THE PREVENTION OF PREMATURITY

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The object of all prenatal care is to improve reproductive efficiency increasing not only maternal wellbeing during pregnancy, but also to bring the foetus to a state of maturity so that it can withstand the normal stress of labour and adapt satisfactorily to extrauterine life. The optimum duration of gestation for attaining such maturity in the human is about 280 days from the first day of the last menstrual period with a physiological range of 259 days to 293 days. Shorter or longer periods of gestation result in steep increases in perinatal death rates which are closely related to the size of deviation. Birth before term (258 days or less) is associated with a perinatal mortality which is 30-33 times higher than for normal gestation periods, whereas births following prolonged pregnancy (294 days or over) have roughly twice the mortality at term. (W. H. O. 1972).

The definition of prematurity is often confused because of accepting criterion related to birthweight of 2500 gms. or less. This birthweight could be the result of either being born before term or because of birthweights being significantly below the average weight for a particular gestational age (small for dates). The proportion of truly premature babies and 'small for dates' babies is difficult to estimate and varies from 1:1 to 2:1 in different reported series. In this paper some of the etiological factors responsible for premature births before 259 days of gestation and the preventive measures which could be adopted to decrease the incidence of such births will be discussed.

The mechanisms which initiate labour before term can only be studied rationally if the factors which determine the normal onset of labour are better understood. The initiation of labour is still the subject of several hypotheses involving both maternal and foetal factors. Under the circumstances, one can at best identify and correct factors which appear in association with premature deliveries but whose causal relationship is difficult to establish.

Maternal factors: These include certain uterine conditions like malformations and incompetent cervix and pathological states in pregnancy like antepartum haemorrhage, pre-eclampsia and eclampsia, pyelonephritis and bacilluria and several common acute infectious diseases in the mother. Corrective measures for the above depend on accuracy of diagnosis and objectivity in management. A close correlation has been observed between maternal heart volume and pre-term deliveries where such mishaps can be prevented by increased rest during the latter weeks of gestation.

Induction of Labour: Induction of labour is generally indicated in pregnancies complicated by conditions which affect foetal wellbeing e.g. toxemias, diabetes, postmaturity, etc. Elective induction refers to induction of pregnancy but is performed for patient's or physician's convenience. This is justifiable if it can be demonstrated that the incidence of...
foetal and maternal complications are significantly less than when labour starts spontaneously. The occurrence of prematurity and the consequent high perinatal death rate can be tragic especially in elective repeat section. In doubtful cases, good clinical judgement has to be supported with established methods of assessment of foetal maturity like amniotic fluid analysis for creatinine, bilirubin, percentage of fat cells and the lecithin:sphingomyelin ratio. Facilities for such investigations must be made available and used more often at least in teaching hospitals, so that the risk of prematurity can be assessed before performing any type of induction whether elective or indicated.

Premature rupture of membranes: The management of cases with premature rupture of membranes before 37 weeks is considered a controversial issue by many experts. Risks of sepsis to both mother and infant are so great that active management is mostly recommended. The latent period between corticosteroid administration and foetal enzyme induction may not be sufficiently long for conferring any benefit in the form of decreased incidence of respiratory distress syndrome, though inhibition of labour has been attempted with this object (Liggins & Vaughan 1973).

Use of drugs for inhibition of uterine activity

Several reports have recently appeared on the use of drugs to inhibit uterine activity and arrest premature labour. It must be emphasized here that since the distinction between true labour and false labour is difficult to make by clinical observations, drug trials for this condition should be planned as doubleblind or randomised placebo controlled trials. Considering the important role of progesterone in maintaining pregnancy, it has been tried extensively to inhibit uterine contractions. Several routes were employed for its administration i.e. oral Brenner and Hendricks (1962) intramuscular Csapo et al., (1966) intraamniotic Hendricks et al., (1961) intravenous, Kumar et al., (1963) and intramyometrical Bengtsson (1962). The results have not been generally satisfactory though Scommegna et al., (1970) reported that intravenous infusion of pregnenolone sulphate which is an immediate precursor of progesterone, decreased uterine activity when given at the onset of labour at term. Fuchs & Co-workers (1963 & 1965) showed that ethanol inhibits release of oxytocin from the posterior pituitary gland and demonstrated the successful use of ethanol infusion for inhibition of labour (Zlatnick and Fuch 1972). These results have since been confirmed by other workers (Mehra et al., 1970; Wakhloo 1970; and Mahendru 1972) and ethanol treatment is standard treatment for inhibition of labour in many hospitals.

Several sympathomimetic drugs with epinephrine like effects have been synthesized which are also known to inhibit myometrial activity. They can be administered by intravenous, intramuscular or oral routes and have varying degrees of side effects like maternal tachycardia and hypotension, but have now been used with success by many workers. Isoxsuprine, Ritodrine, Salbutamol and Orciprenaline are agents which can be used either for inhibition of uterine activity after the onset of premature labour, with success ranging from 40-77% or prophylactically during pregnancy where there is previous history of repeated premature births or...
abortions. However, the results reported by different workers are difficult to compare since the criteria used for definition of success are varied. Some of the reported results with the different drugs are given in Table I. Bienariz and Coworkers (1971) advocated a multitarget approach using simultaneously large volume infusion of ethanol, ritodrine and pregnenolone sulphate. This combination of agents was expected to be more efficient since pregnenolone would decrease myometrial sensitivity, ethanol and rapid blood volume expansion inhibit oxytocin release and the betamimetic compound decreases the intensity of uterine contractions.

### Social aspects of Prematurity

In 30-50% of premature births, no definite cause can be found other than unfavourable socio-economic factors including high parity, poor nutritional and environmental conditions and inadequate prenatal care during pregnancy. In this group, the complication of premature rupture of membranes also has a significantly high incidence. Preventive aspects of prematurity are closely linked with organisation of good antenatal care. Long term measures which would pay high dividends are better nutrition, improvement in environmental conditions, control of communicable diseases and general and health education. Steps which can give some immediate returns include evaluation of the effectiveness of existing maternal health services and their improvement and expansion within the existing limitations of resources and personnel. Identification of the high risk groups of women and improved services, both institutional and domiciliary to such groups is important. Certain traditional procedures in the working of the antenatal clinics have to be modified.

### Table 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Drugs</th>
<th>Criteria of Success</th>
<th>Success Rate (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>Fuchs et al</td>
<td>Ethanol</td>
<td>3 days</td>
<td>67</td>
</tr>
<tr>
<td>1970</td>
<td>Mehra et al</td>
<td>Ethanol</td>
<td>3 days</td>
<td>68</td>
</tr>
<tr>
<td>1972</td>
<td>Mahendru</td>
<td>Ethanol</td>
<td>7 days</td>
<td>60</td>
</tr>
<tr>
<td>1972</td>
<td>Zlatnick &amp; Fuchs</td>
<td>Ethanol</td>
<td>3 days</td>
<td>80</td>
</tr>
<tr>
<td>1968</td>
<td>Malhotra &amp; Joseph</td>
<td>Isoxsuprine</td>
<td>7 days</td>
<td>71.4</td>
</tr>
<tr>
<td>1969</td>
<td>Dass</td>
<td>Isoxsuprine</td>
<td>7 days</td>
<td>72</td>
</tr>
<tr>
<td>1970</td>
<td>Baillie et al</td>
<td>Orciprenaline</td>
<td>Upto 36 weeks</td>
<td>70</td>
</tr>
<tr>
<td>1973</td>
<td>Mathur et al</td>
<td>Orciprenaline</td>
<td>3 days</td>
<td>68</td>
</tr>
<tr>
<td>1973</td>
<td>Liggins &amp; Vaughan</td>
<td>Salbutamol</td>
<td>7 days</td>
<td>40</td>
</tr>
<tr>
<td>1972</td>
<td>Wesselin De</td>
<td>Ritodrine</td>
<td>5-8 days</td>
<td>77</td>
</tr>
<tr>
<td>1974</td>
<td>Renaud et al</td>
<td>Ritodrine</td>
<td>7 days</td>
<td>65.6</td>
</tr>
</tbody>
</table>

Analysis of the types of cases where premature births occur shows that cases suitable for use of drugs to inhibit labour are likely to constitute only 25%-26% of all premature births (Zlatnick and Fuchs 1972; Devi 1974). Selection of cases has to be done after careful assessment as there are several contraindications like intrauterine growth retardation, antepartum haemorrhage, hypertension, etc. where inhibition of labour can lead to intrauterine death.
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or discarded, so that women with higher risk get more attention from technically better trained staff. Periodic evaluation of clinic practices become necessary so that new knowledge can be introduced and applied suitably. Additional hospital beds for antenatal cases in proportion to the pattern of high risk cases attending the clinics would be required. If all these changes must take place in the delivery of health care to pregnant mothers, senior obstetricians and teachers in obstetrics need to be involved more actively with decision and policy making bodies concerned with organisation of maternal and child health services in the community.

In conclusion, one may state that early clinical recognition of high risk cases and threatened premature labour can now lead to rational use of drugs to inhibit uterine activity along with other measures. The proportion of infants thus saved from the hazards of prematurity would however remain small, compared to those who can be saved by stepping up general preventive public health measures, more intensive and extensive prenatal care and health education.

REFERENCES