BACTERIURIA IN PREGNANCY AND ITS TREATMENT

by

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Introduction

Bacteriuria in pregnancy is one of the most common infections in females, but until recently little attention has been paid to it, because of the relatively low rate of development of symptomatic disease in the affected population. Kass (1960 a, b) showed that asymptomatic bacteriuria occurred in 6% of pregnant women and 40% of these developed pyelonephritis if not treated. Pyelonephritis did not occur in his non-bacteriuric group. He also found an increased incidence of prematurity and a high perinatal mortality in patients with bacteriuria as compared with the non-bacteriuric group. By elimination of this bacteriuria with antimicrobial therapy, pyelonephritis of pregnancy could be virtually eliminated and the incidence of prematurity significantly reduced. If bacteriuria of pregnancy is not treated, it may have an adverse effect on the mother and the baby. Later the mother may develop chronic pyelonephritis and renal failure which may be fatal.

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Material and Methods

The study was carried out in two parts.

Two groups of pregnant women less than 28 weeks of gestation, who were resident of Aurangabad, and were attending antenatal clinic, during the period from March 1974 to October 1974 were selected for the study.

(1) One hundred random cases were screened for the incidence of asymptomatic bacteriuria.

(2) Thirty-four patients with a history suggestive of urinary tract infection were studied as follows:

(a) Interrogation including direct questioning about urinary symptoms and history of instrumentation of the genito-urinary tract, previous obstetric history.

(b) Urine analysis of freshly voided mid-stream specimen for protein and a centrifuged sample for white cells.

(c) White cell excretion rate according to method described by Little and Dewardner (1962).

(d) White cell excretion rate after I.V. Hydrocortisone (Little and Dewardner 1962).

(e) Urine culture and sensitivity for presence of significant bacteriuria as described by Deshmukh and Sharma (1970).

(f) Hb, blood urea and blood creatinine.

The effect of two regimes of treatment on 44 patients with bacteriuria was studied.

These patients were divided into two groups. Group A and Group B. Each group had 5 patients with asymptomatic bacteriuria and 17 with asymptomatic bacteriuria.

Group A. Patients in this group received Cap. chloromycetin 50 mg/kg/day in divided doses for 2 weeks duration.

Group B. Patients in this group received Cap. chloromycetin 50 mg/kg/day in divided doses for 2 weeks followed by tab. Furadantin 100 mgs Hs upto 6 weeks after delivery.

After delivery, follow up consisted of clinical examination, urine analysis and urine culture. Urine culture was done once a week during pregnancy and at 2 weeks, 6 weeks and 12 weeks after delivery. Intravenous pyelography was done 3 months after delivery in those patients who had recurrent bacteriuria or recurrence of symptoms inspite of treatment.

Observations and Discussions

Group I

Of the 100 asymptomatic pregnant women, 6 showed the presence of white cells in the urine and urine culture showed a significant growth of pathogenic organisms at their first visit, at less than 28 weeks of gestation. A second urine culture a week later confirmed the presence of asymptomatic bacteriuria.

Of the 94 abacteriuric patients, 6 did not attend the A.N.C. subsequently. The remaining 88 were subjected to urine analysis and culture studies at near term (between 36-38 weeks of gestation). Four patients now showed, white cells in urine and culture revealed significant bacteriuria, confirmed again a week later. The total incidence of bacteriuria thus works out to be 10.3%, 6% at 28 weeks of gestation, with 4.5% developing bacteriuria late in pregnancy; emphasizing the importance of doing routine urine cultures in all patients attending an antenatal clinic at all stages of pregnancy.

Kincaid Smith and Bullen (1965) have reported that 1-3% of women who had been abacteriuric at the initial screening visit could become clinically ill with symptomatic urinary tract infection later. All our patients with bacteriuria were treated with antimicrobials as soon as bacteriuria was confirmed.

Group II

Thirty-four patients had symptoms of urinary tract infection. Of these 4 (11.8%) gave a history of postnatal urinary retention and puerperal fever in the previous delivery; 3 amongst these 4 had required catheterization.

Tables I and II show the relation between age, parity and bacteriuria. Kass (1959), Marguerite and Patrick (1967) and Kincaid Smith (1968) showed an increasing incidence of bacteriuria with age and parity, but we could not confirm this finding. Our results corroborate those of Turner (1961) and McFadyen *et al* (1973) and Roy *et al* (1974). Kakoty *et al* (1974) found a higher incidence of bacteriuria in primagravidae and below the age of 20 years.

A comparison of Tables III and IV reveals an interesting finding. The incidence of prematurity in the present pregnancy is similar in the bacteriuric (11.4%) and abacteriuric (9.5%) groups, but the incidence of premature delivery in the previous pregnancies is much higher in the bacteriuric group (18.2%)

TABLE I
Relation Between Age and Bacteriuria

Sr. No.	Age in years	Bacteriuric patients		Abacteriurics (controls)	
		No. of patients	Per cent	No. of cases	Percent
1.	Less than 20 years	12	27.3	26	31.00
2.	20 to 30 years	30	68.2	53	63.00
3.	More than 30 years	2	4.5	5	6.00
	Total	44		84	

TABLE II
Showing relation between parity and bacteriuria

Sr. No.	Para	Bacteriurics		Abacteriurics	
		No. of patients	%	No. of patients	%
1.	Primi	18	40.9	28	33.3
2.	1st	5	11.36	12	14.3
3.	2nd	16	36.3	38	45.2
4.	3rd or more	5	11.36	6	7.2
	Total	44		84	

TABLE III
Relationship of Bacteriuria and Premature Delivery in Present Pregnancy

Group	Total No. of patients	No. of premature deliveries	%
Bacteriurics	44	5	11.4
Nonbacteriurics	84	8	9.5

TABLE IV
Relationship of Bacteriuria in this Pregnancy to History of Premature Delivery in Past

Group	Total no. of patients	Previous history of premature delivery	%
Bacteriurics	44	8	18.2
Abacteriurics	84	7	8.3

than in the bacteriuric group (8.3%). As mentioned earlier, we had treated all our patients with antimicrobials as soon as the presence of significant bacteriuria was confirmed. Thus, at the time of delivery, during the present pregnancy the factor of bacteriuria was eradicated. However, in the previous pregnancies, the patients must have had a latent urinary infection which had contributed very significantly to premature delivery. Effective treatment during the present pregnancy has brought down the incidence of prematurity from 18.2% to 11.4%

which approximates the incidence of prematurity in bacteriuric viz. 8.3% to 9.5%.

Table V shows that pre-clamptic toxaemia is more common in bacteriurics than in abacteriurics. Norden and Kilpatrick (1965) Stuart *et al* (1965), Kincaid Smith and Bullen (1965) have observed a higher incidence of pre-eclamptic toxaemia and hypertensive disease of pregnancy in bacteriurics than in non-bacteriurics. They were unable to reduce the incidence of P.E.T. by effective treatment of bacteriuria and attributed P.E.T. to underlying renal disease rather than to bacteriuria itself. Monzon *et al* (1963) Bryant *et al* (1964) and Little (1966) have found no relation between bacteriuria and P.E.T. compared with a control group.

Table VI shows that there is no difference in the weight of babies of bacteriuric or abacteriuric patients presumbly because all bacteriuric patients were treated and became abacteriuric by the time they delivered.

Table VII shows that severe anaemia is significantly more common in bacteriuric patients. Conversely Hb more than 12 gms/100 ml is statistically less common in bacteriuric patients. In other words, in anaemic pregnant patients one should look for bacteriuria. Giles and Brown (1962) Mc Fadyen *et al* (1973) Kakoty

TABLE V

Relation of Bacteriuria with Pre-eclamptic Toxaemia (PET)

Grcup	Total no. of patients	No. of patients with P.E.T.	%
Bacteriuric	44	4	9.1
Abacteriuric	84	5	6.0

TABLE VI

Relationship of Bacteriuria to Weight of Baby

Sr. No. Weight of baby in kg.	Bacteriurics		Abacteriurics	
	Number	Percentage	Number	Percentage
1. Less than 2.1	5	11.4	8	9.5
2. 3.1 to 2.5	18	40.9	36	43.0
3. 2.6 to 3	21	47.7	40	47.5
Total no. of patients	44		84	

TABLE VII

Relationship of Bacteriuria to Anaemia

Hb% grams	Bacteriurics		Abacteriurics	
	No. of cases	%	Total no. cases	%
6 to 9	10	22.7	6	7.1
9 to 12	30	68.1	62	73.8
Above 12	4	9.2	16	19.1
Total	44		84	

et al (1974) and Roy *et al* (1974) have said that anaemia is more common in bacteriurics.

Blood urea and blood creatinine levels were within the normal range in all patients.

Table VIII and Fig. 1 show the interesting relationship between white cells/H.P.F. in a centrifuged sample of urine and the white cell excretion rate. All 44 patients had significant bacteriuria. But 12 (27.2%) of these showed 5 white cells/H.P.F. or less, while 3 (6.8%) showed 2 white cells/H.P.F. or less. Very often the presence of a few white cells in a pregnant patient is neglected, which may be disastrous, especially for the baby. Here, the white cell excretion rate may be helpful. Nine out of the 12 patients with 5 white cells/H.P.F. or less showed an increased white cell excretion rate. However, 3 cases, 1 with 2 white cell/H.P.F. and 2 with 3-5 white cells/H.P.F. showed a W.C.E.R. within the normal range. Yet all these patients showed significant bacteriuria. Hence the only fool-proof method would be urine culture, but in the absence of facilities for urine culture, the presence of white cells in the urine of pregnant women must be viewed with suspicion and preferably given the benefit of doubt and treated.

Table IX shows that 84.1% of organism were E. coli. Both patients with proteus infection gave history of catheterization. The third patient with history of catheterization had E. coli infection.

Treatment

Out of 22 patients in group A, 4 relapsed after the first course of chloromycetin. One relapsed one week after stopping treatment, the remaining 3 relapsed two weeks after stopping treatment. All the 4 cases were given a second course of chloromycetin orally for two weeks. On follow up, it was found that 2 patients were completely free from urinary tract

TABLE VIII
Distribution of Pyuria

Sr. No.	Pyuria, white cells/H.P.F.	No. of cases	Percentage
1.	Less than 2	3	6.8
2.	3 to 5	9	20.4
3.	6 to 10	17	38.6
4.	11 to 15	7	16.0
5.	Plenty of pus cells	8	18.2
	Total patients	44	

TABLE IX
Organism Grown on Urine Culture

Sr. No.	Organisms	No. of cases	Percentage
2.	E. coli	37	84.1
1.	E. coli + Proteus	1	2.3
3.	Proteus	2	4.5
4.	Coagulase positive Staphylococci	4	9.1
	Total No. of patients	44	

TABLE X
Outcome of Treatment

Treatment group	Asymptomatic			Symptomatic		
	No. of cases	Relapse	%	No. of cases	Relapse	%
Group A (Capsule chloromycetin only)	5	Nil	Nil	17	4	23.5
Group B (Capsule chloromycetin + furadantin)	5	Nil	Nil	17	Nil	Nil

infection till 12 weeks postpartum. In the remaining 2 patients urine was also sterile till delivery (1½ months after stopping the second course of treatment). But these 2 patients had relapse of infection after delivery. This was detected 2 weeks after delivery, when they reported for follow up. Urine culture grew E. coli, sensitive to chloromycetin and furadantin. They did not show any signs and symptoms of overt urinary tract infection and were given tablet furadantin 100 mgs. H.S., 12 weeks after delivery, when they reported for intravenous pyelography. After that they were followed up for one month and upto that time urine culture reports were sterile. Both those patients who did not respond to a second course of chloromycetin had premature deliveries. Brumfitt *et al* (quoted by Norden and Kass 1968) have indicated that excess rate of prematurity in bacteriuric women was limited to those women who did not respond readily to antimicrobial treatment or whose infection returned after a course of treatment.

In all 4 patients in Group A, during relapse the organisms grown on urine culture were the same as those grown in pretreatment cultures. This may be due to either inadequate treatment (in terms of duration) or reinfection because of the physiological changes in the urinary tract due to pregnancy (which are present till after delivery). Two patients had relapse for a second time after delivery. Organisms on urine culture were the same as on the previous 2 occasions. It is very difficult to differentiate between relapse or reinfection in these 2 patients as we were not able to do serotyping in these cases. Urine culture of these 2 patients had remained sterile for 1½ months after stopping the second course of treatment, but became positive after delivery. During delivery organisms from urethra and vagina can be pushed up into bladder, causing reinfection (Shand *et al* 1970). Kakoty *et al* (1974) treated 6 patients with short courses of drugs. Two of these did not respond to a single course and 1 continued to harbour organisms even after 3 such courses of treatment.

All 22 patients who were treated with capsule chloromycetin for 2 weeks, followed by furadantin upto 6 weeks postpartum, were free from urinary tract infection till delivery, i.e. the percentage of cure was 100%. After delivery, 2 patients did not report for follow up. The remaining 20 patients also were free from urinary tract infection upto 3 months post partum.

It can be said from the above observations that group B treatment is better compared with group A treatment, to

prevent reinfection during pregnancy and in the immediate post partum period.

There was no evidence of toxicity of the drugs either on the mother or on the baby.

Kass (in 1960 a) has recommended continuous therapy from the diagnosis of urinary tract infection until delivery because of the high rate of relapse, but others (Williams *et al* 1968, William and Smith 1970, Kincaid Smith 1968) favour short term therapy of bacteriuria of pregnancy in uncomplicated cases.

Intravenous pyelography

Intravenous pyelography was done in 2 patients who had relapsed twice inspite of 2 courses of 2 weeks' treatment with capsule chloromycetin. In one patient there was some destruction of the upper calyceal system suggestive of pyelonephritis (Fig. 2) and the other patient showed kinking near the junction of the upper calyx and the pelvis. (Fig. 3). These factors might have been responsible for resistant infection and/or relapse. It has been shown that in the majority of those patients who get reinfection or who are resistant to treatment, some abnormality of the urinary tract can be demonstrated (Kincaid Smith 1968).

It may be worthwhile doing I.V.P. in all patients who show significant bacteriuria.

Summary

The incidence of asymptomatic bacteriuria was found to be 10.3% in a random group of pregnant women attending the antenatal clinic at medical college hospital, Aurangabad, 4.5% being abacteriuric at 28 weeks of gestation, but developing significant bacteriuria at 36-38 weeks of pregnancy. There was no correlation of bacteriuria with age or parity. The incidence of prematurity in the bacteriuric group was reduced by treatment with antimicrobial agents. Pre-eclamptic toxemia was slightly more common in the bacteriuric group (9.1%) as compared with the abacteriuric group (6%), but there was no difference in the average weight of babies, because all bacteriuric patients received prompt antimicrobial therapy. A significant correlation was found between bacteriuria and anaemia, though blood urea and creatinine were normal in all cases. Three out of 44 bacteriuric patients (6.8%) showed 3 white cells/HPF in a centrifuged urine sample, yet 2 out of these showed an increased white cell excretion rate indicating inflammation, and hence urinary infection. E. coli is the commonest infecting organism, B. proteus being important following instrumentation of the urinary tract.

A course of 2 weeks of chloromycetin 50 mgs/kg/day in divided doses followed by Furadantin 100 mgs H.S. upto 6 weeks postpartum, effectively prevents relapse and/or reinfection, while intermittent therapy with short courses of chloromycetin does not. Intravenous pyelography was done in 2 patients with relapse. Both showed changes of chronic pyelonephritis.

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See Figs on Art Paper XI