RELATIONSHIP BETWEEN PLACENTAL SITE AND BIRTH WEIGHT OF THE HUMAN INFANT

by

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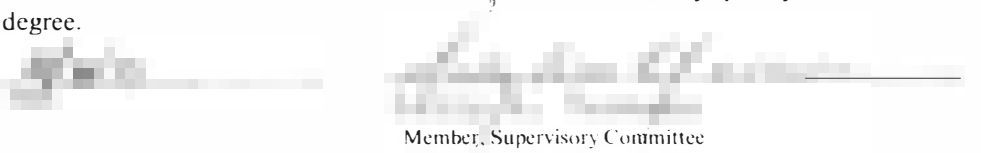

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ABSTRACT

The purpose of this study was to determine whether or not a relationship exists between the uterine placental site and the birth weight of infants delivered from a low risk population and to establish the Doppler as a reliable instrument for placental localization before delivery.

The sample consisted of 26 Caucasian primiparous and multiparous women who were delivering a full-term infant by elective Cesarian section. Twenty-one of the 26 infants were considered for statistical analysis. Sixteen women were examined for location of the placenta with the Doppler before delivery.

There was no significant relationship between placental site, segment and wall and infant birth weight. However, a significant correlation was found between placental site and birth length, placental weight, infant's gestational age, and maternal gravida.

A comparison was made between placental site and the mean value for maternal gravida and months since last pregnancy, infant's gestational age on Dubowitz assessment, placental weight, birth weight, length, and occipital frontal circumference (OFC). It was noted that the greatest birth weight for placental site was associated with an anterior/posterior fundal position and the second ranking birth

weight with a placental site in the upper uterine segment on the anterior/posterior wall.

The agreement between the placenta localization with the Doppler before delivery and manual removal varied considerably. When the placenta was located in the fundus on the anterior wall, 100% accuracy was achieved, 70% with an upper uterine segment posterior wall placental site, 50% with a posterior fundal site, 30% with an anterior upper uterine segment site, and 0% accuracy with an anterior lower uterine segment site.

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CHAPTER I

INTRODUCTION

This study was conducted to establish a relationship between the placental site and birth weight from a low risk population. Review of the available literature reveals Booth, et al. (1962) as the only study which reported a possible relationship between the uterine placental site and the birth weight of the human infant. The animal studies of Rosahn and Greene(1936) and Perry and Rowell (1969) have indicated that the placental site is significantly related to the subsequent birth weight of the fetus and is also related, longitudinally, to gestational age. These studies suggest that the blood supply to the uterus and the resultant placental circulation are the major factors influencing fetal weight (Healy, McLaren, & Michie, 1961; Dunean & Lewis, 1969; Wotton, McFadyen,& Cooper, 1977). If a similar relationship is present in man, additional information would be available to the practitioner either before or at the time of delivery for higher-risk infants.

Events resulting in a low or high birth weight infant for gestational age are many and complex, necessitating the control of medical and environmental factors which play a significant role in altering birth weights. A comparison of the uterine placental site with the birth weights of infants

who are at risk because of maternal or fetal reasons is beyond the scope of this study. Rather, the purpose is to determine whether or not a trend exists between the uterine placental site and the birth weight of infants delivered from a low-risk population.

The literature review which follows will support the idea that there is a relationship between the uterine placental site and subsequent birth weight. This will be examined by tracing the maternal uterine blood flow, both arterial and venous. In addition, maternal factors which might alter birth weight will be reviewed and a reliable means of placental localization before delivery is suggested.

Literature Review

It has long been recognized that the fetus *in utero* and its ultimate success at birth is dependent entirely on the placenta's provision of adequate nutrition, gas exchange, and excretion (Assali, Rauramo, & Peltonen, 1960; Bruce & Abdul-Karim, 1974). Bruce and Abdul-Karim (1974), in a physiological review of the mechanisms controlling maternal placental circulation, found that the placenta's ability to accomplish these activities depends on maternal placental blood flow, fetal placental blood flow, uterine blood flow, and the efficiency of the placental transfer mechanisms. They also emphasized the difficulty in measuring maternal and fetal placental blood flow. Consequently, it has become acceptable to use the maternal uterine blood flow as

an index for maternal placental blood flow; however, Bruce and Abdul-Karim (1974) have clearly shown that the maternal placental vascularity is quite different from the vascularity of the remainder of the uterus.

Several studies were made by Assali and associates (1953, 1960) with actual measurements of the maternal uterine blood flow during pregnancy. Assali, et al. (1953) determined the blood flow, oxygen consumption, and vascular resistance of the pregnant and non-pregnant uterus by obtaining blood samples from the uterine vein and brachial artery. Measurements of women undergoing elective Cesarean sections were compared with those of women having tubal ligations during the postpartum period. It was concluded from this study that uterine blood flow and oxygen consumption are greatly increased in the pregnant uterus, while vascular resistance is noticeably reduced. In 1960, Assali, et al. studied uterine and fetal blood flow and oxygen consumption. Their studies were conducted on women having therapeutic abortions by hysterotomy between nine and twenty-eight weeks gestation. Blood measurements were taken from the uterine vein, brachial artery, and umbilical vessels. The results indicated that uterine and fetal blood flow and oxygen consumption increase progressively throughout gestation.

Although Assali has measured the actual uterine blood flow during pregnancy, there is no indication in the literature that the arterial or venous blood flow to one area of

the uterus is greater than that to another. When the path of uterine blood flow is traced, some assumptions may be made, but only with a clear understanding of that path. Arterial blood reaches the human uterus from the aorta via the uterine arteries which are branches of the anterior division of the hypogastric arteries (Netter, 1961). After branching, they enter in broad ligaments, following their length and ending in the uterine wall at the level of the isthmus, an area of demarcation between the cervix and the body of the uterus (Pritchard, 1976). Here the uterine arteries bifurcate, producing descending cervical branches which surround the cervix and anastomose with branches of the vaginal artery (Netter, 1961). The main uterine branches follow a tortuous course upward along the lateral margin on each side of the uterus, with spiral branches to the anterior and posterior surfaces of the uterus. They terminate where the Fallopian tubes enter the uterus, i.e., the fundus, by joining freely to the ovarian arteries (Netter, 1961). Thus the uterus is suspended between the two arterial loops, giving it a bilateral, double access to arterial blood supply (Hoeber, 1966).

The uterine veins, in general, follow the course of the uterine arteries. They also anastomase freely and empty into the plexuses at the sides of the uterus in the ovarian and broad ligaments (Greenhill, 1965). The ovarian veins empty into either the renal veins or the inferior vena cava; the veins of the broad ligament drain into the hypogastric

veins and then into the common iliac veins (Greenhill, 1965). (See Figure 1.) This brief tracing of the maternal uterine blood flow suggests that blood flow is concentrated to the body of the uterus, the area between the isthmus and the fundus, with a lesser blood supply to the lower segment of the uterine body (Arey, 1965; Hoeber, 1966) and the fundus (Netter, 1961; Hoeber, 1966).

Little information exists regarding those factors which determine the site of blastocysts attachment. There is some disagreement whether implantation takes place as a matter of chance, as stated by Arey (1965), with the entire lining of the uterus, except the region of the cervix, in a state of readiness for the reception of the blastocyst, or whether as Hoeber (1966) reports, implantation occurs where the blood supply is best, i.e., the anterior and posterior wall of the uterine body. The latter alternative has been demonstrated in various studies. Booth and associates (1962) concluded that, in 200 pregnancies, the placenta was located on the anterior surface of the uterine body in 53% and on the posterior surface in 39%. Hoeber (1966) and Pritchard (1976) determined that in 75% of all women delivered, the placenta was located on either the anterior or posterior wall of the uterus. Consequently, it could be expected that those placentas located within the body of the uterus would receive adequate nutrition and oxygen from the maternal arterial blood flow and excretion from the venous blood flow, with a resultant fetal birth weight appropriate for

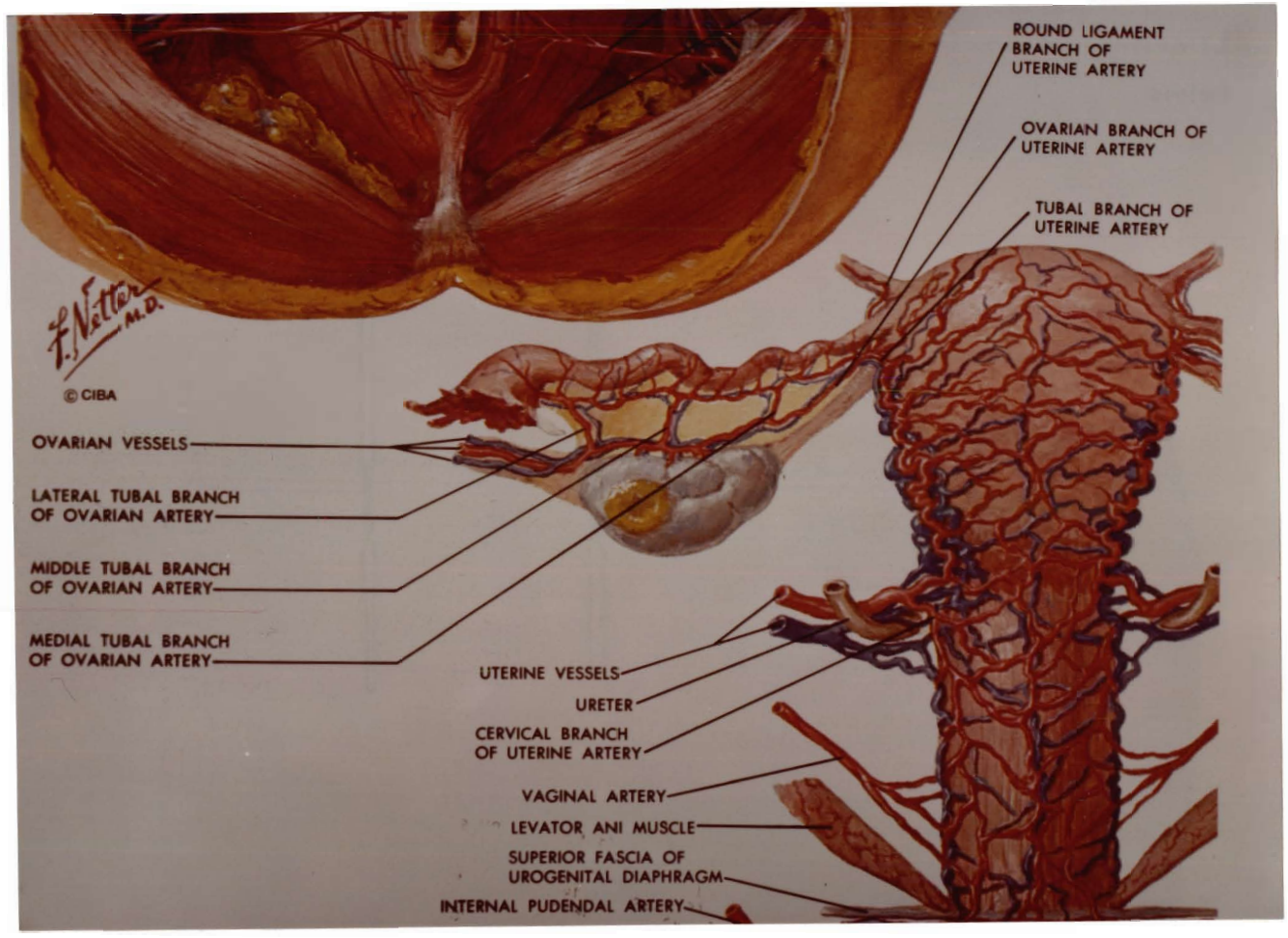

Figure 1. Blood Supply of the Uterus

Note. From The CIBA Collection of Medical Illustrations: Volume 2 Reproduction System by F.H. Netter. Copyright 1961 by Ciba Pharmaceutical Company, Division of Ciba - Geigy Corporation. Reprinted by permission.

gestational age. On the other hand, those placentas located in the lower segment of the uterine body or fundus would receive diminished nutrition and oxygen and reduced excretion, as indicated by the maternal uterine blood flow, resulting in infants small for their gestational age.

To eliminate any maternal complications that might influence fetal birth weight, the following factors were considered in selection of the subjects for this study:

1) Gestational diabetes (fasting blood sugar level above 100 mg/ml and insulin-dependent diabetes) (Lubchenco, 1976).

2) Maternal nutrition (weight gain of more than 20 pounds from the time of the first prenatal visit to the time of delivery) (Antonov, 1947; Smith, 1947; Naeye, 1973).

3) Maternal age (less than 16 years of age or greater than 40 years of age)(Lubchenco, 1976; Jones, 1977).

4) Toxemia (any two or more of the following: proteinuria 3+ or above, blood pressure increase of 20 mmHg systolic or 10 mmHg diastolic or both during pregnancy, 3+ pitting edema, or a weight gain of 3-5 pounds in 7 days) (Lubchenco, 1976).

5) Smoking (one-half pack of cigarettes or less a day) (Frazier, et al., 1961; Yerushaly, 1964 & 1971).

6) Maternal addiction: heroin (Naeye, 1973; Rothstein & Gould, 1974), and alcohol (more than 2 oz. daily) (Jones, et al., 1973; Jones, et al., 1973; Hanson, et al., 1976).

7) Maternal infections (Pritchard, 1976).

8) Anemia (Hemoglobin below 12.0 g/100 or a hematocrit below 32 g/100) (Pritchard, 1976).

9) Placental anomalies (Pritchard, 1976).

Most methods of placental localization are complicated, costly, and not without some disadvantages for the mother or

fetus. The most precise method of placental location during the third trimester is provided by sonography. Pritchard (1976) states that the placenta can be accurately located by sonography 95% of the time. There is some disagreement in the literature as to the safety of sonography during pregnancy. Abdulla, et al. (1971) compared chromosomal aberrations in maternal and fetal blood cultures between women exposed to ultrasound and those not exposed, before termination of pregnancy by hysterotomy. They found no difference between exposed and control groups. Lyon (1974), after exposing rats to different frequencies of ultrasound and x-ray, found that only those rats exposed to x-ray were unable to produce young. Thacker (1975) observed changes in the DNA molecule of yeast after exposure to ultrasound. Shoji, et al. (1975) studied the effects of low frequency ultrasound on mice at eight days of gestation and found a marked increase of malformations between irradiated fetuses and the untreated controls. Pizzarello, et al. (1975) amputated the forelimbs of adult mewts. The left limb was exposed to ultrasound while the right limb was left unexposed. Regeneration of both forelimbs were compared and found to be generally slower in the ultrasonicated limbs. Roseboro, et al. (1978) subjected suspensions of human peripheral blood and HeLa Cells to varying power levels of ultrasound for one minute. They found no significant difference in the frequency of chromosomal aberration between subjected and control cells. In addition to being a costly

procedure, doubt exists whether sonography is a safe method of locating the placenta when a fetus is to be considered.

Pritchard (1976) mentioned several radiologic techniques used to localize the placenta. They include (1) soft-tissue x-rays, (2) intravenous injection of radioactive isotopes to locate the area of maximum radioactivity, (3) contrast media injected into the amnionic sac, and (4) retrograde arteriography. These techniques are not without their hazards to both the mother and fetus. Soft-tissue x-ray exposes the mother and fetus to radiation and gives a correct diagnosis of placental implantation site in only eighty-five percent of the cases. Pritchard (1976) and Edelstone (1977) have reported that radioactive isotopes are highly accurate in locating the placenta, but it is not always easy to differentiate between anteriorly and posteriorly located placentas. Pritchard (1976) states that with amniography the placenta may be punctured during amniocentesis, causing fatal hemorrhage; in addition, the hypertonic contrast medium may cause premature labor. Arteriography has the disadvantage of requiring an injection of a bolus of contrast material into the maternal femoral artery. All three of the above methods have the additional danger of exposing the mother and fetus to ionizing radiation (Edelstone, 1977).

Hunt (1969), Hakim (1970), and Nelson and Parkes (1974) have described the Doppler as a simple, inexpensive, and accurate method of locating the placenta before delivery. Hunt (1969) used the Doppler for placental location in 118

patients; of these, fifty-six cases were confirmed with palpation of the placenta at the time of Cesarean delivery with one error in placental localization. Hakim (1970), using many of the same techniques as Hunt, compared the accuracy of the Doppler with that of radioactive carbon monoxide and the Gamma Camera and found the Doppler to have the same accuracy as the Gamma Camera for localization of the placenta (90-95 percent accuracy). Nelson and Parkes (1974), using the Doppler to locate placenta previas, found that the technique correctly diagnosed them in only seventy-nine percent of the cases.

This technique, which is now used extensively during labor for monitoring the fetal heart tones, is without any known hazards to the mother or fetus. For the previously stated reasons, the Doppler was used in this study to locate the placenta.

Nelson and Parkes (1974) and Pritchard (1976) have reported that the following sounds can be auscultated over the abdomen during the third trimester of pregnancy. They are:

1) the fetal heart.

2) the placenta.

   a. The funic souffle (a high-pitched sound synchronous with the fetal heart, similar to the crack of a whip). This sound represents the blood flow in the umbilical cord.

   b. The uterine souffle (a low-pitched continuous background murmur as wind blowing through trees). This sound represents the blood flow through the intervillous spaces.

3) the uterine arterial blood flow (high-pitched murmurs in the lower lateral uterine area synchronous with the maternal pulse).

4) the abdominal aorta (low-pitched, corresponding to the maternal pulse rate).

5) fetal movements.

Hypothesis

The hypothesis for this study is three-fold: 1) there is a positive relationship between low birth weight for gestational age and placental location in the lower segment of the uterine body, 2) a positive relationship exists between low birth weight for gestational age and a placenta located in the fundus of the uterus, and 3) the Doppler has a 90-95% accuracy in locating the placenta before delivery. For statistical purposes, the hypotheses will be stated in the null form.

HO_1: No relationship can be found between infants who have low birth weight for gestational age and location of the placenta in the lower segment of the uterine body.

HO_2: No relationship can be found between infants who have low birth weight for gestational age and location of the placenta in the fundus of the uterus.

HO_3: The Doppler is not an accurate instrument at the 90-95% level for location of the placenta before delivery.

CHAPTER II

METHODOLOGY

The purpose of this study was to determine whether or not a relationship exists between the uterine placental site and the birth weight of infants delivered from a low risk population and to establish the Doppler as a reliable instrument for placental localization before delivery.

Sample

The sample was limited to Caucasian primiparous and multiparous subjects who were delivering a full-term infant (38-42 weeks gestation) by elective Cesarean section. Further consideration for inclusion in the sample was a pregnancy without major medical complications for the mother and/or fetus. This limitation was set in an attempt to eliminate any influences which might result in an infant with either a high or low birth weight for gestational age.

A major private hospital in Salt Lake County was utilized for data collection. It provided an adequate population (350 deliveries; 30 elective Cesarean sections/month) of white women and their infants who had been identified as being at low-risk for major medical complications. All the women admitted to the hospital during the time of data

collection for delivery of a term infant by elective Cesarean section were approached for inclusion in the study.

Measures

Subjects were examined for location of the placenta with the hand held Hewlett-Packard Doppler, Model 8026-B. With the subject in the supine position, the entire abdomen was coated with mineral oil to secure acoustic coupling and the transducer was applied to the skin surface. Placental sounds were auscultated while the transducer was systemically scanned over the anterior and lateral aspects of the abdomen overlying the uterus from the fundus to the symphysis pubis. The area over which the placental sounds can be heard was mapped. There was little difficulty in locating a placenta on the anterior wall of the uterus. A posterior placenta could be heard through the anterior wall, but with a diminished intensity in sound. However, if the edge of the placenta was identified toward the fundus or laterally, it was assumed that the main bulk of the placenta was on the posterior wall (Hunt, 1969). In addition to locating the placenta on the anterior or posterior uterine wall, a distinction was made between a fundal placenta, a placenta in the upper uterine segment, and a placenta in the lower uterine segment (See Figure 2). The precise location of the placenta according to uterine segment and wall was recorded.

To ensure the reliability of the investigator in using the Doppler as a research tool and the accuracy of the

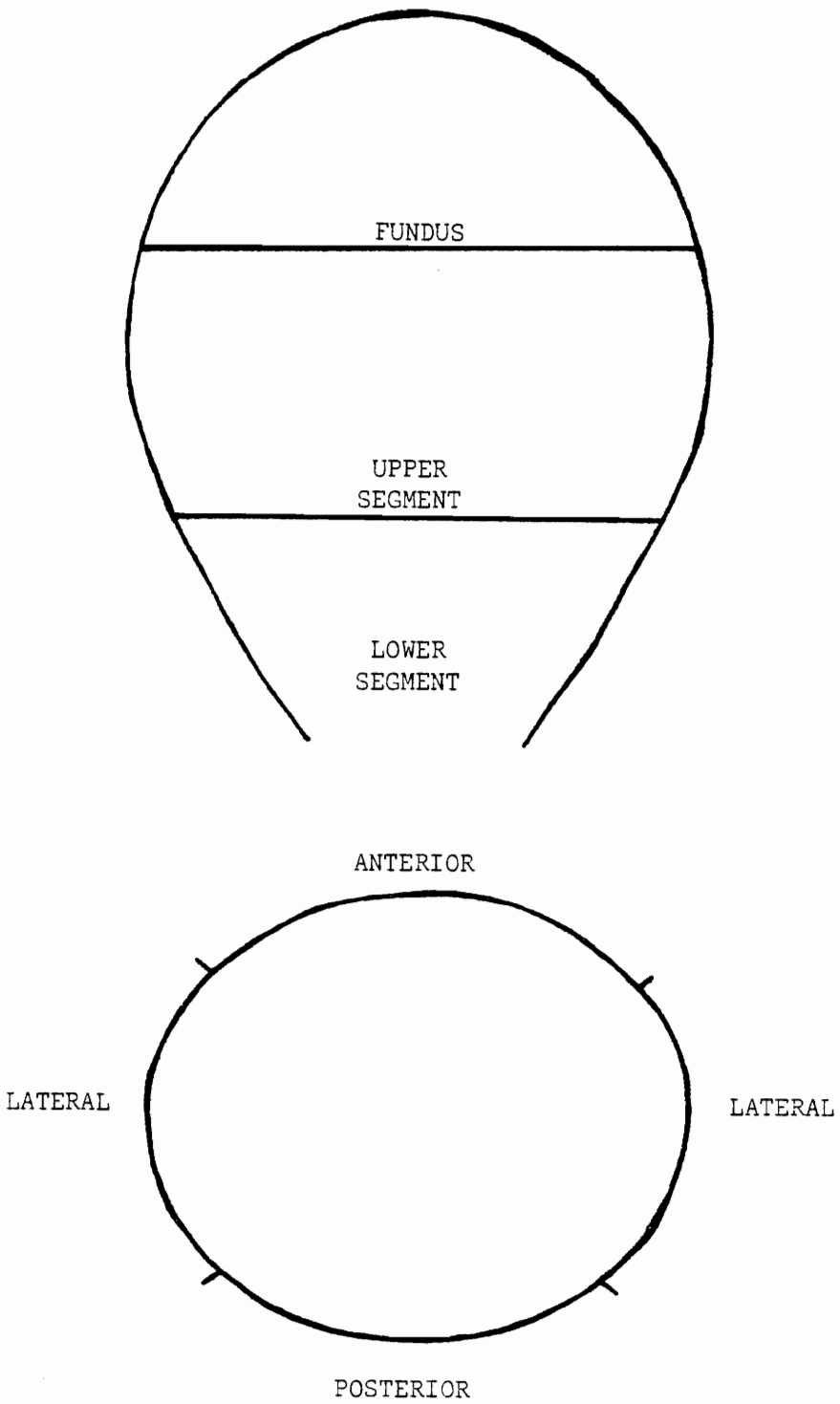

Figure 2. Site of Placental Attachment

Doppler in locating the placenta, two measures were undertaken. First, the investigator examined 10 women between 30 to 36 weeks gestation with the Doppler. These women had been previously examined by sonography at a major hospital in Salt Lake County for various obstetrical complications. The location of the placenta was indicated on the radiology report. The results from the Doppler examination were then compared with the radiology report for accuracy of the investigator in locating the placenta. Second, the exact location of placenta was reported to the investigator at the time of delivery following manual removal of the placenta by the physician. Again, a comparison was made between the location of the placenta by the Doppler method and the location of the placenta by manual removal.

The placentas were all examined and weighed soon after delivery to avoid any errors due to drying. The membranes were not stripped off but the umbilical cord was cut at five centimeters from the attachment. At the time of delivery, the placenta was drained of any excess blood before weighing. The placental mass was obtained by simple weighing of the placenta.

Aherne (1966), Chakravorty (1967), Hervane (1971), and Chung and Park (1974) have established a positive correlation between placental weight and the weight of the fetus at birth. It is very difficult to test the functional capacity of the placenta and, for this reason, anatomic studies to determine the normal relationship between the placenta

and newborn have been regarded as important. By considering the functional capacity of the placenta in this study, additional information was available for identifying those infants who had larger or smaller birth weights for their gestational age.

All infants were weighed on admission to the nursery. The occipital frontal circumference (OFC) and length were determined 24 to 36 hours after delivery at the time of the Dubowitz assessment. The birth weight was determined by the nursery staff. To establish reliability, all linear measurements and assessments were made by the investigator.

The initial birth weight, length, and OFC was plotted on the Combined Intrauterine-Neonatal Growth Chart for height, weight, and OFC (Lubchenco, 1972). This graph is a widely used tool in determining which infants are large, average, or small for gestational age.

Dubowitz (1970) and Lubchenco (1972) have shown that the gestational age of infants calculated from the last menstrual period is an inaccurate index. All infants were assessed for gestational age by the combined Dubowitz Neurological and External Scale for Gestational Age (Dubowitz, 1970).

Procedure

Daily hospital rounds were made to determine whether any elective Cesarean sections were to be performed within the next 24 hours. If a Cesarean section was scheduled,

the investigator was available one hour before all deliveries to meet personally with the expectant mother and her physician. Many of the subjects were admitted to the obstetrical unit the night before their scheduled Cesarean section. In this case, contact was made at that time.

The study was introduced verbally to the potential subjects with participation invited. Those mothers willing to join the study were given a written explanation of the research and a written consent was obtained from each participant for Doppler location of the placenta and for measurement and examination of the infant 24 to 36 hours after birth. A brief medical and obstetrical history was taken. Placental location by Doppler was then carried out on all participating subjects.

The investigator was present at all deliveries for examination and measurement of the placenta. On examination of the placenta, any gross abnormalities were noted. The placenta was weighed and its actual location was obtained by verbal communication with the physician.

The infant's birth weight was acquired from the nursery admission record and the length, OFC, and Dubowitz assessment were determined by the investigator 24 to 36 hours post delivery.

CHAPTER III

RESULTS AND DISCUSSION

The data were statistically analyzed by the Univac 1108 computer at the University of Utah Computer Center (UU/CC). The Statistical Package for the Social Science (SPSS) was used for tabulation of frequencies and Pearson Product Moment Correlation.

Sample

The sample consisted of 26 women and 23 infants. The average age of the subjects was 28, with a range of 16 to 39 years. The mean gravida was 3, with a range of 1 to 7. Three women did not meet the criteria for inclusion as subjects who were being studied for relationship between placental site and infant's birth weight but were considered in the statistical analysis for validation of the Doppler as an accurate instrument for placental location. One woman was a Class C diabetic, one was from an ethnic background other than Caucasian, and the third had a bicornuate uterus, which interfered with determining the exact placental site on manual removal and blood flow to the uterus.

In a review of the maternal complications that might influence birth weight, the following findings may be of interest: one woman had a weight gain of 8 and one gained

19 pounds, while two women lost weight, one 5 and one 42 pounds. The infants of these four women had birth weights above the mean weight (3326 grams) with birth weights of 3400, 3425, 3400, and 3575 grams respectively. The infants were within the 50th percentile on Lubchenco's Combined Intrauterine-Neonatal Growth Chart for Height, Weight, and OFC and, for these reasons, were included in the study. The average weight gain of the 26 women was 28 pounds. Three women smoked five to ten cigarettes per day. Three women consumed alcoholic beverages, but in quantities of less than 2 oz. per day. All 26 subjects indicated they had had some type of infection during their pregnancy. These infections consisted of colds, sore throats, flu symptoms, two vaginal yeast infections, and an abscessed tooth. All subjects' hematocrits and hemoglobins were within the preset limits. There were no subjects with toxemia.

Twenty-one of the infants were average for gestational age (AGA) in weight, length, and OFC. One infant was large for gestational age (LGA) on all three measurements. There were no factors in the maternal history to indicate an LGA infant, other than that a previous infant had been LGA. One infant was small for gestational age (SGA) but the placenta had a velamentous insertion of the cord and weighed 240 grams. The average placental weight recorded was 560 grams. Only the 21 infants that were average for gestational age were considered for statistical analysis. The SGA and LGA infants were excluded so that the statistical

results would be an accurate representation of the sample. The mean gestational age since the last menstrual period was 39 with a range of 37-43 weeks and, for Dubowitz assessment, was 38 ranging from 38 to 42 weeks.

Results

There was no significant relationship between placental site, segment or wall and infant birth weight. However, a significant correlation was found between placental site and birth length (significance = .054 and .027). There was a negative correlation between gestational age by Dubowitz assessment with a placenta site in the fundus on the anterior or posterior wall (significance = -.001), but a positive correlation existed when the placenta was in the fundus or upper uterine segment and on the posterior wall (significance = .017). Gravida correlated negatively with placental site when the placenta was on the posterior wall and in any one of the three segments (significance = .070). (See Table 1.) The positive correlation between placental site and gestational age was quite evident when considering that lower segment placental sites and early separation result in premature labor and delivery. There was no obvious indication for the positive relationship between placental site and birth length. The first null hypothesis was accepted since neither of the two infants with lower uterine segment placental sites were SGA and birth weight failed to correlate significantly with placental sites.

TABLE 1

Correlation Matrix Between Placental Site and Gravida, Months Since Last Pregnancy, Gestational Age on Dubowitz Assessment, Placental Weight, Birth Weight, Birth Length, and Birth Occipital Frontal Circumference. (N = 21)

Placental Site	Fundal Anterior/Posterior		Upper Uterine Segment Anterior/Posterior		Lower Uterine Segment Anterior/Posterior		Anterior Fundal Upper Uterine Segment/ Lower Uterine Segment		Posterior Fundal Upper Uterine Segment/ Lower Uterine Segment	
	Pearson r	Sig	Pearson r	Sig	Pearson r	Sig	Pearson r	Sig	Pearson r	Sig
Gravida	-.0460	.453	.0801	.413	0	---	-.2554	.212	-.5330	.070***
Months Since Last Pregnancy	.3051	.231	.2955	.220	0	---	.3072	.194	-.1462	.354
Gestational Age on Dubowitz Assessment	-.8637	.001*	.0119	.487	0	---	-.2598	.207	.7047	.017****
Placental Weight	-.4514	.111	-.0114	.488	0	---	-.0813	.406	.2567	.252
Birth Weight	-.2354	.271	.0523	.443	0	---	-.2202	.246	-.0033	.497
Birth Length	.5707	.054**	.2198	.271	0	---	.1518	.319	-.6576	.027*****
Birth OFC	.1836	.318	.1110	.380	0	---	-.0253	.469	-.2040	.299

* .001
** .054
*** .070
**** .017
***** .027

Table 2 illustrates a comparison between the mean values of the 21 infants studied. Each placental site (segment and wall) was compared with maternal gravida and months since last pregnancy, gestational age on Dubowitz assessment, placental weight, birth weight, length, and OFC. The posterior lower uterine segment was not represented in Table 2 since there was not a placenta located in this position. Two trends were apparent. In the population studied, the greatest birth weight for placental site was associated with an anterior/posterior fundal segment implantation and the next trend in birth weight was with a placental site in the upper uterine segment, anterior/posterior wall. The evidence fails to support the idea presented in the literature review that the infant's birth weight will be larger when the placental site is in the upper uterine segment on the anterior or posterior wall. Therefore, the second null hypothesis was accepted.

The accuracy of the Doppler in predicting the location of the placenta before delivery is indicated on Table 3. It was noted that there were varying percentages of accuracy in predicting placental location, depending on the uterine segment and wall. There were two possible explanations: (1) the inexperience of the investigator in using the instrument and, (2) the small sample size ($\underline{N}$ = 16). Not all 26 subjects were scanned with the Doppler before delivery since the instrument was only available to the investigator during the first three weeks of data collection. The third

TABLE 2

Mean Values of Factors Related to Placental Site and Gravida, Months Since Last Pregnancy, Gestational Age on Dubowitz Assessment, Placental Weight/Grams, Birth Weight/Grams, Birth Length/Centimeters, and Birth Occipital Frontal Circumference/Centimeters. (N = 21)

Placental Site	Anterior/Posterior Fundal (N = 9)	Anterior/Posterior Upper Uterine Segment (N = 10)	Anterior Lower Uterine Segment (N = 2)
Gravida	4.3	2.6	3
Months Since Last Pregnancy	28	36	40.7
Gestational Age on Dubowitz Assessment	39	39	40
Placental Weight/Grams	560	580	560
Birth Weight/Grams	3,438	3,335	3,255
Birth Length/ Centimeters	57.6	51	52.5
Birth OFC/Centimeters	35	35	34

TABLE 3

Percent of Accuracy in Predicting Placental Site Before Delivery with Doppler. (N = 16)

Placental Site	Predicted With Doppler	Observed With Manual Removal	Percent Accuracy
Anterior Fundal	4	4	100
Anterior Upper Uterine Segment	6	2	30
Anterior Lower Uterine Segment	0	1	0
Posterior Fundal	1	2	50
Posterior Upper Uterine Segment	5	7	70
Posterior Lower Uterine Segment	---	---	---

null hypothesis was rejected when localizing the placenta in the anterior fundal position (accuracy 100%) but must be accepted when the placenta is located in the upper or lower uterine segment on the anterior or posterior wall.

CHAPTER IV

SUMMARY AND RECOMMENDATIONS

This study was conducted to establish a relationship between the placental site and birth weight of the infant from a low-risk population and to verify the accuracy of the Doppler in localizing the placenta before delivery.

The sample consisted of 26 mothers from a low-risk population who delivered a full term infant by Cesarean section. Twenty-one of their infants were included in the study.

Frequencies of all the data were obtained. A Pearson Product Moment Correlation was generated to establish the relationship between placental site, maternal gravida and months since last pregnancy, gestational age on Dubowitz assessment, placental weight, birth weight, length, and OFC. On comparing the frequencies of placental site with birth weight, a relationship was not noted at a significant level. Birth length and gestational age were significantly related to placental sites in the fundus and upper uterine segment on the anterior or posterior wall. The positive correlation between gestational age and placental site would indicate that placentas implanted in the fundus or upper uterine segment are less apt to result in early separation and premature delivery of the infant than placentas implanted in the

lower uterine segment. Had a significant relationship been established between placental site and birth weight, the perinatal nurse would have access to additional information concerning those infants who were at higher risk because of low birth weight.

The Doppler produced various percentages of accuracy in localization of the placenta before delivery. There was a 100% accuracy in localizing placentas in the fundal anterior portion of the uterus. Nevertheless, when the placenta was located in the upper or lower uterine segment or on the posterior wall, accuracy dropped markedly. As pregnancy progresses, the blood flow to the uterus increases so that in the term uterus there is an immense uterine blood flow. As a result, it was difficult to distinguish between the placental souffle from implantations in the upper and lower segments versus the turbulance of the uterine blood flow. The relatively large size of the infant in relationship to the placenta in a term pregnancy may contribute to the difficulty in localizing the placenta on the posterior wall.

The Doppler could become a valuable and inexpensive instrument to the perinatal nurse and/or nurse midwife in localizing the placenta before delivery. It would be instrumental, with documentation and adequate practice, in diagnosing a lower uterine segment placental site when bleeding occurs during pregnancy. The Doppler is appropriate for use both in the clinic or area isolated from a major medical facility.

Recommendations for further studies in this field are:

1) replication of this study in a high-risk maternal population.

2) continuation of this study to establish a significant relationship between placental site and birth weight on an adequate sample size.

3) further investigation into the accuracy of the Doppler as a valuable instrument for placental localization before delivery.

4) determination of the gestational stage at which the Doppler is most accurate in localizing the placenta.

5) replication of this study in populations with different ethnic backgrounds.

APPENDIX A

MATERNAL INFORMATION SHEET

I.D. No._____

Maternal:

Age_____ Parity_____ Gravida_____

Time since last pregnancy_____months.

Time since last abortion_____months.

Gestational age (by dates)_____weeks.

Smoking: Yes_____No_____Less than one pkg/day_____

One pkg/day_____Two pkgs/day_____

More than two pkgs/day_____

Drinking: Yes_____No_____Number of drinks/day_____

Beer_____Wine_____

Diabetes: Yes_____No_____Fasting blood sugar_____

Insulin_____

Maternal infections: Yes_____No_____

Type of infection(s)_____

Organism_____Frequency_____

Toxemia: Yes_____No_____Proteinuria_____

Blood pressure_____

Weight gain_____pounds

Edema_____

Maternal drugs: Yes_____No_____

Drug(s)_____Frequency_____

Anemia: Yes_____No_____Hct_____Hb_____

Weight gain_____pounds

Other_____

_____

_____

APPENDIX B

INFANT INFORMATION SHEET

I.D. No._____

Infant:

Sex: Male_____ Female_____

Apgar Score: One minute_____ Five minutes_____

Birth weight_____grams

Birth length_____cms

Birth OFC_____cms

Dubowitz score_____weeks

Size for gestational age: SGA_____ AGA_____ LGA_____

Placenta weight_____grams

Placenta: Normal_____ Abnormal_____

Anomaly/Anomalies_____

Other_____

_____

_____

_____

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