Transfer of Cephaloridine from Mother to Fetus

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Where there is risk of intrauterine infection in pregnancy any antibiotic administered to the mother must cross the placenta in order to be effective in the fetus. The concentration in the fetus must be sufficient to inhibit the growth of the commonly encountered pathogenic organisms.

Materials and Method

Thirty-one women whose membranes had been ruptured for 48 hours or more and in whom delivery was imminent were given cephaloridine ('Ceporin'), a broad spectrum semisynthetic antibiotic, in doses of 1 g. 12-hourly by intramuscular injection. At delivery a venous blood sample was taken from the mother and the cord, and a further sample from the baby once sometime during the 36 hours after birth. Sera were separated and stored at -20°C . until they could be assayed for cephaloridine. Concentrations of cephaloridine in the sera were estimated by microbiological assay (M. J. Marshall, 1966, personal communication).

Results

The concentrations of cephaloridine found in 30 maternal and 31 cord sera and in the sera from 21 newborn infants are shown in the Figure, which gives the mean levels obtained in each 2-hour period after injection. The levels in maternal serum after injections of 1 g. followed the expected pattern (Apicella, Perkins, and Saslaw, 1966; Kislak, Steinhauer, and Finland, 1966). Cephaloridine readily crossed the placenta and was found in high concentrations in the cord and infant sera. Though peak levels in the baby were lower than those in the mother, the decline was slower, and measurable levels persisted for up to 22 hours after the last pre-delivery dose. Cephaloridine concentrations in the babies were higher than those in the mother from about 5 hours after an injection of the antibiotic. On the occasions when a low level of cephaloridine was found in cord serum it accompanied a low level in the maternal serum.

Discussion

A survey of some current textbooks of obstetrics and paediatrics shows that Baird (1962), Claye and Bourne (1963), Morison (1963), and Hutchison (1967) recognize the danger to the fetus from ascending infection with increasing duration of labour and ruptured membranes, and with intrapartum anoxia. Browne and Browne (1964), Greenhill (1965), and Schaffer (1965) advise that, in these circumstances, a broad spectrum antibiotic should be given prophylactically to the mother. Butler (1967) supports this view.

Cephaloridine has been shown to be a safe and suitable antibiotic for use in the perinatal field (Barr and Graham, 1967; Keay, Syme, and Barnes, 1967; Burland and Simpson, 1967). Barr and Graham (1967) have shown that high levels are found in liquor after intramuscular injection. The results in this trial confirm that cephaloridine readily passes across the placenta and that fetal serum concentrations reach levels likely to be effective against a wide range of common pathogenic organisms. Barber and Waterworth (1964) found that strains of *Staphylococcus aureus*, including those resistant to penicillin, were inhibited by $0.12\text{--}0.25\text{ }\mu\text{g./ml.}$ of cephaloridine, *Streptococcus pyogenes* by $0.007\text{ }\mu\text{g./ml.}$, and *Escherichia coli* by $2\text{--}4\text{ }\mu\text{g./ml.}$ *Pseudomonas pyocyanea* is resistant to the antibiotic. The serum concentrations in the baby tend to fall more slowly than those in the mother, a pattern to be expected in view of the reduced urinary excretion of the antibiotic by immature kidneys. This feature and the correspondingly high serum levels in newborns receiving cephaloridine were described by Burland and Simpson (1967).

Summary

Cephaloridine was administered to 31 pregnant women in whom delivery was imminent. Results of assay show that cephaloridine crosses the placenta to reach the fetal circulation and that measurable

FIG.—Mean serum cephaloridine levels at 2-hour intervals.

levels are maintained for up to 22 hours after dosage in the mother.

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