THE CHOICE OF ANTIBIOTICS IN INTRAPARTUM AND POSTABORTAL INFECTIONS

by

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The bacterial flora responsible for intrapartum and postabortal infections are found to vary in different localities due to several factors. The same can also be said of their susceptibility to antibiotics available at present. Hence it is essential to recognise not only the organisms responsible for the infection but also their susceptibility to the antibiotics before proper treatment could be instituted. With this in view a clinical and bacteriological study was made of 133 parturients and 28 abortions from July 1963 to June 1964 in the Government Erskine Hospital, Madurai. Of those in labour 33 were controls and 100 were clinically or potentially infected.

The method of study is described in detail elsewhere. (Rao *et al.* 1965) In those delivered by caesarean section, the liquor amnii, lower segment swab, placental and membrane bits were taken for bacteriological investigation. In most of the cases, vaginal and cervical swabs and the conceptus, whenever available in abortions, were also cultured. Maternal and cord blood were cultured in glucose broth. Other samples were cultured on Fildes agar plates and Brewer's medium. The resultant growth was identified. For the streptococci, tolerance tests were mainly used for identification: (namely, resistance to heat, ability to grow in McConkey's medium, Sodium azide broth and in the presence of potassium telurite). *Streptococcus pyogenes* was recognised with the aid of Lancefield Group A serum. Biochemical tests were used for the identification of the colon group of organisms. The slide coagulase test was utilised to establish the identity of *Staphylococcus pyogenes.* No anerobic cultures were made. The organisms grown were tested for sensitivity to penicillin, tetracycline, chloramphenicol, streptomycin and Synermycin (Oleandomycin and Tetracycline) using blood agar plates impregnated witih these antibiotics.

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Results

From 161 patients, 752 specimens were taken for culture and 27.8 per cent of them were positive (Table I). Streptococcus was the commonest, next was *E.* coli and least frequent was the staphylococcus (Tables II and III). Thirty-four per cent had mixed infections. Amongst the streptococci the order of frequency was strep. faecalis, enterococcus, Strep. pyogenes, Strep. spp. and Strep. salivarius. (enterococcus, an appelation used for enteric streptococci (Group D) other than Strep. faecalis; Strep. spp. means streptococci whose identify was not clear.) *E.* coli was present in 25 per cent of abortions. Staphylococcus was absent among the controls. The sensitivity of these organisms to different antibiotics is shown in Tables IV to IX. For the

TABLE I

Total Number of Patients and Number of Specimens Studied

Type of delivery	No. of patients	No. of specimens	Culture positive	
			No. of specimens	Percentage
Controls	33	160	28	17.5%
Caesareans	56	346	90	26%
Vaginal	44	164	51	31%
Abortions	28	82	40	48.7%
Total	161	752	209	27.8%

TABLE II

Organisms Grown on Culture: Streptococci

Type of delivery	No. of patients	Number of patients			
		Strep. pyogenes	Strep. fecalis	Entero-coccus	Strep. spp. saliv.
Controls	33	2	9	5	—
Caesareans	56	8	20	11	7
Vaginal	44	4	14	4	4
Abortions	28	4	10	4	4
Total	161	18	53	24	15

TABLE III

Organisms Grown—Colon Group and Staphylococci

Type of delivery	No. of patients	Number of patients				Staphylo-cocci
		E. coli	Paracolon	Proteus.	Total	
Controls ..	33	5	—	—	5	—
Caesareans ..	56	8	1	1	10	7
Vaginal ..	44	10	3	—	13	7
Abortions ..	28	7	—	—	7	2
Total ..	161	30	4	1	35	16

TABLE IV

Strep. Pyogenes: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Controls ..	3	100	100	100	100	100.0
Caesareans ..	17	100	100	100	76.4	100.0
Vaginal ..	5	100	100	100	60.0	100.0
Abortions ..	4	100	100	100	100	100.0

P—Penicillin. T—Tetracycline. C—Chloramphenicol. S—Streptomycin. Sy—Synermycin.

TABLE V

Strep. faecalis: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Controls ..	15	60.0	93.3	100.0	93.3	100.0
Caesareans ..	36	91.3	77.7	83.3	36.1	83.3
Vaginal ..	24	56.5	79.1	83.3	54.0	91.6
Abortions ..	17	64.7	94.0	88.2	47.0	88.2

TABLE VI

Enterococcus: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Controls ..	8	75	100	100	87.5	100.0
Caesareans ..	20	100	100	100	75.0	100.0
Vaginal ..	7	100	100	100	85.6	100.0
Abortions ..	4	75	75	100	50.0	75.0

streptococci, considered as a whole, irrespective of species differences the most efficacious antibiotic was chloramphenicol and the second best was Synermycin (Table VII). Strep. pyogenes was found to be sensitive to all antibiotics tested except Streptomycin (Table IV). With Strep. faecalis, Synermycin was slightly superior to chloramphenicol; but with enterococcus chloramphenicol was the best. (Strep. spp. and Strep. salivarius responded to all antibiotics satisfactorily). Against E. coli the antibiotics of choice were chloramphenicol and streptomycin (Table VIII). Staphylococci were found to be fairly resistant to penicillin but responded well to tetracycline and chloramphenicol (Table IX). On statistical analysis, chloramphenicol ranked the best antibiotic for almost all the organisms tested and for all the cases — controls, caesareans, vaginal deliveries or abortions. Arranged according to the infective agents con-

TABLE VII

Streptococcus: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Control ..	29	72.4	93.1	100.0	89.7	100.0
Caesareans ..	98	93.9	90.8	92.9	61.2	92.9
Vaginal ..	48	75.0	85.4	91.7	62.5	95.8
Abortions ..	37	70.3	83.8	94.4	62.2	86.5
Total ..	212					

TABLE VIII

E. coli: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Control ..	13	—	76.7	100.0	100.0	76.7
Caesareans ..	18	—	50.0	83.3	77.8	33.3
Vaginal ..	16	—	31.3	37.5	37.5	25.0
Abortions ..	13	—	30.8	69.2	61.5	69.2

TABLE IX

Staphylococcus: Sensitivity to Antibiotics (in per cent)

Type of delivery	No. of positive specimens	P.	T.	C.	S.	Sy.
Caesareans ..	19	10.5	100.0	100.0	21.0	94.5
Vaginal ..	9	33.3	100.0	100.0	11.0	88.9
Abortions ..	5	—	100.0	100.0	0	100.0

cerned the second place was claimed by tetracycline or synermycin in the case of streptococci and staphylococci and by streptomycin in E. coli infections. In abortions, Synermycin may also be preferred in E. coli and staphylococcal infections.

Discussion

To combat infections we have now a wide range of antibiotics. When they are used indiscriminately or in inadequate doses, the susceptible organisms are liable to become resistant. In mixed infections, the less susceptible organism may become dominant and the antibiotic may not then show its therapeutic effect. When resistance develops to one member of the tetracycline group (Tetracycline, oxytetracycline, chortetracycline, Demethylchlor-tetracycline etc.) the other members may not be useful. For synergistic action and to diminish chances of resistance more than one antibiotic may be combined carefully. Apart from the resistance to antibiotics, their toxicity

should also be borne in mind. Penicillin hypersensitivity is estimated to occur in about 3 per cent. Streptomycin too may produce milder drug reactions and extremely rarely chloramphenicol may lead to severe bone marrow depression. Still, they are potent weapons against severe infections and are indeed life saving.

All haemolytic streptococci, anaerobic streptococci, pneumococci, gonococci and *Cl.* welchii are sensitive to penicillin. It is fortunate that Strep. pyogenes has not shown development of resistance to this antibiotic and it is still the cheapest and best in infections due to this organism. Till a few decades ago it was thought that the puerperal and postabortal infections were mostly streptococcal in origin. Recently it was shown that E. coli may produce serious and even fatal infections in obstetrics. (Dean and Russel, 1960; Jones, 1962; Reid, 1961; and Coleman, 1964). In our series, *E.* coli was isolated in 25 per cent of abortions and it was also responsible for 3 out of the 6 deaths recorded during this study. In one, E. coli was grown in all the specimens including cord blood but was found resistant to all antibiotics in vitro. In the other two, E. coli was sensitive to streptomycin and chloramphenicol in vitro but not to tetracycline which the patients were given in large doses. Streptomycin and chloramphenicol are therapeutically more efficacious antibiotics against this organism and this is supported by the data on Table VIII. Penicillin resistant staphylococci are commonly seen in our hospitals. By themselves or in combination with others, they may give rise to severe infections. Tetracyclines, chloramphenicol and erythromycin may be used in these cases but only in severe infections so as to prevent development of resistance of these organisms to these antibiotics also.

Can a suitable antibiotic be chosen based on a vaginal smear stained with Gram's stain? After a careful study of 48 patients where such vaginal smears and swab cultures were done we are of the opinion that the smears do not always indicate the nature of the organisms responsible for intrapartum infections. Besides, the organisms present in the vagina or cervix may not be responsible for intrauterine infections.

We do not advocate routine use of antibiotics in labour. They are indicated in those who continue in labour for over 6 to 8 hours after rupture of membranes and in those where numerous vaginal examinations have been made — particularly, when they are badly 'handled' or traumatised prior to admission. Because of frequency of mixed infections (streptococci and E. coli) penicillin and streptomycin may be given to these potentially or clinically infected cases except where there is history of allergy or hypersensitivity to these drugs. In severe infections, chloramphenicol appears to be more potent than the tetracyclines. Preliminary culture studies from the cervix and from the uterus, (in cases of caesarean section or rupture uterus) are helpful to find out the offending organism and the sensitivity tests give us valuable information in the management of such severe infections, especially, when the response to the

antibiotic used initially is not satisfactory.

Summary

1. A clinical and bacteriological study was made in 133 parturients and 28 abortions from July 1963 through June 1964. Of those in labour 33 were controls and 100 were clinically or potentially infected.

2. In those delivered by caesarean section the liquor amnii, lower segment swab, placental and membrane bits were taken for bacteriological culture. The vaginal and cervical swabs in most cases and the conceptus, whenever available, in septic abortions were also cultured.

3. The organisms isolated were tested for susceptibility to penicillin, streptomycin, chloramphenicol, tetracycline and Synermycin.

4. The place of antibiotic therapy with particular reference to the different types of organisms responsible for puerperal and postabortal infections is briefly discussed.

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