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Original Research Article

A STUDY ON MORPHOLOGY OF PLACENTA WITH VARIOUS PARAMETRES

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Abstract

Introduction: The intrauterine existence of fetus is dependent on one vital organ "THE PLACENTA". Placenta is a vital organ for maintaining pregnancy & promoting normal foetal development

Materials and Methods: The present study was conducted in the department of Anatomy, Sri Venkatasai Medical College, Mahabubnagar in collaboration with the Department of Obstetrics and Gynecology.

Results: Various observations on gross appearance of human placentae were recorded in specially designed data sheets (annexure) and analysed. The study is done in 50 placentae for each of the above method. The observation made during the course of the present study with relevance to the shape of placentae, consistency, cord attachment, thickness and diameter, weight, fetoplacental weight ratio are tabulated in the foregoing pages for the sake of convenience and to gain an insight into the data.

Conclusion: In the current study 50 full term normal term placentae were collected from S.V.S Hospital, Mahaboobnagar and subjected for gross inspection and dissection with relevance to shape and consistency, cord insertion, thickness, diameter, weight Etc

Keywords: Placenta, Weight, Thickness.

Introduction

The intrauterine existence of fetus is dependent on one vital organ "THE PLACENTA". Placenta is a vital organ for maintaining pregnancy & promoting normal foetal development[1]. Placenta is a unique wonderful organ that arises denovo, directly related to the growth & development of fetus in utero. Being an organ of evoked vital importance for continuation of pregnancy & fetal nutrition it has great interest among the Pathologists & the obstetricians as well, and much work has been done to understand the 'Unique' biological status of this complex organ[2].The human placenta is discoid because of its shape, at term $4/5^{th}$ of Placenta is of fetal origin, which develops from chorion frondosum and one $1/5^{th}$ is of maternal origin, which develops from decidua basalis.It has foetal & maternal surfaces & peripheral margins[3].The placenta at term is a circular disc with a diameter component of 185mm & thickness of about 2.5cm at its center. Feels spongy & weight about 500gms. The proportion of the weight of placenta & baby is roughly 1:6 at term. It occupies about 30% of uterine wall[3].The fetal surface is covered by smooth & glistening amnion with the Umbilical cord attached at the center. Branches of the umbilical vessels are visible beneath the amnion as they radiate from the insertion of the cord[3].The maternal surface is finely granular, mapped into 15-30 convex polygonal areas called lobes or grooves by series of fissure called

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cotyledons. The maternal blood gives a dull red colour; numerous small greyish spots are seen due to depositions of calcium in the degenerated area and are of no clinical importance[4].Margins of the placenta are limited by the fused basal & chorionic plates and are continuous with the chorion and amnion[3]. The placenta is developed from two sources the principal component is fetal which develops from Chorion Frondosum and the maternal component consists of decidua basalis[3].The placental complex formed by the cooperative effort between the extra embryonic tissue of the embryo and the endometrial tissue of the mother, represents symbiosis between the two separate organisms without rejection. The formation of placenta is a biological event which is important both embryological and immunologically.A thorough examination of placenta is neglected and often under estimated by the Gynecologist, pediatrician and pathologist inspite of its valuable role in the fetal development. The examination of placenta soon after the delivery is very vital as it gives mirror images of fetal development. It forms the morphological record of anatomical condition, intrauterine events and intrapartum events of gestation. In the case of foetal deaths the examination of placenta is mandatory and examination of placenta yields valuable information for the management of mother and baby. Ultrasonographic examination of placenta is an important part of obstetrical evaluation of pregnancy. With advent of ultrasonography antenatal evaluation of placenta has become essential and neonatal outcome depends upon status, growth and abnormalities of placenta. With ultrasonography the obstetrician can quite clearly visualize and locate the placenta repetitively and presumptively with completesafety throughout the gestation.

MATERIALS AND METHODS

The present study was conducted in the department of Anatomy, Sri Venkatasai Medical College, Mahabubnagar in collaboration with the Department of Obstetrics and Gynecology. A total number of 50 normal full term placentae with 5cms length of umbilical cord were collected from the Sri Venkatasai Hospital and relevant medical histories of the mother were noted from the data available in the Hospital records. The specimens were brought to the Department of Anatomy S.V.S.Medical College and washed under running tap water to remove the blood clots and blotted with absorbable cloth to make them dry.

The following data was recorded.

- Shape
- Consistency.
- Cord attachment.
- Thickness of placenta is measured by inserting the fine needle through and measured up to nearest millimeters.
- Weight measured up to nearest grams with weighing machine.
- Diameter of the placenta is measured by taking as average of the diameter in three various plangs with measuring tape.
- By dissection method the number of fetal cotyledons–are counted.
- Feto placental weight ratios are recorded

Results

Various observations on gross appearance of human placentae were recorded in specially designed data sheets (annexure) and analysed. The study is done in 50 placentae for each of the above method.The observation made during the course of the present study with relevance to the shape of placentae, consistency, cord attachment, thickness and diameter, weight, fetoplacental weight ratio are tabulated in the foregoing pages for the sake of

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convenience and to gain an insight into the data.

Shape and Consistency of Placenta

In all the 50 placentae the shape is discoid, soft and friable in consistency

Table 1: Shape of The Placenta

Shape	No of placentae	Percentage
Round	32	64%
Oval	16	32%
Bilobed	1	2%
Succenturiata	1	2%

Out of 50 placentae, round shape is observed in 64% cases, oval shape is observed in 32% cases, placenta succenturiata in one case and incomplete bilobed in one case.

Table 2: Mode of Cord Insertion

Types of attachment	**No. of placentae**	**Percentage**
Central attachment	20	40%
Eccentric insertion	16	32%
Marginal insertion	13	26%
Velamentous insertion	1	2%

The incidence of insertion of cord is shown in the above table. Out of 50 placentae central attachment is observed in 40% of cases, eccentric attachment in 32%, marginal attachments in 26% and velamentous attachment is seen in one case.

Table 3: Thickness of the Placentae

Thickness in (cms)	**No. of Placenta**	**Percentage**
1.9	3	6%
2.1	2	4%
2.3	1	2%
2.4	3	6%
2.5	5	10%
2.6	7	14%
2.8	9	18%
3.2	12	24%
3.4	2	4%
3.5	5	10%
3.8	1	2%
TOTAL	50	100%

Out of the 50 Normal placentas the thickness varied from 1.9 to 3.8 cms as shown in the table.3.2 cm of thickness of placenta is observed in 24% of cases, 2.8 cm in 18% of cases, 2.6 cm in 14% of cases and 3.5 cm in 10% of cases.

Table 4: Diameter :f Placentae

Diameter (cm)	**No. of Placenta**	**Percentage**		**Diameter (cm)**	**No. of Placenta**	**Percentage**
14.2	1	2%		18	1	2%
14.8	1	2%		18.1	1	2%

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15.2	1	2%	18.2	6	12%
15.8	1	2%	18.5	1	2%
16.2	6	12%	18.8	3	6%
16.6	1	2%	19.2	2	4%
16.8	3	6%	19.5	3	6%
16.9	1	2%	19.8	1	2%
17.1	2	4%	20.2	2	4%
17.2	8	16%	20.5	1	2%
17.4	1	2%	21	1	2%
17.8	2	4%	**Total**	**50**	**100%**

Out of 50 normal placentae the diameter observed varied from 14.2-21 cm. Diameter observed is 16.2 cm in 12% of cases, 17.2cm in 16% of cases, 18.2 cm in 12% of cases and 18.5-20.5 cm in 26% of cases.The maximum diameter of 21cm is recorded in 2% of cases.

Table 5: Weight of Placentae

Weight in grams	No. of Placenta	Percentage	Weight ingrams	No. of Placenta	Percentage
331	1	2%	476	2	4%
352	2	4%	478	1	2%
383	1	2%	482	1	2%
412	1	2%	483	1	2%
423	1	2%	488	1	2%
424	1	2%	489	1	2%
428	1	2%	490	2	4%
432	1	2%	495	1	2%
434	1	2%	500	1	2%
440	1	2%	501	1	2%
451	1	2%	502	1	2%
452	3	6%	503	2	4%
453	4	8%	504	1	2%
456	1	2%	507	1	2%
458	2	4%	511	1	2%
462	1	2%	512	1	2%
466	1	2%	523	2	4%
470	1	2%	534	1	2%
475	2	4%	Total	50	100%

Out of 50 cases the weight of the placenta observed ranged between 331 to 534 gms. The weight of 453 gms observed in 8% of cases and 452 gms in 6% of cases and maximum weight of 523 gms in 4% of cases.. The maximum weight of 534gms in 2% of cases. The least weight of 331gms is recorded in 2

Table 6: Feto Placental Weight Ratio

Weight of the Foetus Gms	Weight of placenta Gms	F:P Ratio	Weight of the Foetus Gms	Weight of placenta Gms	F:P Ratio
2100	462	4.5	2900	530	5.40

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3400	485	7.00		2700	504	5.35
3300	443	7.44		2600	440	5.90
2600	435	5.90		2500	462	5.41
3200	510	6.20		2450	510	4.80
3600	455	7.90		2700	489	5.52
2600	453	7.73		2740	460	5.90
2600	458	5.67		3400	489	6.95
2700	488	5.64		3550	510	6.96
2850	468	6.04		2700	502	5.37
2600	510	5.09		2800	450	6.22
2950	420	7.02		1600	383	3.97
2500	432	5.78		2400	452	5.30
2500	331	7.78		2500	523	4.78
3400	564	6.02		3500	505	6.93
2650	445	5.95		2400	342	7.01
3500	458	7.64		3000	453	6.62
3100	451	6.87		2800	511	5.47
3000	523	5.73		2400	452	5.30
2800	414	6.76		3200	465	6.88
3000	434	6.91		3500	470	7.44
2900	476	6.09		3000	456	6.57
3700	480	7.70		2600	440	5.90
3500	483	7.24		3600	460	7.82
2500	476	5.25		3450	510	6.76

Table 7: Placental Cotyledon

sl no	**No. of maternal cotyledons**	**No. of foetal cotyledons**	**M:F Ratio**		**Sl no**	**No. of maternal cotyledons**	**No. of foetal cotyledons**	**M:F Ratio**
1	20	63	3.26		26	17	57	3.11
2	19	41	2.22		27	16	52	3.25
3	17	57	3.11		28	12	49	4
4	17	69	3.77		29	14	52	3.71
5	18	62	3.44		30	19	79	4.44
6	18	64	3.55		31	18	55	3.05
7	18	55	3.17		32	18	71	3.94
8	16	56	3.5		33	19	79	4.66

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9	18	68	3.77		34	16	50	3.12
10	18	50	3		35	15	53	3.71
11	21	61	3.2		36	15	37	2.57
12	20	71	3.55		37	18	46	2.36
13	15	42	2.8		38	17	62	3.64
14	16	53	3.46		39	15	42	2.8
15	18	62	3.49		40	13	35	2.57
16	19	61	3.44		41	14	51	3.64
17	15	48	3.2		42	14	64	4.57
18	15	62	3.81		43	16	40	2.6
19	15	58	3.86		44	15	65	4
20	18	54	3		45	17	62	3.64
21	19	55	3.11		46	15	45	3
22	15	60	4		47	15	68	4.53
23	16	51	3.18		48	20	56	2.8
24	18	58	3.22		49	18	80	4.55
25	19	71	4		50	19	77	4.33

Out of 50 cases no. of maternal cotyledons observed ranged between 12 to 21 and foetal cotyledons 35 to 80. The ratio of maternal and foetal cotyledons ranged between 2.22 - 4.66. The highest incidence of 1:3.2 is observed in 14% of cases.

Discussion

The present study has been taken up to know the normal and the associated variations of placentae. The present study is made in the respect of shape and consistency, attachment of the cord, diameter and thickness, placental weight, fetoplacental weight ratios, vessels in the umbilical cord, the pattern of the maternal and fetal cotyledons, and vascular pattern of the placenta. Benirschke 1981, observed that "physicians are generally uncomfortable with the task of examining the placenta", yet it is a task they should willingly undertake. The results are often helpful in caring for the neonate and the findings provide a record for the pediatrician and obstetrician who can use this to plan for the future care for the mother and child.

Shape and Consistency

Regarding the shape and consistency of the placenta all are discoid in shape and they are soft and friable in consistency.According to Fox[5]. H 1978 abnormal shapes of the placenta are placenta lobata in which the division is incomplete. According to Moore Persaud[6] 1996 the shape of persistent area of chorionic villi determines the shape of the placenta and usually it is a circular area giving discoid shape to the placenta. According to Benirschke & Kaufmann[7] 2000 in the case of placenta succenturiata one or more lobes are present with the incidence 5%. According to them fenestrated placenta is a rare anomaly, extrachorial placenta incidence is5.3% in 13,500 and the incidence of ring shaped placenta is one in 6000.

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In the present study one case is placenta succenturiata and one case is bilobed, the division is incomplete. Cord attachment

In the present study the normal and the associated anomalies with relevance to the attachment of the umbilical cord are central, eccentric, marginal and velamentous. Out of 50 placentae 20 are central, 16 are eccentric, 13 are marginal and one is velamentous insertion (Table-2). According to Shannon 1970 velamentous type is common in infants weighing less than 2500 gms. Wynn[8] 1974 Woods Maligh 1978 have studied 940 placentae and found no correlation between the birth weight and site of cord insertion in normal term infants. According to Heifitz[9] S.A., 1996 the incidence of central attachment in 90% of cases, Marginal 8.7% of cases and 1.2% of velamentous type. According to Benirschke & Kaufmann 2000 reported 7% incidence of marginal insertion of the cord and also revealed that the incidence of velamentous insertion as 1.1% in the review of 1,95,000 cases of singleton deliveries. According to them the incidence of velamentous insertion of the cord is more frequent with twins and almost the rule with triplets. In the present study the average placental thickness is around 25mm (Table-3). In 24% cases thickness of the placentae is 3.2cm and in 18% of cases 2.8cm, 14% of cases 2.6cm and 3.5cm of 10% of cases. In the present the average diameter ranged between 17.2 to 19.5cms, in eight cases (16%) the diameter observed is 17.2cm and the maximum diameter of 21 cm is observed in 2% of cases (Table-4). According to the Boyd & Wynn1974 and Aplin 1989 the diameter ranged from 60 mm at 3rd month to 180 mm at full term and they also stated that there is an accompanying increase in the placental weight. Benirschke & Kaufmann[7] 1990 stated that the placenta increase in surface area and thickness with accompanying size and length. The diameter and thickness of placenta narrated by various authors in review of literature. According to Wilfred[10] M et.al. (1967) the placenta reaches nearly its maximum diameter during the 1st half of the pregnancy and continues to increase in thickness throughout most of the gestational period as a result of the growth of the villi.

Weight of the placentae (Table-5)

The placental weight according to various authors

Name of the author	**Year**	**Placental weight (gms)**
Benirschke	1961	425-550
Williams et al	1969	500
Boyd JD	1970	450-600
Hamilton & Boyd	1970	508
Fox H	1978	323-550
Asha V Kher et al	1981	425
Bhatnagar et.al	1983	500
Kaplan CG	1996	350-750
Tewari et.al	1997	310-510
In present study	2004	325-523

The present study coincides with the studies of Fox H et.al. 1978, Kalpana[11]C G et.al. 1996 and Tewari[12] et.al. 1997. The other studies showed wide variations. Thomson et. al. 1969 stated that if membranes and cord are attached and adherent blood clot is not removed, the weight may be increased by nearly 50% and hence wide variation have been observed

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Placental and Fetal Weight Ratio

The range of the placental and fetal weight ratio ranged from 1:5-1:7.7(Table-6). According to Molteni R. A., 1979 and Bonds[13] et al 1984 the incidence of perinatal problems increased in those infants whose placental and fetal weight ratio was greater than 1:11. Benirschke & Kaufmann[7] P 1990 the placental and fetal weight ratio was 1:5.9 -1:7.23. According to A.K.Datta[14] (2000) in full term the ratio will be 1:7.

Maternal and Foetal Cotyledons

In the present study the number of maternal cotyledons ranged from 12–21. Fetal Cotyledons are 35–80. The ratio is 1:3.45 (Table-7). According to Crowford 1959 the total number of cotyledons remains the same throughout gestation. According to various authors the maternal cotyledon number is variable. According to, Arey (1956), Williams et.al. (1964) Bhatnagar et.al.1983 the number is 15-20 and according to Boyd and Hamilton 1970 the number is 10–38. According to Grays[15] Anatomy (2005), the number of maternal cotyledons is 15–30.

Vascular Pattern

In the present study all the 50 placentae exhibited disperse type of vascular pattern. Bascich & Smout 1938 stated that the human placenta shows two types of vascular patterns. Disperse type and Magistral type. In the disperse type the calibre of umbilical artery diminishes and in magistral type this artery gives of small side arteries and almost reach the placental margin with reduction in their size. According to A.K.Datta (2000), in disperse type the umbilical artery divide in dichotomous manner and undergo successive reduction in calibre. In magistral type the artery maintain always the uniform calibre up to the periphery of the placenta and give off number of small side branches

Vessels in the Umbilical Cord

In the present study in the stump of umbilical cord there are two umbilical arteries and one umbilical vein in all the 50 placentae. Bernischke & Brown[16] 1955 stated that absence of one artery is associated with congenital anomalies of the fetus. Hamilton-Boyd, Mossman 1966 stated that only one artery in present in 1% of Umbilical cords. According to Benirschke & Driscoll[17] 1967, the percentage corresponds very closely with that recorded in the literature. According to Benischkes & Dodd's 1967, absence of one umbilical artery is seen in 0.85% of all cords in singleton and 5% of cords of atleast one twin. About 30% of all infants with one umbilical artery were associated with congenital anomalies. Bryan & Kohler[18] 1975 studied 20,000 infants and found that in 143 cases (0.72%) there is existence of a single umbilical artery. Fox .H 1978 observed that careful examination may disclose a venous remnant in 5% of cases. Blank & Byrne 1985 identified a single umbilical artery in 1.5% cases. According to Catanzarite 1995, an isolated single umbilical artery may be associated with adverse out come of pregnancy. They also have observed 46 infants with single umbilical artery and recorded 2 fetuses having lethal chromosomal abnormalities and occurrence of tracheo oesophageal fistula

Conclusion

In the current study 50 full term normal term placentae were collected from S.V.S Hospital, Mahaboobnagar and subjected for gross inspection and dissection with relevance to shape and consistency, cord insertion, thickness, diameter, weight, feto placental weight ratio, vascular pattern in the umbilical cord and foetal and maternal cotyledons.

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