ASYMPTOMATIC BACTERIURIA OF PREGNANCY

(Subsequent follow up of cases during labour and puerperium)

by

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Introduction

Problem of urinary tract infection in general and during pregnancy in particular, though recognised for nearly a century, still requires consideration from the point of view of early detection and prophylaxis.

The latter aspect merges itself into the important problem of asymptomatic bacteriuria particularly during pregnancy.

The incidence of asymptomatic bacteriuria of pregnancy has been variously assessed to range from 0.5 to 14.3 per cent (Hoza *et al* 1964); Kass, however, has reported the incidence of 6 per cent in a fairly large series.

Furthermore, it is essential to establish criteria for differentiating asymptomatic bacteriuria from active urinary tract infection and evolve quick and easy method for detection and differentiation of the two.

In view of this it was therefore decided to study the pregnant patients coming to the S. N. Hospital, Agra, and to follow them up in the puerperium.

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Review of literature

Bacteriuria in pregnancy is almost always a result of infection in the urinary tract. Earlier, Schweizer Biedl and Kraus (1896) and Sittma (1894) thought that there could be condition of bacilluria without concomitant lesions in the urinary tract.

Kass (1956) found asymptomatic bacteriuria in 6% of 4000 patients examined during their initial prenatal visits and in 7 per cent of 1000 patients examined at term. He has seen that if bacteriuria is eliminated during pregnancy by the use of long-acting sulphanilamide or by other antibacterial group, no pyelonephritis is encountered, whereas about 40% of pregnant women with bacteriuria who are given placebos develop clinical evidence of urinary tract infection before term. When pyelonephritis occurs it usually occurs during the last trimester or during the first few weeks postpartum.

Kaitz and Hodder (1961) found the incidence of asymptomatic bacteriuria in 12.8 per cent of pregnant women when the initial

count is over 100,000/ml. in clean voided specimen. He had shown that an overall incidence of acute pyelonephritis was 1.9 per cent.

Turner (1961) gives the incidence of asymptomatic bacteriuria as 7.0 per cent out of 1500 cases studied. He found that 60 per cent of patients developed some type of urinary tract infection.

Turck and Goffe (1962) has shown the distribution of bacteriuria out of 1727 patients studied at King County Hospital as 6.5 per cent. In the two other hospitals (groups or private) it was 1.8 per cent and 2.3 per cent respectively. There was striking difference in the incidence of bacteriuria between private patients and those in the King County Hospital.

Slotnick, Prystowsky (1962) gave the incidence of asymptomatic bacteriuria in the postpartum period as 12.5 per cent. Overall incidence in primigravidae was 10.2 per cent and in multigravidae 12.8 per cent. Occurrence of asymptomatic bacteriuria was 13 per cent.

Goss, Franklin and Hunter and Skogland (1963) screened 1093 patients, out of them 51 had bacteriuria i.e. 4.7 per cent. They found that the incidence of pyelonephritis was not significant, but that 10 per cent of combined groups had pyelonephritis and 16 per cent were treated for other urinary infection.

Hoza and Hefner and Smith (1964), by evaluating 1000 patients, disclosed 143 who had bacteriuria over one or more occasions (14.3%). He states that a moderate increase in clinical urinary tract disease was noted in patients with bacteriuria.

Material and Methods

The patients for this study were selected from the gynaecological outpatient department and the antenatal clinic of the S. N. Hospital, Agra. By direct questions, the patients with any symptom referable to the urinary tract were excluded; 200 pregnant women in the third trimester of pregnancy and 80 non-pregnant women having no symptoms referable to urinary tract were investigated. The latter formed the control group. Urine was collected by autoclaved glass catheter with all aseptic precautions in sterile glass tubes.

Two smears were prepared from centrifuged deposit and stained with Gram's and methylene blue techniques; another cover slip preparation was examined to notice the presence of pus cells, epithelial cells or red blood corpuscles.

Urine was cultured on McConkey's medium; plate was examined after 24 hours for presence of bacterial growth, discrete or diffuse colonies in a square inch; if the number of colonies was too great to be counted the pourplate technique for quantitative assessment was used (Macay and Mccartney). A subculture was done from the colony in peptone water and later on passed in sugar sets so as to find biochemical activities of the organisms, and smear examination was again done, to make the final identification. In case of staphylococci coagulase test was done to find the pathogenic or non-pathogenic character of the organisms

Observations

The observations are divided into two parts:

Part I dealing with observations on control and antenatal cases.

Part II dealing with the follow-up study on pregnant cases.

Part I: The preliminary culture was positive in 26 antenatal cases, an incidence of 13 per cent. Only 3 of the 80 control non-pregnant women had a positive urine culture. The incidence therefore of asymptomatic bacteriuria was significantly higher in the pregnant group as compared to the control group ($X^2 = 4.28$, p, Chisquare value > 0.05).

No statistically significant difference was found in the age distribution in this study.

Analysis of cases showing asymptomatic bacteriuria and those with sterile culture according to economic status did not reveal statistically significant difference; urinary findings are summarised in Table 1a and 1b.

TABLE 1a

Shows the bacterial count/cc of the urine sample with findings in smear stained Gram's technique and methylene blue stain and the different organisms encountered in 26 antenatal cases showing asymptomatic bacteriuria

Colony count/cc.	No. of cases	E. Coli	Proteus	Pseudo monas	Staphylo cocci	Grams' stain positive	Methylen blue positive
Below							
10,000	3	1	..	..	2	..	..
10,000	1	1	..	..	..	..	..
20,000	1	..	..	..	1	..	..
30,000	2	2	..	..	..	2	..
40,000	1	..	1	..	..	1	1
50,000	1	..	..	1	..	1	1
60,000	5	2	3	..	..	4	4
70,000	0	..	..	..	..	..	..
80,000	2	1	..	1	..	2	2
90,000	1	..	1	..	..	1	1
1,00,000	4	1	3	..	..	4	4
Above							
1,00,000	5	2	3	..	..	5	5

TABLE 1b

Shows the bacterial count/cc of the urine sample with findings in smear stained Gram's techniqde and methylene blue stain in 3 control cases showing asymptomatic bacteriuria

Colony count/CC	Organisms detected in Gram's stain	Organisms detected in methylene blue	Name of organisms.
8,000	....	....	Staphylococci coagulase positive.
10,000	....	....	E. Coli
12	....	....	E. Coli

Urinary Sediment

Pus cells were detected in 176 cases varying in number from 1-6 to 10/field to 12 pus cells per H.P. Pus cells were detected in all cases showing positive culture i.e. out of these 176 cases showing pus cells, 26 cases showed positive culture. None of the cases without pus cells had a positive urine culture. In only one of 3 samples with positive culture out of 80 examined (in control series) occasional to 3 pus cells were found.

Methylene blue stain

In 18 cases organisms could be identified in smears stained with methylene blue. All had positive cultures. The morphology of these organisms was differentiated into cocci and bacilli, unidentifiable cellular debris was seen in three cases. In none of the smears from control series were organisms detected.

Gram's stain

In 20 cases organisms could be identified in smear stained with Gram's technique. Out of these, in three there were gram positive cocci and in 17 gram negative bacilli. In none of the cases from the control series were organisms detected.

Culture and colony counts

The minimum bacterial count of 20 bacteria per cc. of urine was observed in one antenatal case, while 5 cases had bacterial content above one million per milliliter.

Organisms

During the study Proteus and Coliform organisms were most frequently encountered i.e. 42.2% and E. Coli in 40% respectively. Table 2 shows the organisms identified in the 26 antenatal cases showing asymptomatic bacteriuria.

TABLE 2

Organisms identified in the 26 antenatal cases showing asymptomatic bacteriuria

No.	Organisms	No. of cases	Percent.
1	E. Coli		
	Typical	3	13.1
	Atypical	7	26.9
	Proteus		
	Vulgaris	10	38.4
	Morgani	1	3.8
	Pseudomonas		
	Pyocyneus	2	7.6
	Staphylococci		
	Coagulase positive	2	7.6
	Coagulase negative	1	3.8

The different organisms with the colony count is shown in Table 1a. In the control group the colony count in the two cases which showed E. Coli was 10,000 per ml, in one and 12,000 per ml in other. The bacterial count in the case with staphylococci was 8000 per ml. The relation of types of organism with number of pus cells in the urine sample was also studied.

From Table 1a it becomes clear that the proteus and pseudomoneus

TABLE 3

Shows the organisms encountered in the cases with positive culture in labour or postnatal period

Organisms	Positive culture in follow up	E. Coli	Proteus	Pseudo-monas Pyocyaneus	Staphy lococci
Patients who had asymptomatic bacteriuria druing antenatal period.	7	1**	4	2	0
Negative culture in antenatal period.	4	3**	....	....	1

**Did not have any signs or symptoms referable to urinary tract infection.
***One of these cases developed urinary tract infection.

organisms when present in the urinary tract have a higher bacterial count as well as higher number of pus cells in the urine. Staphylococci show a low colony count as well as few pus cells. The urine containing coagulase negative organisms showed lowest bacterial count (20 colonies/cc of urine) and only occasional pus cells.

child was delivered by caesarean section.

Of the 26 patients with bacteriuria during the antenatal period, 7 showed positive culture during labour and the postnatal period and 4 out of the 155 followed up with negative antenatal culture had a positive culture during labour and the postnatal period. Table 4 shows the results of

TABLE 4

Shows the results on follow-up of the cases of asymptomatic bacteriuria

No . o.	No. of cases	No. of cases followed up	Culture positive during labour and postnatal period.	Signs and symptoms of urinary tract infection.
Antenatal culture positive	26	26	7	6
Antenatal culture negative	174	155	4	1
Total	200	181	11	7

Part II

A follow up of cases studied in the antenatal period was possible in 181 out of 200 cases; of the remaining 19 patients 6 did not come for confinement to the hospital, while 13 have not reached full-term as yet.

All cases had normal delivery except in 18 cases, low forceps being applied in 13 cases while in 5 the

follow up of the cases of asymptomatic bacteriuria. Thus a total of 7, out of the 181 cases followed up, developed urinary tract infection, an incidence of 3.86 per cent. In the cases with asymptomatic bacteriuria 6 out of 26 patients developed urinary tract infection i.e. 23 per cent, while in the cases with sterile urine cultures during the antenatal period the in-

lence of urinary tract infection was 0.645 per cent only. On applying X^2 (Chisquare) test the difference in the incidence of development of urinary tract infection in those with antenatal bacteriuria and those with sterile culture during antenatal period was found to be highly significant (p. value > 0.05).

The urinary findings of the cases who developed urinary tract infection were interesting. Table 3 shows the organisms encountered in the cases with positive culture in labour or postnatal period. Four of the 11 cases with antenatal asymptomatic bacteriuria, due to proteus organisms, developed urinary tract infection detected during labour and the postnatal period, both cases with pyocyaneus bacteriuria showed signs of urinary tract infection on follow up.

The bacterial count in all the cases showing urinary tract infection was above 80,000 per cc while in those without urinary tract infection but persistence of bacteriuria, the bacterial count was betwen 20,000 and 50,000 per cc. The comparison with initial bacterial count to consequent development of urinary tract infection is shown in Table 5.

TABLE 5

Shows the comparision with initial bacterial count with development of urinary tract infection

Colony count/cc	No. of cases with bacteriuria in A.N.P.	U.T.I. in P.N.P.	No. of cases with bacteriuria in A.N.P.	U.T.I. in P.N.P.	No. of cases with bacteriuria in A.N.P.	U.T.I. in P.N.P.	No. of cases with bacteriuria in A.N.P.	U.T.I. in P.N.P.
Below								
10,000	1	..	..	..	..	..	2	..
10,000	1	..	..	..	..	..	..	..
20,000	..	..	..	..	..	..	1	..
30,000	2	..	..	..	..	..	..	..
40,000	..	..	1	..	..	..	..	..
50,000	..	....	..	..	1	..	..	..
60,000	2	..	3	..	..	..	..	..
70,000	..	..	..	..	..	..	..	..
80,000	1	..	..	..	1	..	..	..
90,000	..	..	1	1	..	..	..	..
100,000	1	..	3	1	..	1	..	..
Above 100,000	2	..	3	2	..	1	..	..

A.N.P.—Antenatal period.
P.N.P. —Postnatal period.
U.T.I.—Urinary tract infection.

Higher number of pus cells was associated in infections with pseudomonas pyocyaneous.

Comments

The overall incidence of positive culture in the control series was 3.7 per cent while in the antenatal cases 13 per cent had a positive urine culture.

In our study none of the samples below 30,000 organisms per ml. were organisms identified in centrifuge

sediment from 5 cc. of urine. In the methylene blue stained smears the lower limit was 40,000 per ml. This difference between Gram's stain may be due to the better visual contrast in the former in contrast to the colour monotony of the latter.

In the present series Proteus vulgaris and Morgani were most frequently encountered, followed by E. coli, staphylococci and pseudomonas pyocyaneus.

Roughly the pus cell count ran parallel to the bacterial count. It is interesting to note that both the samples containing pseudomonas pyocyaneus and 8 out of 11 samples containing proteus organisms had pus cell count above 5 per high power field while in none of the samples containing staphylococci and in only 4 out of 10 containing E. Coli was the pus cell count above 5/H.P. field.

On a follow-up, 6 cases developed urinary tract infection. In none of our cases was there an overt sign of urinary tract infection. In the 7 cases who developed urinary tract infection the average pus cell count varied from 10.0/high power field to 21.5.

The most interesting finding of this study has been a correlation in the bacterial count, staining by Gram's method, and the pus cell count with the future development of frank urinary tract infection. None of the patients with an antenatal urine sample containing bacteria below 30,000 per ml. developed postnatal urinary tract infection (except one case which had sterile urine in antenatal study). Thus 6 out of 7 i.e. 85.5 per cent cases developing urinary tract infection in the postnatal, period were detected to have bacteriuria of severe enormi (90,0000 ml. or above). By proper treatment the morbidity could have been prevented.

Summary and Conclusions

1. Asymptomatic bacteriuria was detected in 26 women out of 20(examined and in 3 out of 80 non-pregnant women examined, an inciden of 13 as compared to control (X^2 = 4.28 p. value > 0.05).

2. Gram's stain, having detectec bacteriuria in smear in more cases than methylene blue stain, is therefore superior.

3. Proteus vulgaris and proteb morgani were encountered in 42.2 per cent of antenatal cases having bacteriuria, E. Coli in 40 per cent pseudomonas pycyaneus in 7.6 pe cent, staphylococci (coagulase positive) in 7.6 per cent and staphylococci (coagulase Negative) in 3.8 per cent of antenatal cases. Of the 3 cases of asymptomatic bacteriuria in non-pregnant control cases E. Coli were detected in 2 and staphylococc (coagulase negative) in one.

4. On follow up study 7 cases of the 181 followed up developed symptoms of urinary tract infection during labour or postnatal period, an incidence of 3.86 per cent. However, in asymptomatic bacteriuria group 6 out of 26 patients developed urinary tract infection i.e. 23 per cent, while in cases with sterile urine culture during antenatal period the incidence of urinary tract infection was 0.645 per cent only.

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