gland to series. Hypophysis can now be removed in experimental animals without injuring surrounding brain tissue; hypersecretory effects produced by injection of hormone. This should result a great addition to our knowledge of polyglandular syndromes.

Gertrude Gunn,
Record Librarian.

NO MEETING NEXT WEEK - THANKSGIVING.