examination has been developed and given special attention very good results have been claimed. It is a method of examination which is likely to become increasingly useful in the future.

The clinical assessment of disproportion therefore depends upon a careful examination of the maternal pelvis and of the foetal head followed by fitting the head into the pelvis. The size of the pelvis can be estimated with a reasonable degree of accuracy by palpation of its outlet and cavity and measurement of the diagonal conjugate. The size of the foetal head can be judged by abdominal, vaginal and bimanual vagino-abdominal examination. The relative sizes of the head and pelvis can then be estimated by direct fitting of the head into the pelvic brim during bimanual palpation. The importance of frequently repeated examinations cannot be overstressed. Radiology provides a valuable auxiliary method of assessment in experienced and careful hands.

CHLORAMPHENICOL IN NON-TUBERCULOUS URINARY INFECTIONS

By R. Marcus, M.D., Ch.M., F.R.C.S.
Department of Surgery, University of Liverpool.

Chloramphenicol (D-threo-1 paralnitrophenyl-2-dichloroacetamide-1, 3 propanediol) is a pure crystalline substance obtained from cultures of the streptomyces venezuelae (Ehrlich et al., 1948). Synthesis is relatively simple. It is administered in capsules containing 250 mgm. as it has a bitter taste and is not very soluble in water. When it is necessary to administer it parenterally, propylene glycol is used as the vehicle. It is relatively stable in that it retains 100 per cent. of its activity at a pH of 0.4 to 9.56 and is unaffected by boiling in distilled water for a number of hours (Gottlieb et al., 1948).

Chloramphenicol is excreted by the kidneys in greater concentration than that found in the blood. After 1 g. a peak is reached in the blood and urine at two hours, at which time the concentration is about 33 times greater in the urine than in the blood (Ley, et al., 1948).

With the help of the Medical Research Council 17 cases of non-tuberculous urinary infection have been treated with chloramphenicol and the results studied. No case was accepted for treatment unless there had been a thorough and prolonged course of treatment with urinary antiseptics and penicillin. Penicillin and streptomycin were administered when the tests showed the organisms were sensitive to these antibiotics. The dosage, mode of action and value of these agents has recently been reviewed by Wells and Marcus (1949) and will not be described in this communication.

Synopsis of Cases Treated

Sensitivity tests showed streptomycin and penicillin resistant strains of organisms in all cases.

Case 1

W.H., aet. 76. Cystitis and epididymo-orchitis due to indwelling catheter and tidal drainage after abdomino-perineal excision of rectum.


18.4.51. Urine—sterile.

Remarks. Rapid and permanent sterilization of the genito-urinary tract.

Case 2

142067 F.B., aet. 73. Suppurative pyelo-nephritis after catheterization for chronic re-
tention. Blood urea 40 mgm. per cent. before catheterization.

28.3.50. Admitted with indwelling catheter. Blood urea 200 mgm. per cent. Urine—large number of pus cells, B. pyocyaneus sensitive to 16 units/ml and coliform non-lactose fermenters sensitive to 32 units/ml chloramphenicol.

1st course—chloramphenicol, 250 mgm., six-hourly, streptomycin, ½ gm., six-hourly. Total, 6 gm.


8.4.50. Urine—still infected with the same organisms.

14.4.50. Died.

Autopsy. Both kidneys large and on section showed gross suppurative pyelonephritis. Macroscopically little kidney parenchyma remained. Bladder showed areas of acute necrotizing cystitis. Prostate grossly enlarged.

Remarks. Chloramphenicol was of no value in the presence of an enlarged prostate, an indwelling catheter and abscesses in the kidneys.

Case 3

147110 W.W., aet. 79. Pyelonephritis five days after prostatectomy for chronic retention and overflow incontinence. Kidney function poor.

20.9.50. Swinging temperature and decreasing urinary output.

26.9.50. Temperature still swinging. Urine—large number of pus cells and organisms. Culture—B. coli, sensitive to 16 units/ml and B. proteus sensitive to 64 units/ml chloramphenicol.

1st course—chloramphenicol, 500 mgm., six-hourly. Total, 6 gm.

30.9.50. 2nd course—1 gm., six-hourly. Total, 12 gm.

1.10.50. Apyrexial.

13.10.50. Apyrexial. Urine few colonies of B. coli and Ps. pyocyaneus. B. coli sensitive to 8 units/ml and Ps. pyocyaneus resistant to 128 units/ml chloramphenicol.


1.3.51. Blood urea 37 mgm. per cent. Urine—profuse growths of B. aerogenes sensitive to 32 units/ml chloramphenicol.

3rd course—chloramphenicol, 750 mgm., six-hourly. Total, 12 gm.

5.3.51. Urine—small growth of B. aerogenes.

14.3.51. Urine—moderate growth of B. aerogenes sensitive to 8 units/ml chloramphenicol.

4th course—chloramphenicol, 750 mgm., six-hourly. Total, 21 gm.


Remarks. Acute pyelonephritis responded, symptoms relieved but sterilization of the urine not achieved.

Case 4

151561 Dr. J.L., aet. 85. Secondary haemorrhage 15 days after prostatectomy for chronic retention and overflow incontinence. Poor kidney function.


13.3.51. Urine—less blood-stained.

17.3.51. Urine—fairly large deposit of pus cells with an occasional R.B.C. Small growth of B. coli and proteus.


Case 5

139212 J. H. P., aet. 69. Resuture of wound in bladder 17 days after prostatectomy for chronic retention due to carcinoma of prostate. Gross back pressure changes in kidneys. Indwelling urethral catheter for one year before operation produced a chronic urinary infection without relieving the back pressure.


30.3.50. Urine—scanty pus cells and organisms. Culture atypical B. coli.

3.4.50. Urine—large number of pus cells and organisms. Culture atypical B. coli.

7.4.50. Catheter out, passed urine freely and wound dry.

14.4.50. Discharged healed.

20.12.50. Wound soundly healed.

Remarks. The bacteriostatic effect of chloramphenicol aided healing which was permanent.

Case 6

148746 H.C., aet. 61. Cystitis and suprapubic fistula after suprapubic diathermy excision of a wedge of a carcinoma of the prostate, causing acute retention.


4.12.50. Small growth or proteus.
5.12.50. Large growth of B. coli.
Remarks. Suprapubic fistula healed rapidly.
Cystitis relapsed.

Case 7
145038 W.B., aet. 83. Persistent cystitis after prostatectomy for acute retention.


11.4.51. Urine—culture sterile.
Remarks. As for Case 1.

Case 8

24.2.50. Endoscopic resection of bladder neck.

11.9.50. Urinary deposit—few epithelial cells and pus cells with a large number of organisms. Culture, profuse growths of B. coli.
Remarks. Multiple diverticulae made the infection resistant to therapy.

Case 9
V.B., aet. 42. Tuberculous bladder cured by streptomycin. Symptoms persisting from secondary infection. Deposit of urine contained large number of pus cells. Culture, B. proteus, strain I, sensitive to 32 units/ml. chloramycetin. Strain II sensitive to 16 units/ml. chloramycetin.

28.7.50. Chloramphenicol, 0.5 gm., six-hourly. Total, 6 gm.

2.8.50. Urine—B. proteus resistant to 128 mgm./ml.

10.4.50. Symptoms unaltered. Urine—B. coli sensitive to 16 units/ml. chloramphenicol.
Remarks. B. proteus rapidly became resistant to chloramphenicol and was subsequently replaced by B. coli.

Case 10

31.7.50. Urine—large number of pus cells and B. proteus sensitive to 32 units/ml. chloramphenicol.
1st course—chloramphenicol, 500 mgm., six-hourly. Total, 9 gm.

5.8.50. Urine clear. Culture, sterile.

10.9.50. Urinary infection due to B. proteus relapsed and diabetes difficult to standardize with insulin.
15.9.50. Urine—B. proteus sensitive to 64 units/ml. chloramphenicol.
2nd course—chloramphenicol, 750 mgm., six-hourly. Total, 42 gm.

1.10.50. Urine—sterile.
5.12.50. Urine—sterile.
Remarks. Relapsed infection cured with a prolonged course of chloramphenicol.

Case 11
129946 D.H., aet. 6. Infected hydronephrosis nine days after plastic operation on the kidney.

10.9.49. Temperature swinging.
12.9.49. Urine—moderate number of pus cells. B. coli and Ps. pyocyaneus sensitive to 32 units/ml. chloramphenicol. Chloramphenicol, 250 mgm. b.d. Total, 3 gm.

Discharged.
18.5.50. Urine—large number of pus cells. Culture, B. coli.

28.6.50. Urine—sterile.
Remarks. Chloramphenicol controlled the swinging temperature. Urine spontaneously became sterile several months after the treatment.

Case 12
129767 D.S., aet. 6. Infected congenital hydronephrosis.

15.3.50. Urine—staphylococcus aureus and B. coli sensitive to 4 units/ml. chloramphenicol. Chloramphenicol, 0.25 gm, eight-hourly. Total, 2 gm.

4.4.50. Plastic operation on right kidney. Urine aspirated from the kidney grew staphylococcus aureus insensitive to 5 units/ml. penicillin.

21.11.50. Staphylococcus aureus.
27.11.50. Urine—staphylococcus aureus, sensitive to 12.5 units/ml. penicillin and 4 units/ml. chloramycetin. Penicillin, 100,000 units b.d. for three days.

1.12.50. Urine—sterile.
2.12.50. Urine—sterile.
Remarks. B. coli eradicated. Staphylococcus not affected although the sensitivity was the same. Several months later the staphylococcus became penicillin sensitive and responded favourably to treatment with this antibiotic.
Case 13
113818 W.S., aet. 41. Resistant B. coli infection of the kidneys which contained staghorn calculi. Stones removed. Right kidney clear, left kidney still had small fragments of calculi in its substance.
18.11.49. Urine B. coli sensitive to 8 units/ml. chloramphenicol.
1st course—chloramphenicol, 500 mgm., six-hourly. Total, 9 gm.
17.12.49. Urine—moderately large number of pus cells and organisms. Culture, B. coli.
9.5.50. Urine—moderate number of pus cells. B. coli sensitive to 8 units/ml. chloramphenicol.
Remarks. The small fragments in the left kidney caused the relapse but did not affect the sensitivity of the organisms.

Case 14
1st course—250 mgm., six-hourly. Total, 6 gm. B. aerogenes sensitive to
14.3.51. B. aerogenes sensitive to 16 units/ml. chloramphenicol.
2nd course—750 mgm. six-hourly. Total, 15 gm.
21.3.51. Urine—sterile.
11.4.51. Urine—sterile.
Remarks. As there were no fragments in the kidney, adequate dosage of chloromycetin eradicated the infection.

Case 15
139186 E.P.E., aet. 72. Persistent urinary infection after prostatectomy.
26.10.50. Urine—B. coli, sensitive to 5 units/ml. chloramphenicol. Faecalis alkaligenes sensitive to 32 units/ml. chloramphenicol.
2.11.50. Chloramphenicol, 750 mgm., six-hourly. Total 1 1/2 gm.
6.11.50. Sterile.
7.11.50. Deposit—n.a.d.
Remarks. Chloramphenicol eradicated residual infection in the urinary tract.

Case 16
148241 F.J.D., aet. 48. Urinary infection due to ureteric calculus. Ureterolithotomy, 17.10.50.
19.2.51. Profuse growth of B. coli sensitive to
22.2.51. Urine—sterile.

Case 17
143898 S.C., aet. 60. Large septic wound in bladder following partial cystectomy.
23.6.50. Swab from bladder. B. proteus sensitive to 32 units/ml. chloramphenicol. Non-haemolytic organism of the paracolon group sensitive to 32 units/ml. chloramphenicol.
26.6.50. Chloramphenicol, 0.5 gm., six-hourly. Total, 9 gm.
7.7.50. Wedge excision of bladder neck. Bladder and abdominal wall closed in layers leaving a small suprapubic deficiency for through and through catheter drainage.
12.7.50. Urine—B. coli, sensitive to 16 units/ml. chloromycetin. B. proteus, sensitive to 128 units/ml. chloromycetin.
Remarks. Chloromycetin was of value in cleaning up the suprapubic wound and rendering it possible to embark successfully on definitive surgery. Reinfection did occur because of the open wound, but did not slow down the rate of healing.

Discussion
Chloramphenicol has been subjected to a severe test as it was administered when all other forms of treatment had failed. It appears from the results and observations on other cases (Marcus, 1950) that it has a bacteriostatic effect on sensitive organisms. It acts more slowly and relapses occur more commonly than with penicillin and streptomycin. A favourable asset is the slow development of resistant strains of organisms in unsuccessfully treated cases. A second or third course may eradicate some of the relapses.

Longer courses of treatment improve the results but vitamin B deficiencies, gastro-intestinal disturbances, alteration in the bacterial flora and yeast infection in the mouth occur. These complications can usually be prevented by the simultaneous administration of large doses of vitamin B complex, but when established may be impossible to eradicate.

It may be pertinent at this stage to analyze some of the other causes of the unsuccessful results. In Case 2 the kidneys were riddled with abscesses and the renal substance involved in a supplicative
pyelonephritis. Resolution was not possible in the presence of an enlarged prostate and an indwelling catheter as reинфекion of the kidneys was inevitable. Cases 3, 5, 11 and 12 survived because the urinary obstruction was removed and the drainage tubes discarded. Infection recurred in Cases 3 and 5 because the chronically distended bladder had not had time to contract down sufficiently and completely evacuate all the urine. The small amount of residual urine acted as a sump in which the organisms thrived. Carcinoma of the prostate, small fragmented calculi, diverticulae and bladder neck obstruction caused the relapsing infection in the remaining cases.

Summary

Chloramphenicol should only be administered when the organisms are sensitive to it and intestinal obstruction, if allowed to continue, killed the patient, and operation was therefore undertaken to relieve it. The precise mode of death was not, however, clearly understood and this failure adequately to analyze the lethal factors at work left a considerable gap in the knowledge of the principles of treatment, which should have been designed to counteract the secondary effects of obstruction in addition to relieving the obstruction itself.

It is clear now that the theories of the day, for instance that deprivation of bile, or toxemia from the activity of the Cl. Welchii, killed the patient, were wide of the mark.

In taking stock of the position today, it is therefore right that we should go back to this point and consider pathology first, asking ourselves whether we now know the answers to these questions which eluded our predecessors in the

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**THE MANAGEMENT OF ACUTE INTESTINAL OBSTRUCTIONS**

*By Rodney Smith, M.S., F.R.C.S.*

*St. George's Hospital*

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R. Marcus

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