

CHAPTER II

LITERATURE REVIEW

This chapter concerns with the brief statements about the literature that relate to this study.

The risk of unfavorable outcomes

Ballantyne (1902) was recognized to be the first to call attention to dysmaturity. Until 1945, Clifford (1945) reported 46 cases, and to describe the syndrome and its clinical important in detail. He also considers dysmaturity to be caused by a placental insufficiency and introduces the term "placental dysfunction syndrome". According to Carl J. Pauerstein dysmaturity occurs approximately 1% of all deliveries, 20 - 30% of post term pregnancies (Pauerstein, C.J., 1987).

While the majority of post term fetuses probably continues to gain weight, the longer pregnancy progresses past term, the greater the likelihood of the fetus appearing undernourished and chronically distressed. During this time the fetus not only may fail to gain weight but also may actually lose weight (Prichard, J.A., 1989). In general, the longer the truly post term fetus stays in

utero, the greater the risk of a severely compromised fetus and newborn infant. The intrauterine environment may be so hostile that further fetal growth is arrested, then growth retarded, LBW, dysmaturity infants occur as a bad outcome. The fetus may appear at birth actually to have lost considerable weight especially from lost of subcutaneous fat and muscle mass. Abnormalities of birth weight are associated with increased likelihood of newborn death and long-term disability (Prichard, J.A., 1989).

It was demonstrated that up to the age of 2 years, the mortality rate of infants of postterm gestations is twice as high as that of babies of term pregnancies (Zwerdling, M.A., 1967).

The incidence of fetal postmaturity in several reports are different, 3 per cent at term and 20 per cent at postterm (Strand, A., 1956) and a similar fivefold increase of fetal postmaturity in postterm gravidas (Sjostedt, S., 1958). Incidence of postmaturity was higher in male fetuses of both primigravidas (male fetuses, 7 percent; female fetuses, 5 percent) and multigravidas (male fetuses, 8 percent; female fetuses, 5 percent) (Strand, A., 1956). In addition, there is a definite placental dysfunction syndrome that occurs more often in postmature infant than in those of average gestational age (Kunstadter, R.H., 1956).

During the last three decades, Intra Uterine Growth Retardation (IUGR) has been recognized as one of the most important factors affecting perinatal mortality, morbidity, and lifelong sequelae (Advances in Gynecol. and Obstet., 1989). Up to now, there is an increasing interest in fetal growth retardation (FGR) that some authors suggest the cause derives from placental insufficiency. A prospective study was proved that there was evidence of physical and intellectual deficits in small for date infants (Fitzhardinge, P.M., 1972). Particularly, placental dysfunction is correlated with increased incidence of IUGR (Voherr, H., 1975).

At the forty-third week of gestation fetal perinatal death was two- to fivefold and at the forty-fourth week it was three- to sevenfold increased compared to values for term pregnancies (Browne J.C.M., 1963; Wrigley, A.J., 1958; Nakano, R., 1972; Jenkins, D.M., 1971; Gibberd, G.F., 1958). Other reports state that the perinatal mortality rate rose from 2.2 percent for 42 weeks to 10 - 14 percent for 44 weeks of gestation (Kloosterman, G.J., 1956).

During 1970 - 1980 the study in USA found that the rate of low birth weight decreased from 7.3 to 6.3%. Term low birth weight decreased from 3.5% in 1970 to 2.8% in 1980 and 25% of low birth weight babies fall into the

category of fetal growth retardation (Advances in Gynecol. and Obstet., 1989).

The causes of low birth weight have been discussed by numerous investigators. The first investigates the reasons for the delay in onset of parturition; the second deal with the mechanisms of placental insufficiency leading to evidence of dysmaturity syndrome. This means that there are two distinct mechanisms responsible for abnormally low birth weight. In one, the rate of growth is normal but for an unduly short period of time; in the other, the fetus fails to maintain a normal rate of growth. A fetus or infant of low birth weight may be the consequence of an abnormally short gestational age but a normal rate of growth (appropriately grown, preterm fetus or infant) or of a gestation of normal duration but with an impaired rate of growth (growth-retarded, term fetus or infant) (Prichard, 1985).

Another literature states that statistics vary slightly, 8% to 10% of the prolonged gestation, babies will manifest recognizable abnormalities as placental dysfunction. The findings in the infant vary in degree and generally are more severe the longer the pregnancy (Lowrey, G.H., 1986).

Within a fetal weight range of 3,500 to 4,000 Gm., only a slight difference existed in term (28 to 29 per

cent) and postterm (34 to 36 per cent) gravidas (Holtorff, J., 1986). Seven to ten per cent of the fetuses of above 4,000 Gm were born to term gravidas and 12 to 20 per cent to postterm gravidas (Lucas W.E., 1965; Holtorff, J., 1986; Beischer, N. A., 1969; Perlin, I.A., 1960). Birth weight slightly decreases with increasing maternal age but increases with parity (Karn, M.N., 1951-52). In contrast, Daichman and Gold were unable to detect a difference in incidence (8.1 per cent) of birth of 4,000 Gm and heavier fetuses between term and postterm gravidas (Daichman, I., 1954). Failure of increase in average fetal body weight after 41 to 42 weeks of gestation does not mean that all fetuses stop growing. It rather indicates that some fetuses grow at a normal, some at a more or less reduced rate, whereas other fetuses do not gain weight at all or may even lose weight (Gruenwald, P., 1964).

From the thirty-ninth week of pregnancy on, the mean birth weight of postmature newborn infants lies 200 to 300 gm below that of normal neonates of the same age. Maternal age appears not to influence the incidence of fetal postmaturity (Sjostedt, S., 1958).

In 1991, Kramer reported that the mean birth weight of all infants delivered after term according to a LNMP was 3490 Gm., which is very close to that of term infants, because a majority of post term pregnancies are inaccurate (McLean, F.H., 1991). He also reported the probability

that an infant born at term, as determined by the LNMP, was actually a term infant was 95 percent. The probability that a baby born to post term, based on the mother's LNMP, was actually postterm plummeted to 12 percent (Kramer, M.S., 1988).

The definition of diagnostic criteria

A variety of criteria are used to define IUGR but the birth weight below the 10th percentile for gestational age is the criterion most often employed and most generally applicable to the identification of fetus with impaired growth and its potential attendant complications. Depending on the parameters chosen, IUGR complicate from 3% to 10% of all gestations (Pauerstein, C.J., 1987).

For any gestational age, as weight decreases below the 10th percentile, the risk of fetal death increases remarkably (Prichard, 1985).

The diagnostic tests of the unfavorable fetal outcomes in antepartum period

Fetal blood flow measurements have a good capacity for predicting unfavorable fetal outcomes and can be recommended for clinical use. The combination of ultrasound screening and Doppler blood flow measurement has

reduced the number of pregnancies requiring intensive surveillance (Marsal, K., 1988).

The sonographic biometry is a more sensitive technique for identifying IUGR but that the umbilical artery waveforms are a valuable adjunct for improving the diagnostic accuracy for the prenatal detection of IUGR. These data also provide suggestive evidence that umbilical artery velocimetry may be predictive of IUGR at an earlier gestational age than sonographic estimation of fetal weight (Berkowitz, G.S., 1988).

Oligohydramnios is a hallmark for intrauterine growth retardation (IUGR) and has been evaluated in populations suspected of having IUGR. The result shows that the semiquantitative assessment of amniotic fluid volume can effectively screen for IUGR and thereby delineate a population, regardless of gestational age, that is at risk for perinatal morbidity and mortality (Hill, L.M., 1983).

Intrauterine growth retardation is difficult to diagnose before birth. Sonographically diagnosed oligohydramnios has been reported to be highly sensitive and reliable in detecting IUGR in carefully prescreened patients. The author suggests that, although the presence of oligohydramnios should increase the clinician's index of suspicion for IUGR, routine sonographic screening to detect oligohydramnios is not warranted (Philipson, E.H., 1983).

The aspiration of amniotic fluid provides for a variety of diagnosis tests that are indicative of fetal well-being or lack thereof. A very comprehensive listing of abnormalities of the fetus that are amenable to detection with the aid of appropriate analysis of amniotic fluid has been provided by Roberts and co-workers in 1983 (Prichard, 1989).

Measurement of fetal biparietal diameter (BPD) has proved valuable for the diagnosis of postmaturity, i.e., in such fetuses BPD shows arrest of growth or even regression, whereas during normal fetal growth BPD increases on the average 1.6 mm. per week between weeks 31 and 37 and 0.7 to 1 mm. between weeks 38 to 41 (Varma, T.R., 1973). Serial BPD values showing an increase of less than 0.45 mm. per week indicate fetal dysmaturity; thus with serial BPD measurements, fetal dysmaturity could be predicted in 90 per cent of cases (Tchilinguirian, N.G.O., 1973).

The management of postterm gravidas

Release of meconium into amniotic fluid in vertex presentation is still a valid, albeit rather insensitive, indicator of placental insufficiency and fetal hypoxia. Meconium passage into amniotic fluid occurs when the oxygen saturation in the umbilical vein blood drops to 30 per cent, i.e., half of its normal value. Meconium passage is due to hypoxia of the smooth musculature of the



gastrointestinal tract resulting in hyperperistalsis and relaxation of the anal sphincter (Bernstine, R.L., 1960). When meconium release is noticed in postterm gravidas, the incidence and degree of acidosis measured in umbilical blood of the newborn infants is increased (Doring, G.K., 1967). Meconium was present in the liquor in 6.9 per cent of patients before the onset of labor and in this group the incidence of fetal heart rate abnormality was significantly increased (Beischer, N.A., 1969). In a recent prospective study on 1,000 gravidas at risk, amnioscopy revealed that the presence of clear fluid before labor was associated with a perinatal mortality rate of 0.4 per cent and a 5 per cent incidence of low Apgar score; when, however, meconium was detected before labor, a perinatal mortality rate of 7.5 per cent and a 22 per cent incidence of low Apgar score occurred. Accordingly, a greenish floccular appearance of amniotic fluid meconium release is usually indicative of insufficient placental function and fetal hypoxia; after recent meconium staining, a very low oxygen saturation of umbilical vein blood of 15 to 25 per cent was measured (Walker, J., 1954). Fetal hypoxia was observed in 5 per cent of postterm gravidas (Evans, T.N., 1963), and the amniotic fluid contained meconium in 7 per cent; in one out of three cases estriol values were low (<12 mg. per 24 hours) and in four out of five cases more or less pronounced placental insufficient existed (Beischer, N.A., 1969). Due to the stress of labor meconium staining

occurred in 22 per cent of postterm gravidas with clear amniotic fluid before labor (Beischer, N.A., 1969). Thick clumps of dark meconium indicate more severe fetal hypoxia than light greenishtinted amniotic fluid (Mintz, N., 1960).

An amniotic fluid volume of less than 400 ml. indicates that the fetus is at risk (Morris, E.D., 1968). Reduction of the volume of amniotic forewaters is accompanied by a perinatal mortality rate of 2 per cent and a 10 per cent incidence of low Apgar score; Therefore, labor should be induced in these patients as well as in those with meconium-containing amniotic fluid (Barham, K.A., 1973).

Amniotomy performed during the first stage of labor has been found to increase frequency and severity of Dip I type FHR pattern (early deceleration) from 2 to 32 per cent (Tchilinguirian, N.G.O., 1973). Although a Dip I type FHR pattern is not considered pathologic, one must carefully weigh the merits of amniotomy versus its possible harmful affects on an already compromised fetus and amniotomy should be avoided in early labor. When the fetal head is not engaged to the maternal pelvis, extensive digital separation (membrane stripping) of the lower amniotic pole from the uterine wall is often a useful procedure for induction of labor (Voherr, H., 1974).

In postterm gravidas presenting with a favorable cervix and in the absence of contraindication, induction of labor can save fetuses who might be lost due to placental insufficiency if pregnancy is allowed to continue (Tchilinguirian, N.G.O., 1973).

Generally, the management of the uncomplicated, prolonged pregnancy remains controversial. One must weigh the risk of increased fetal morbidity and mortality associated with continued intra-uterine existence beyond 42 weeks' gestation against problems associated with routine induction of labor. Those advocating conservative management rely on one or more antepartum tests of fetal well-being, including the non-stress test (NST), the oxytocin challenge test (OCT), also designated the contraction stress test (CST), amniocentesis or amnioscopy for detection of meconium, determination of estriol levels, measurement of human placental lactogen (hPL), and real-time ultrasound scanning for analysis of fetal breathing movements (FBM), fetal movements (FM), and amniotic fluid volume (AFV). In general, the variation parameters predict normal outcome well but are less accurate in predicting poor outcome; none is good predictor of postmaturity. Advocates of routine intervention at 42 weeks' gestation cite multiple factors to support their philosophy of aggressive management. These factors include increasing maternal and physician anxiety over fetal well-being and the potential of perinatal morbidity and mortality.

Briefly, a minority routinely terminate the pregnancy regardless of cervical examination at 42 weeks' gestation. The majority of institutions favor regular assessment of fetal well-being when expectant management is followed.



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย