

MEDICAL GRAND ROUNDS
PARKLAND MEMORIAL HOSPITAL
April 24, 1958

Bibliography

I. Musts!!

1. Longcope, W.T. and Winkenwerder, W.L.: Clinical features of the contracted kidney due to pyelonephritis. *Bull. Johns Hopk. Hosp.* 53:255, 1933.
2. Weiss, S. and Parker, F., Jr.: Pyelonephritis: its relation to vascular lesions and to arterial hypertension. *Medicine* 18:221, 1939.
3. Birchall, R. and Alexander, J.E.: Medical aspects of pyelonephritis. *Medicine* 29:1, 1950.
4. Beeson, P.B.: Factors in the pathogenesis of pyelonephritis. *Yale J. Biol. & Med.* 28:81, 1955.
5. Beeson, P.B.: The case against the catheter. *Am. J. Med.* 24:1, 1958.

II. Predisposing factors:

A. Obstructive Lesions.

6. Brewer, G.E.: The present state of our knowledge of acute renal infections. *J.A.M.A.* 57:179, 1911 (July 15). clearly demonstrated the importance of urethral obstruction in the production of experimental pyelonephritis.
7. Mallory, G.K., Crane, A.R. and Edwards, J.E.: Pathology of acute and of healed pyelonephritis.. *Arch. Path.* 30:330, 1940. Classic path. description.
8. Braude, A.I., Shapiro, A.P. and Sieminski, J.: Hematogenous pyelonephritis in rats. *J. Clin. Invest.* 34:1489, 1955.
9. Beeson, P.B., Rocha, H. and Guze, L.B. Experimental pyelonephritis: influence of localized injury in different parts of the kidney on susceptibility to hematogenous infection. *Trans. Assn. Am. Phys.* 70:120, 1957. Intra renal hydronephrosis 2nd to medullary damage was essential in the production of cortical lesions.
10. DeNavasquez, S.: Experimental pyelonephritis in the rabbit produced by staphylococcal infection. *J. Path. Bact.* 62:429, 1950. Renal scarring 2nd to healed staph. infection predisposed rabbits to hematogenous infection by coliforms.

B. Diabetes Mellitus:

11. Harrison, J.H. and Bailey, O.T.: The significance of necrotizing pyelonephritis in diabetes mellitus. *J.A.M.A.*, 118:15, 1942.
12. Bernard, D.M., Story, R.D. and Root, H.F. Urinary tract infections in diabetic women. *New Eng. J. Med.* 248:136, 1953 (Jan. 22).
13. Kass, E.H.: Bacteriuria and the diagnosis of infections of the urinary tract. *Arch. Int. Med.* 100:709, 1957. 18% females, 5% male diabetics have significant bacteriuria.

C. Genetic Factors:

14. Perkoff, G.T., Stephens, F.E., Dolowitz, D.A. and Tyler, F.H. A clinical study of hereditary initial pyelonephritis. *Arch. Int. Med.* 88:191, 1951. An interesting association with nerve deafness noted, why are many drugs which are nephrotoxic, also ototoxic.
15. Sohar, E. Renal disease, inner ear deafness, and ocular changes. *Arch. Int. Med.* 97:627, 1956.

D. Catheterization:

16. Kass, E.H. Asymptomatic infections of the urinary tract. *Trans. Assn. Am. Phys.* 69:56, 1956. 95% of patients with indwelling catheters are infected by 96 hours.
17. Kass, E.H. and Schneideman, L.J. Entry of bacteria into the urinary tracts of patients with indwelling catheters. *New Eng. J. Med.* 256:556, 1957 (March 21).
18. Jackson, G.G. and Griebble, H.G. Pathogenesis of renal infection. *Arch. Int. Med.* 100:692, 1957.

III. Acute pyelonephritis:

A. Pyelonephritis of children -- NOT a benign self-limited disease in many instances.

19. Wharton, L.R., Gray, L.A. and Guild, H.G. The late effects of acute pyelitis in girls. *J.A.M.A.* 109:1597, 1937 (Nov. 13). Follow-up at an average of 9.6 years, 17/30 patients had persistent urinary abnormalities.
20. Woodruff, J.D. and Everett, H.S. Prognosis in childhood urinary tract infections in girls. *Am. J. Obst. & Gynec.* 68:798, 1954. 30/76 abnormal at 5-23 year follow up.
21. Macaulay, D. and Sutton, R.N.P. The prognosis of urinary infections in childhood. *Lancet* 2:1318, 1957 (Dec. 28).
22. Stansfeld, J.M., Chronic pyelonephritis in children. *Proc. Roy. Soc. Med.* 47:631, 1954. Most patients are less than one year, with many of these less than one month. Usual symptoms are anorexia and vomiting.

B. Pyelonephritis in pregnancy.

23. Peters, J.P., Lovieles, P.H. and Zimmerman, H.M. Pyelitis in toxemias of pregnancy. *Am. J. Obst. & Gynec.* 32:911, 1936. 13% of toxemics had the diagnosis of pyelitis made -- probably not etiologically related.
24. Baird, D. The upper urinary tract in pregnancy and puerperium with special reference to pyelitis of pregnancy. *J. Obst. & Gynec. Brit. Emp.* 43:1, 1936 and 43:435, 1936. A monumental study of the problem.

C. Necrotizing Renal Papillitis -

25. Edmondson, H.A., Martin, H.E. and Evans, N. Necrosis of renal papillae and acute pyelonephritis in diabetes mellitus. *Arch. Int. Med.* 79:148, 1945.
26. Robbins, S.L., Mallory, G.K. and Kinney, T.D. Necrotizing renal papillitis: a form of acute pyelonephritis. *New Eng. J. Med.* 235:885, 1946 (Dec. 19).
27. Mandel, E.E. Renal medullary necrosis. *Am. J. Med.* 13:322, 1952.

IV. End Stage Pyelonephritis:

28. Jackson, G.G., Dallenbach, F.D. and Kipnis, G.P. Pyelonephritis: Correlation of clinical and pathologic observations in the antibiotic era. *Med. Clin. N. Amer.* Jan. 1955, pp. 297. 9% of all autopsies showed pyelo, in 1/3 it was of major importance.
29. Weiss, S. and Parker, F., Jr. Relation of pyelonephritis and other urinary-tract infections to arterial hypertension. *New Eng. J. Med.* 223:959, 1940 (Dec. 12). Estimated pyelo. responsible for 15-20% of malignant hypertension.
30. Reeschin, F. Studies of chronic pyelonephritis. *Ejnar Munksgaard, Copenhagen*, 1948, pp. 46-47.
31. Saphir, O. and Taylor, B. Pyelonephritis lenta. *Ann. Int. Med.* 36:1017, 1952. 43/50 patients with malignant hypertension had moderately severe to severe pyelo.
32. Heptinstall, R.H. and Corrill, R.H. Experimental pyelonephritis and its effect on the blood pressure. *J. Path. Bact.* 69:191, 1955. The only suggestive experimental evidence of hypertension in experimental pyelonephritis.

V. Inapparent Progressive Pyelonephritis

A. Frequency of Occurrence.

33. Marple, C.D. The frequency and character of urinary tract infections in an unselected group of women. *Ann. Int. Med.* 14:2220, 1940. 23% of patients on a general ward had significant bacteriuria.
34. Loopuyt, L. Infections of the urinary tract. I. frequency of urinary infections. *Acta medica scandinav.* 125:245, 1946. Females 29% bacteriuria, males 3%.
35. Kass, E.H. Asymptomatic infections of the urinary tract. *Trans. Assn. Amer. Phys.* 69:58, 1956. -- 4-23% of various groups of patients demonstrated significant bacteriuria.

B. Value of "Glitter cells" and pyuria

36. Sternheimer, R. and Malbin, B. Clinical recognition of pyelonephritis with a new stain for urinary sediments. *Am. J. Med.* 11:312, 1951.
37. Berman, L.B., Schreiner, G.E. and Feys, J.O. Observations on the glitter cell phenomenon. *New Eng. J. Med.* 255:989, 1956 (Nov. 22). Glitter cells can in no way be considered a specific reaction in pyelo, though in patients with pyelo at least blue-staining cells are generally seen.
38. Poirier, K.P. and Jackson, G.G. Characteristics of leucocytes in the urine sediment in pyelonephritis. *Am. J. Med.* 23:579, 1957.

C. Quantitative Urine Cultures:

(Ref. #33 and 35)

39. Sanford, J.P., Favour, C.B., Mao, F.H. and Harrison, J.H. Evaluation of the "Positive" urine culture. *Am. J. Med.* 20:88, 1956. Patients with pyelonephritis have greater than 10,000 bacteria/ml urine..
40. MacDonald, R.A., Levitin, H., Mallory, G.K. and Kass, E.H.: Relation between pyelonephritis and bacterial counts in the urine; an autopsy study. *New Eng. J. Med.* 256:915, 1957 (May 16).
D. Risk of catheterization: (References - 5, 33)
41. Gize, L.B. and Boeson, P.B. Observations on the reliability and safety of bladder catheterization for bacteriologic study of the urine. *New Eng. J. Med.* 255:474, 1956 (Sept. 6).
E. Nosocomial Infections: Not only hospital staph. cross infections are a problem.
42. Orskov, I. Nosocomial infections with *Klebsiella* in lesions of the urinary tract. *Acta path et microbiol. Scand.* 93:259, 1952.
43. Kirby, W.M.M., Corbran, D.O. and Tanner, D.C. Urinary tract infections caused by antibiotic resistant coliform bacilli. *J.A.M.A.* 162:1, 1956 (Sept. 1).
44. Dutton, A.A.C. and Ralston, M. Urinary tract infection in a male urological ward with special reference to the mode of infection. *Lancet* 1:115, 1957 (Jan. 19). While thinking about this - see reference #17.

VI. Therapy.

A. General:

45. Kass, E.H. Chemotherapeutic and antibiotic drugs in the management of infections of the urinary tract. *Am. J. Med.* 18:764, 1955.
46. Garrod, L.P., Shooter, R.A. and Curwen, M.P. The results of chemotherapy in urinary infections. *Brit. Med. J.* 2:1003, 1954 (Oct. 30).

B. Prophylaxis -- the futility thereof:

47. Blahoy, P.R. Experiences with terramycin in urinary and genital tract infections. *Canad. M.A.J.* 66:151, 1952.
48. Petersdorf, R.G., Curtin, J.A., Hoeprich, P.D., Peder, R.N. and Bennett, I.L., Jr. A study of antibiotic prophylaxis in unconscious patients. *New Eng. J. Med.* 257:1001, 1957 (Nov. 21).

Case #1 -- Acute pyelonephritis

34 year old white [REDACTED]

[REDACTED] 1957: awakened with urgency and terminal dysuria. Symptoms intermittent.

[REDACTED] 1957: noted appearance and progressive increase in left costovertebral angle tenderness and fever. Urinalysis at 11:00 p.m.: 50-200 WBC/oil field, no pale staining (Sternheimer) cells, loaded with gram negative rods. Pour plate: 44,000,000 *E. coli*/ml. urine. Treatment begun with Streptomycin and Chloramphenicol and continued for 14 days.

[REDACTED] 1957: Completely asymptomatic.

[REDACTED] 1958: Urine culture sterile. IVP normal.

[REDACTED] 1958: Urine culture sterile.

Case #2. Necrotizing Renal Papillitis [REDACTED] # [REDACTED]

Present Illness: This 60 plus year old colored female was admitted to the hospital with a two year history of progressive weakness and ease of fatigue. One year ago patient became bed ridden. Additional complaints of abdominal pain, vomiting, tarry stools and urinary frequency.

Physical Examination: Salient features included; Temperature 99°, B.P. 210/110, grade 3 fundi with hemorrhages and exudates, and cardiac enlargement.

Laboratory Findings: Hemoglobin 7.8 gm.%, WBC:24,000 with 89% PMN's, Urinalysis S.G. 1005, 0 sugar, 1+ albumin, loaded with WBC including moderate "glitter cells", 10-15 RBC, Blood chemistries: BUN 56 mg.%, CO₂ 22 mM/L., Cl 110 mEq/L., sugar 103 mg.%. Urine culture: 74 million colonies/ml. of Proteus sp. and A. aerogenes.

Course in Hospital: Began to show daily temperature elevations to 101°. Kynex therapy was begun on the tenth hospital day. Cystoscopy on eleventh day revealed normal bladder mucosa and purulent urine bilaterally. By the sixteenth hospital day she was totally disoriented and noted to be totally anuric. At that time the diagnosis of necrotizing papillitis was suggested (Congratulations to Dr. Roberts). During this time there was a progressive rise in BUN to 116 mg.%. The patient died on the nineteenth hospital day, having remained anuric.

Case #3. Inapparent progressing pyelonephritis: 55 year old white [REDACTED]

Present Illness: 1930 (Age 28) Intermittent episodes of "cystitis" associated with sinusitis. Cultures revealed. Staphylococcus albus and E. coli. These symptoms persisted for 1½ years.

1938 and 1940 - Uneventful pregnancies.

1943 - Sudden onset of hematuria, clearing within several days. Diagnosed as trigonitis. No associated chills, fever or lumbar pain.

1957, [REDACTED] Onset of hematuria, urgency and frequency. Treated with Gantrisin with decrease in symptoms. One week later, developed rigors, fever, painful micturition and right CVA tenderness. Hospitalized and treated with penicillin, streptomycin and tetracycline for five days. Discharged on triple sulfa then gantrisin.

[REDACTED] Occasional painful micturition. Urine culture showed moderate growth of E. coli. Treated with tetracycline, developed diarrhea after several days and discontinued therapy. Follow-up cultures showed no growth.

[REDACTED] Urine culture revealed moderate growth of E. coli resistant to tetracycline.

[REDACTED] Urine culture: greater than 500,000 E. coli per ml. of urine. Treated with tetracycline and streptomycin for fourteen days.

[REDACTED] Urine culture sterile.

[REDACTED] Recurrence of symptoms. Placed on gantrisin daily then sulfamethoxy-pyridazine every other day until the present.

1958, January: Urine culture sterile.

[REDACTED] Asymptomatic

Past History: No catheterization prior to [REDACTED] 1957. N. history of renal calculi.

Family History: One sister 50 years of age has chronic pyelonephritis secondary to an aberrant vessel. This sister's two daughters have similar conditions.

Physical Examination: Blood pressure 166/82. Fundoscopic normal. Heart not enlarged.

Laboratory studies: Normal BUN, calcium, phosphorus. Normal intravenous urogram.

Case #4 End Stage Pyelonephritis: [REDACTED]

23 year old colored female admitted for the last time in [REDACTED], 1957.

Family History: Mother and two aunts hypertensive.

Present Illness:

1941: delivery stillborn at home.

1952: [REDACTED] Antepartum 2nd pregnancy. BP 118/70 - 140/90

Admitted post partum. BP 168/100. Urine: 30-90 WBC and trace albumin.

1953: 3rd pregnancy. BP increased. Followed in Fort Worth.

1954: 4th pregnancy, delivered at home.

1955: [REDACTED] Antepartum (last trimester) 5th pregnancy. BP 150/108 to 160/105. Urine: no albumin, 3-5 WBC. Blood Uric Acid 3.9 mg%.

Treated as preeclampsia with fall in BP to 134/88.

June: post partum admission BP 140/92.

1957, [REDACTED] post partum admission, 6th pregnancy. BP 220/110. Ocular fundi showed vaso-spasm, heart was enlarged. Urine: 4 plus albumin, 1 plus sugar. BUN 17 mg%. Treated as preeclamptic, BP decreased to 180/120. [REDACTED] seen in hypertension clinic. BP 220/140. Ocular fundi: old bilateral macular retinitis and arteriolar spasm, no A-V nicking. Heart enlarged.

[REDACTED] admitted PMH for hysterectomy. BP 230/150. ECG, left ventricular strain. Urine: 12-16 WBC/HPF. Urine cultures - [REDACTED] sterile 7/31. greater than 500,000 Staph. aureus (coagulase positive)/ml. [REDACTED] sterile. BUN 21-69 mg%. Treated with streptomycin, tetracycline and novobiocin. BP decreased to 150/100.

[REDACTED] seen in EOR several times for nausea, vomiting, diarrhea, [REDACTED] and "convulsions". BUN 146 mg%. Readmitted [REDACTED] 57. BP 180/120, other findings as before. Developed acute pulmonary edema and died within 36 hours of admission. Lab. findings at that time: BUN 114 mg%, CO₂ 12 mM/l, creatinine 8.8 mg%, WBC 54,000/mm³ with 98% PMN's. Urinalysis: 3 plus albumin, rare WBC, gram positive cocci seen on smear. Culture: streptococcus fecalis.

Natural History of Pyelonephritis

