URINARY TRACT INFECTION IN PREGNANCY

(A Bacteriological Study)

by

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Introduction

Urinary tract infection is an important complication of pregnancy and the postpartum period. Significant bacteriuria has been found in certain pregnant women who did not present urinary tract symptoms or signs of infection. Urinary tract infection constitutes a major problem for the obstetrician and is a significant contributing factor of morbidity in our country. Furthermore, a significant association of bacteriuria with prematurity and perinatal death has been reported (Kass, 1962). It is possible, in addition, that appropriate management of urinary tract infection in its earlier stages might prevent the development of irreversible chronic pyelonephritis. The problem of chronicity especially in cases where no predisposing factors are demonstrated is assuming great proportion with the development of drug resistance of bacteria. A series of organisms have been reported to be responsible for such infections and there are divergent reports regarding the —drug resistance and sensitivity.

Diagnosis of urinary tract infection, it done correctly at the earliest possible time, not only saves the expensive modern therapy but the lesion can be detected at the earliest and can be controlled from further damage. A wrong therapy may also lead sensitive organisms to become resistant thus endangering life with serious consequences. The purpose of present communication is to outline the bacteriology of samples of urine received from suspected cases of urinary tract infection in pregnancy over a period of five years and to review the bacterial in vitro sensitivity to some commonly employed antibiotics.

Material and Methods

In all 1785 samples of urine received from clinically suspected cases of urinary tract infection in pregnancy were examined bacteriologically. The midstream sam-

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ples of urine received for examination were routinely examined for pus cells as well as bacteria in the wet preparation and cultured on blood agar and Mac Conkey's media.

The isolates were characterised and their antibiotic sensitivity determined by the disc diffusion technique using the following concentrations of drugs per disc.

1. Penicillin	10 units/disc
2. Streptomycin	25 microgram/disc
3. Tetracycline	25 microgram/disc
4. Chloramphenicol	25 microgram/disc
5. Nitofurantoin	100 microgram/disc
6. Mandelamine	250 microgram/disc
7. Gentamycin sulphate (Garamycin)	10 microgram/disc
8. Colistin methane sulphate (Colomycin)	1000 units/disc
9. Sulpha	300 microgram/disc

Results

Of the total 1785 samples of urine cultured 741 samples yielded pathogenic bacteria. One thousand forty four samples were either sterile or yielded only saprophytic contaminants. Table 1 shows

TABLE I
Incidence of Positive Cultures in 1785 Antenatal

Year	Number of cases investigated	No. of positive culture	Percentage positive
1969	240	134	55.8
1970	300	115	38.3
1971	220	70	31.8
1972	410	110	29.2
1973	515	312	60.5
Total No. of positive culture.	1685	741	

the incidence of positive culture in antenatal cases, and Table II indicate the

TABLE II
Relative Incidence of Different Organisms in Significant Cultures

Microogranism	No. of strains	Percentage positive
Escherichia coli	426 (40)*	57.4
Pseudomonas Pyocyaneous	140 (40)*	18.9
Proteus	20	2.6
Klebsiella aerogenes	34	4.6
Staphylococci (coagulase positive)	81 (40)*	10.9
Mixed organisms	40	5.6

* Figures in parenthesis represent mixed organisms.

analysis of these cultures in relation to the significane of bacteriuria of the 741 significant cultures; 40 yielded more than one organism. Table III indieate the relative incidence of the various isolates and the antibiotic sensitivity pattern of the different organisms isolated. Table IV shows sensitivity pattern of Esch. coli and pseudonomas pyocyaneous to Gentamicin and colistin.

Discussion

Symptoms referable to the urinary passages, fever, back pain, or pyuria may not always be present in cases of active urinary infection in pregnancy and are less sensitive indicators of urinary infection than a positive urine culture (Crabtree, 1942). However, until quantitative urine culture procedures were widely applied, the significance of a positive culture, particularly in a voided specimen, has been limited by the possibility of contamination. The use of a colony count, on a urine specimen that is properly collected and promptly cultured, permits the detection of contaminant organisms, which are usually present in low concen-

TABLE III
Frequency and Sensitivity of 741 Organisms

S.N.	Micro-organism	No. of strains	Percentage of resistance to all antibiotics	Percentage Sensitivity						
				Penicillin	Sulpha	Streptomycin	Chloromphenicol	Tetracycline	Nitrofurantoin	Mendalamine
1.	Esch. coli	466	3.48	—	4.33	46.3	66.5	30.7	60.8	81.2
2.	Pseudomonas pyocyaneous	180	61.1	—	—	6.6	23.3	12.2	22.2	33.3
3.	Proteus	20	5.0	—	10.0	30.0	45.2	40.5	46.0	60.0
4.	Klebsiella	34	5.8	—	17.5	35.0	49.5	58.5	55.0	62.5
5.	Coagulase positive staphylococci	121	28.5	15.5	10.0	40.2	68.4	30.2	10.0	24.0

tration. It has been estimated that, in a voided specimen, a colony count greater than 10^5 per milliliter would indicate infection (Kaitz and Hodder, 1961). Quantitative culture of urine by loop or pour plate method has been found by most bacteriologists to be a reliable procedure for detection of significant bacteriuria in urinary tract infections (Marle, 1941; Kass, 1956; Sanford *et al.*, 1963; Mac Donald *et al.*, 1957; Mc Geachie and Kennedy, 1963). From this laboratory the method and its comparative merits have been described by Deshmukh and Sharma (1970).

The frequency of bacteriuria in the pregnant population reported here is comparable with that in other groups (Kass, 1962; Kaitz and Hodder, 1961; Turner, 1961; Monto and Rantz, 1963; Samuel *et al.*, 1968; Upadhyay and Verma, 1968). Out of 1785 samples of urine cultured, 741 yielded pathogenic bacteria (41 percent) and out of 741 positive cultures in our study 701 (94.4%) yielded the growth of a single organism in significant numbers. The most frequent isolate was Esch. coli. This organism was isolated either alone or in association with other organism. Esch. coli is the commonest causative organism of urinary tract infection (57.4 percent). Next in frequency was pseudomonas pyocyaneous and coagulase positive staphylococci in the present study. Mixed infection was found only in 5.6 percent of cases.

It is apparent from the antibiotic sensitivity pattern of the isolates (Table III) that on the basis of invitro study mandalamine ranks as the best urinary antiseptic in general out of the agents employed on the present study. Gentamycin was specifically used for Esch. coli and pseudomonas pyocyaneous (Table IV). Ninty two percent of Esch. coli and 90

TABLE IV

Sensitivity Pattern of Organism Against Gentamycin and Colomycin

Organisms	No. of isolates tested	Percentage sensitive to	
		Colomycin*	Gentamycin
Esch. coli	230	—	92.5
Pseudomonas Pyocyaneou	75	95.6	90.2

* Used only for pseudomonas pyocyaneous.

percent of pseudomonas pyocyaneous were sensitive to Gentamycin. Colistin methane sulphonate (Colomycin) was used for testing sensitivity of pseudomonas pyocyaneous only, 4.4 percent were found to be resistant to colomycin. Therefore colomycin remains the drug of choice for pseudomonas pyocyaneous infection and Gentamycin specifically to resistant strain of Esch. coli and in mixed infection. Chloramphenicol remains the drug of choice for coagulase positive staphylococci.

The overall sensitivity of Mendalamine was found to be very satisfactory in the present study and the efficacy of this agent in the treatment of urinary tract infection has been emphasised by several workers (Bhujwala, 1969; Mehrotra and Jain, 1969; Das Gupta and Sharma, 1969; Sengupta, *et al.*, 1972).

As far as Nitrofurantoin is concerned the results in the present study are not satisfactory, although effectiveness of it against urinary pathogen has been emphasised by several workers in the past (Nandi and Agarwal, 1967; Naidu and Rao, 1967). However, other workers have found poor results with this drug (Gohain *et al.*, 1969, Samuel *et al.*, 1968).

In our study as well as in several other studies on urinary pathogens (Nandi and Agarwal, 1967; Naidu and Rao, 1967; Gohain *et al.*, 1969; Das Gupta and Sharma, 1969; Mehrotra and Jain, 1969; Sengupta *et al.*, 1972) Chloramphenicol and streptomycin range next to sensitivity to mandalamine and nitrofurantoin. The other antibiotics have not been found to be of much value. Jao and Jackson (1964) have reported successful results of Gentamycin in adults with urinary infections. Very little work has been done with Gentamycin in pregnancy. Efficacy of Gentamycin is to be evaluated by clinical trials.

Summary

1785 samples of urine from suspected cases of urinary tract infections in antenatal cases were cultured. 741 samples yielded pathogenic bacteria. Esch. coli and pseudomonas pyocyaneous were found to be the commonest organisms. The antibiotic sensitivity pattern revealed that Gentamycin is drug of choice for resistant strains of Esch. coli and colomycin for pseudomonas pyocyaneous. For mixed infections Gentamycin remains drug of choice. As far as overall sensitivity of urinary pathogens are concerned mandalamine is drug of choice for gram negative organisms and chloramphenicol for gram positive cocci especially resistant strains of coagulase positive staphylococci.

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