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### Original article

## Morphology & Morphometric Anatomy of the Placenta

Mr. Praveen Kumar.Panuganti <sup>a</sup>, Dr.Ravindra Kumar.Boddeti <sup>b</sup>

<sup>a</sup>\*SVS Medical College, Mahaboob Nagar, Andhra Pradesh, India

<sup>b</sup>Management and Science University, Malaysia

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#### ABSTRACT

The handy information regarding placenta morphology and morphometry is useful for the academicians and medical practitioners to interpret the various fetal and maternal data. Present study on the normal morphological features of placenta with relevant to various parameters like, Shape, Attachment of the cord, Diameter and thickness, Consistency, Weight, Foetoplacental weight ratio, Vessels in the umbilical cord, Vascular pattern. The study was taken at Placenta Morphology and morphology measured under the following heading Gross anatomical observations on the specimens. A total number of 50 normal full term placentae with 5cms length of umbilical cord collected from the Dept. of Anatomy and OBG S V Medical College, Observed for the parameters like Shape, Consistency & Cord attachment, Thickness of placenta is measured by inserting the fine needle through and measured upto 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, Feto placental weight ratios are recorded and tabulated for analysis. In conclusions In the present study it is observed that the weight of the placenta ranged between 321-534gms. The parameters observed in this study and their data concurs with the previous authors. The vide variations mentioned by the various authors is reflected in the present study.

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#### 1.Introduction:

The biochemical and physical duet of the mother and the fetus in the formation of the placenta is one of the most carefully orchestrated phenomenons in the fetal development. It represents the cooperation of two distinct individuals to form a single structure that protects one and enables the genes of the other to live on. This Marvel is a miracle but an example of evolution at its finest. Placenta sub serves these purposes until sufficient maturation of the fetus which enables it to survive in the extrauterine environment. The growth of the foetus depends upon the functional capacity, location and integrity of the placental attachment.

The placenta is analogous to organs like liver, lung and kidney in function but not homologous with them in structure. A thorough examination of placenta is neglected and often under estimated by the physician gynecologist, pediatrician and pathologist inspite of

its invaluable role in the fetal development. The examination of placenta soon after the delivery is very vital as it gives mirror images of foetal 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 foetus. The handy information regarding placenta is useful for the surgeons which protects them from medico-legal problems in the event of maternal and foetal outcome.

#### 2. Material and Methods:

The present study was conducted in the department of Anatomy, Sri Venkateswara Medical College, Tirupati in collaboration with the Department of Obstetrics and Gynecology of Maternity hospital Tirupathi. The studies on placenta were conducted under the following heading "gross inspection method" A total number of 50 normal full term placentae with 5cms length of umbilical cord were collected from the Govt. Maternity hospital and relevant medical history of the mother were noted from the data available in the Hospital records. The specimens were brought to the Department of Anatomy S.V.Medical College and washed under

\* Corresponding Author : Mr.Praveen Kumar.Panuganti,  
Lecturer, Dept. of Anatomy, SVS Medical College,  
Mahaboob Nagar,  
Andhra Pradesh, India.  
India.  
Email: [dr.ravindrakumar@gmail.com](mailto:dr.ravindrakumar@gmail.com)  
[praveen.anatomist@gmail.com](mailto:praveen.anatomist@gmail.com)

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 upto 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.
- Feto placental weight ratios are recorded

To study the normal morphological features of placenta with relevant to various parameters like: Shape, Attachment of the cord, Diameter and thickness, Consistency, Weight, Foetoplacental weight ratio, Vessels in the umbilical cord, Vascular pattern.

Various observations on gross appearance, histological changes and ultrasonographic finding 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.

### 3. Results:

#### Shape and consistency of placenta

In all the 50 placentae the shape is discoid, soft and friable in consistency The incidence of insertion of cord is shown in the above table. Out of 50 placentae central attachment is observed in 60% of cases, eccentric attachment in 20%, marginal attachments in 20% and velamentous attachment is absent in taken cases.

Out of the 50 Normal placentas the thickness varied from 1.8 to 3.8 cms as shown in the [table I] 3 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 3.2 cm in 12% of cases.

Out of 50 normal placentae [table II] the diameter observed varied from 12.2-15.8 cm. Diameter observed is 15.2 cm in 16% of cases, 14.2 - 16.2cm in 12% of cases, 14.8-16.8-17.5 cm in 6% of cases and 15.1-15.8-17.2-18.2 cm in 4% of cases. The maximum diameter of 19.6 cm is recorded in 2% of cases.

Out of 50 cases the weight of the placenta [table III] observed ranged between 321 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 least weight of 372 gms is recorded in 4% of cases. The maximum weight of 534gms in 2% of cases. The least weight of 321gms is recorded in 2%.

The Feto placental weight ratio observed in 50 cases ranged between 3.97 - 8.27 table [IV]

**Table.1 Thickness of the placentaE:**

Thickness in (cms)	No. of Placenta	Percentage
1.8	4	8%
2	1	2%
2.3	2	4%
2.4	2	4%
2.5	5	10%
2.6	7	14%
2.8	9	18%
3	12	24%
3.1	1	2%
3.2	6	12%
3.8	1	2%

**Table.2 Diameter of PlacentaE**

Diameter (cm)	No. of Placenta	Percentage	Diameter (cm)	No. of Placenta	Percentage
12.2	1	2%	16	1	2%
12.8	1	2%	16.1	1	2%
13.2	1	2%	16.2	6	12%
13.8	1	2%	16.5	1	2%
14.2	6	12%	16.8	3	6%
14.6	1	%	17.2	2	4%
14.8	3	6%	17.5	3	6%
14.9	1	2%	17.8	1	2%
15.1	2	4%	18.2	2	4%
15.2	8	16%	19.5	1	2%
15.4	1	2%	19.6	1	2%
15.8	2	4%	Total	50	100%

#### Vascular pattern

Out of 50 all the placental vascular pattern is disperse in type.

#### Vessels in umbilical cord

In all 50 cases the umbilical cord contains two arteries and 1 vein.

**Table.3 Weight of Placentae**

Weight in grams	No. of Placenta	Percentage	Weight in grams	No. of Placenta	Percentage
321	1	2%	476	2	2%
372	2	4%	478	1	2%
403	1	2%	482	1	2%
422	1	2%	483	1	2%
423	1	2%	488	1	2%
424	1	2%	489	1	4%
425	1	2%	490	2	2%
432	1	2%	495	1	2%
434	1	2%	500	1	2%
450	1	2%	501	1	2%
451	1	2%	502	1	4%
452	3	6%	503	2	2%
453	4	8%	504	1	2%
456	1	2%	505	1	2%
458	2	4%	511	1	2%
462	1	2%	512	1	4%
463	1	2%	523	2	2%
470	1	2%	534	1	100%
475	2	4%	Total	50	4%

**Table - IV. 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	482	4.35	2700	503	5.36
3500	495	7.07	2700	504	5.35
3500	423	8.27	2500	452	5.53
2500	425	5.88	2500	462	5.41
3300	502	6.57	2500	501	4.99
3500	475	7.36	2700	489	5.52
2600	453	7.73	2700	463	5.83
2600	458	5.67	3400	489	6.95
2700	488	5.64	3500	501	6.98
2700	478	5.64	2700	502	5.37
2500	500	5.00	2800	450	6.22
2900	422	6.37	1600	403	3.97
2500	432	5.78	2400	452	5.30
2500	321	7.78	2500	523	4.78
3000	534	5.61	3500	505	6.93
2600	453	5.73	2500	375	6.66
3500	458	7.64	3000	453	6.62
3100	451	6.87	2800	511	5.47
3000	523	5.73	2400	452	5.30
2400	424	5.66	3000	475	8
3000	434	6.91	3500	470	7.44

**Discussion:**

The data observed and “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. (3)

Regarding the shape and consistency of the placenta all are discoid in shape and they are soft and friable in consistency.

Abnormal shapes of the placenta are placenta lobata in which the division is incomplete, and 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. 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 29 are central, 10 are eccentric, 10 are marginal and one is velamentous insertion. Velamentous type is common in infants weighing less than 2500 gms.(3) The incidence of central attachment in 90% of cases, Marginal 8.7% of cases and 1.2% of velamentous type.

In the present study the average placental thickness is around 25mm (Table-I). In 32% cases thickness of the placentae is 2.5cm and in 14% of cases 2.8cm, 8% of cases 2.3cm and 1.8cm of 6% of cases.(12) In the present the average diameter ranged between 14.2 to 17.5cms in seven cases (14%) the diameter observed is 15.2cm and the maximum diameter of 17.5cm is observed in 2% of cases (Table-II). The diameter and thickness of placenta narrated by various authors in review of literature.(7) 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.(4)

The range of the placental and fetal weight ratio ranged from 1:5-1:7.7 (Table-III). in full term the ratio will be 1:7. In the present study the number of maternal cotyledons ranged from 1220. Fetal Cotyledons are 3684. The ratio is 1:3.45 (Table-III). The total number of cotyledons remains the same throughout gestation.(14)

In the present study all the 50 placentae exhibited disperse type of vascular pattern, 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.(3)

In the present study in the stump of umbilical cord there are two umbilical arteries and one umbilical vein in all the 50 placentae absence of one artery is associated with congenital anomalies of the fetus (5). 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.(10)

### Summary And Conclusion

With relevance to the shape and consistency all the 50 placentae exhibited discoid shape and are friable by consistency. Regarding insertion of the cord it is observed that 30 (60%) are of central attachment, 10 (20%) marginal, 10 (20%) eccentric and velamentous in nature are not observed and the data differed from the previous authors in the form of lowered incidence of central insertion and increased incidence of marginal insertion. It is observed that thickness of the placenta at the centre is recorded as 3cm in 12 (24%) cases, 2.8 cm in 9 (18%) cases, 2.6 cm in 7 (14%) and 3.2 cm in 6 (12%) cases. This data concurred with the previous authors. It is observed that the diameter of the placenta in the present study ranged between 12.2 - 19.6 cms and is the highest incidence of 16% of cases the diameter recorded is 15.2cm. In the present study it is observed that the weight of the placenta ranged between 321-534gms. The weight of 453 gms is observed in highest number (8%) of cases and data concurs with the previous authors. The wide variations mentioned by the various authors is reflected in the present study. In the present study foeto placental weight ratio it is observed that the ratio ranged between 3.97 8.27 and this data is in accordance with previous authors. The current study exhibits disperse type of vascular pattern in all 50 cases. In the chapter of number of vessels in the umbilical cord two umbilical arteries and one umbilical vein are noticed in all cases and the limited study of 50 cases did not revealed any anomaly and the incidence of it is very low according various authors.

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