

A Study of Morphology and Histological Features of Various Trimesters of Placenta and to Correlate with Ultrasound

Arathi MS*

Sree Balaji Medical College & Hospital Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India

ABSTRACT

Placenta derives is basically a Greek and Latin name. The Latin root "placentas" means a cake; Greek root "plakios" means flat. Fifty-one placentae were collected from the Department of Obstetrics and Gynaecology, Sree Balaji Medical College and Hospital, Chennai. Of the 51 placentae collected, 27 were from term and 3 from pre-term pregnancies. Remaining 21 included placentae from post-abortion and medical termination of pregnancies of which 9 were from first trimester and 12 were from second trimester. On examination of 30 third trimester placentae revealed an average length, breadth, and thickness of 19cm, 16.5cm and 1.5 cm, respectively. The average volume and weight of second trimester placenta in the present study were 31.1 cc and 116.8 gm. Histologically there were anchoring villi and stem villi were present in III and II trimester placentae. Floating villi and placental septae are present only in third trimester placentae. Nucleated RBC's and endometrial glands were present in I trimester placentae only.

Key words: Placenta, Greek root, Foetus

HOW TO CITE THIS ARTICLE: Arathi MS, A Study of Morphology and Histological Features of Various Trimesters of Placenta and to Correlate with Ultrasound, J Res Med Dent Sci, 2021, 9(7): 287-288

Corresponding author: Arathi MS
e-mail ✉: editor.pubs@gmail.com
Received: 07/07/2021
Accepted: 22/07/2021

INTRODUCTION

The placenta is an organ that facilitates nutrients and gas exchange between the maternal and fetal components. Placenta is involved in exchange of nutrient from maternal to fetal. The survival of foetus depends on the size of the placenta. The foetus and chord form the uterine environment. Human placenta is generally discoidal organ. There is some variation in placenta that depends on the mode of delivery. Placenta and fetal membranes perform the functions like protection, nutrition, respiration, excretion, and hormone production. This study aims to determine the gross features of placentae which include shape, size, weight, thickness, the number of cotyledons, umbilical cord length, diameter, and its attachment and also to study the correlation between placental volume and birth weight of the baby born as a result of term and pre-term pregnancies [1-3].

MATERIALS AND METHODS

Study design

The study included a total of 51 placentae. Of the 51 placentae collected, 27 were from term and 3 from pre-term pregnancies. Remaining 21 included placentae from

post-abortion and medical termination of pregnancies of which 9 were from first trimester and 12 were from second trimester. Those placentae collected from first trimester abortions included only placental bits, hence morphological assessment like length, breadth could not be measured and subjected to histological examination only.

Well-fixed bits of I, II & III trimester placentas were processed histologically and embedded. Paraffin section of 6µm were cut and stained using Haematoxylin and Eosin stain and observed using light microscope and oculomicrometer, the results are tabulated in Table 1 and Figure 1A and 1B.

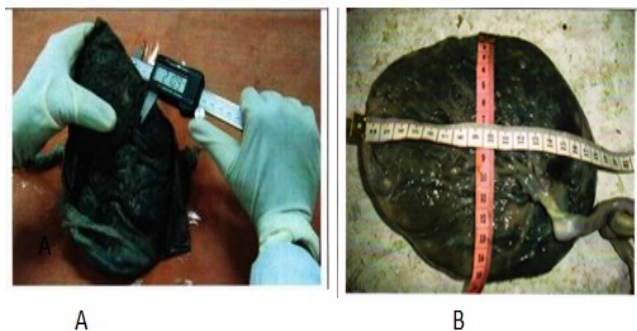


Figure 1: Measuring the width and length of the placenta.

Table 1: Paraffin section of 6µm were cut and stained using Haematoxylin and Eosin stain and observed using light microscope and oculomicrometer.

Dimensions	Maximum	Minimum	Average
Length (cm)	6	10	7.75
Breadth (cm)	5	12.5	7.2
Thickness (cm)	0.7	0.5	0.5
Volume (cc)	15	87.5	31.1
Weight (gm)	108	150	116.8

About 33 placentae were circular in shape and remaining 9 were discoid. Average number of cotyledons present were 24. Insertion of the umbilical cord was eccentric in 35, central, marginal in 6 and velamentous in one. The average length of umbilical cord in III and II trimester placentae were 31.7 and 21.5 cm, respectively. The average diameter of umbilical cord in III and II trimester placentae were 1.3 and 0.5 cm, respectively. In term pregnancies, maximum weight of the baby was 3.7 kg and minimum were 2.2 kg with an average of 2.8 kg. In pre-

term pregnancies, baby weight varied from 1.9 kg to 2.3 kg with an average of 2.1 kg. The histological features reveals that the intervillous space is the widest in I trimester and it is filled with maternal blood. Features of I trimester gradually reduces and features of II trimester emerges. Average number of villi in II trimester placenta in this study is 38, with average size being 500 µm. About 6 capillaries were present per field. Average number of villi in III trimester placenta in this study is 55. Tabulated in Table 2.

Table 2: Histologic features of placenta.

Features	I Trimester	II Trimester	III Trimester
No of villi/field (1 Ox)	15	38	55
Size of villi (µm)	200	500	800
No of layers in villi	2	2	1
No of capillaries	2	6	10
Intervillous space	Wider	Wide	Narrow
Anchoring villi	Absent	Present	Present
Stem villi	Absent	Present	Present
Floating villi	Absent	Absent	Present
Placental septae	Absent	Absent	Present
Nucleated RBC' s	Present	Absent	Absent
Endometrial glands	Present	Absent	Absent

DISCUSSION

From the 51 placentae collected, 27 were from term and 3 from pre-term pregnancies. Remaining 21 included placentae from post-abortion and medical termination of pregnancies of which 9 were from first trimester and 12 were from second trimester. Morphological analysis of placentae of II and III trimesters and histological analysis of the placentae of all the three trimesters were concordant with those reported in the literature [4]. An attempt has been made to assess the placental volume antenatally using two-dimensional ultrasonography by applying volumetric calculations. Placental volume calculated by this method also correlated well with baby weight. Therefore, though it is known that prenatal evaluation of placental volumes using ultrasound imaging has the potential to decrease the number of unexpected fetal demises as recognized by Jauniaux et al. [5] accurate assessment of placental volume is not widely available. In this study also, estimated placental volume

(EPV) calculated by ultrasound correlated well with baby weight. Previous studies reported the value of 3D ultrasound in measuring placental volume. He made a longitudinal case-controlled prospective study in 150 pregnant women and concluded that 3D ultrasound measurement of placental volume correlated well with placental weight and birth weight of the baby. This trend will lead to a better understanding of causes of poor pregnancy outcomes, which in tum will lead to better diagnostic and therapeutic approaches to complicated pregnancies [6-10].

CONCLUSION

Placental volume can be very well considered as a surrogate marker of fetal weight. Prenatal evaluation of placental volumes using ultrasound imaging has the potential to decrease the number of unexpected fetal demises.

Today, only a few specialized centres for placental examination exist in India. As the cost of processing and examining placentas decreases, more placentas delivered will be able to be examined by appropriately trained physicians. This trend will lead to a better understanding of causes of poor pregnancy outcomes, which in turn will lead to better diagnostic and therapeutic approaches to complicated pregnancies.

FUNDING

No funding sources.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGMENTS

The encouragement and support from Bharath Institute of Higher Education and Research, Chennai, is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

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