Section: Anatomy

Original Research Article

MORPHOLOGIC & MORPHOMETRICAL STUDY OF HUNDRED HUMAN PLACENTA AND ATTACHMENT OF UMBILICAL CORD

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ABSTRACT

Background: Placenta represents an extremely intimate parabiotic union of maternal and fetal tissues for the inevitable requirement of the embryo. The placenta, being a provisional organ, is formed in the process of embryogenesis and fetal development. It plays the role of an intermediary channel between the mother and the fetus throughout the pregnancy, and ceases functioning by the end of labor. The mature placenta is a disk-shaped structure with a diameter of 15 to 20 cm and a thickness of 2.5 to 3.5 cm. Its mass reaches 500 to 600 g. the objective is to measure the diameter, thickness & weight of the placenta, 2.To study the shape, size, maternal and fetal surface for cotyledons and changes of the placenta, 3.To study the attachment and vascular pattern of umbilical cord in the placenta. **Materials and Methods:** After the consent received from the patient as well as from the doctor on duty in labour room & operation theatre, the placentae were collected after delivery is completed from the labour room as well as from the operation theatre after caesarean section operation is over and the placentae were cleaned under tap water to remove the blood clots & were numbered with a label. All the parameters were taken immediately and the placentae were disposed properly according to the institutional guidelines. For the measurement of length plain scale fibre glass measuring tape and toothpick were used for measurement of diameter and thickness used. weight of the placentae were measured by weighing scale. The shape, size, maternal surface for calcification, fibrosis, accessory lobes, cotyledons were observed thoroughly with naked eye. The study was an observational descriptive type of study. **Result:** Major findings of present study are 79% placentae showed circular shape, 16% placentae were oval shaped whereas 2% placentae were triangular in shape, 3% showed presence of accessory lobe. Among the 2 triangular placentae one was not perfectly triangular, was irregular in shape. The weight of the placentae among 100, 94 weighted around 500-530 gms. and 2 placentae weighted more than 600 gms. About 56% placentae were found with a diameter of 15-17cm which was most common, followed by28% with a diameter 17-19cm. Thickness was 1.76-2cm showed by 51%. Umbilical cord insertion was central type in 58%, eccentric type in 27%, Velamentous type in 9% & marginal in 6%. Vascular pattern was dispersed in 48%, marginal in 34% and mixed in 18%. The results of the present study were discussed with various authors and their works. **Conclusion:** The placenta is the organ with so much information and a vast area for research. For a healthy and successful pregnancy to terminate in a healthy fetus placenta is a necessary tool for the clinicians to look for. So a detailed and thorough study of placenta may lead to a clear picture of maternal and fetal health in a region.

INTRODUCTION

Placenta is the organ that is responsible for viability and health of the fetus till birth connecting the uterine decidua with the fetal tissue. It gives information about the health status of both the fetus and mother at the same time and help clinician to diagnose and intervene any complications during pregnancy. The maternal health of a society or a class of a people living in a particular area closely depends upon different factors. In that situation a placenta can play a vital role to picturise the reproductive health of the

region which ultimately help to measure the drawbacks of the healthcare delivery system of the particular region. Many researchers have done different studies by different methods, be it radiographically, morphologically or histologically. Human placenta is a discoid shaped choriodecidual organ formed between the villous structures of the extraembryonic tissue and endometrium (decidua basalis) of the uterus. So, villi are the structural component of the placenta. Presents two surfaces, maternal surface is covered by membranes and fetal surface is divided into cotyledons. A mature placenta is a disk-shaped structure with a diameter of 15 to 20 cm and a thickness of 2.5 to 3.5 cm. Its mass reaches 500 to 600 g at term. Both maternal and fetal tissues are different immunologically but there is seldom any rejection reaction between them, there is no mixing of fetal and maternal blood. It fulfils the basic fetal demands e.g. gaseous exchange (respiration), nutritional demand and excretion. Apart from these, synthesis of hormones (hCG), metabolism (glycogen, cholesterol & fatty acid) & some immunological reactions are also reported to played by placenta.[1] Well being of the fetus and viability after birth is analogous to the overall health of the placenta. So before birth the placenta gives a mirror image of the infant. Various information of complicated pregnancy is also conveyed to the obstetrician and in case of an intrauterine death of the fetus, the placental examination is a must. From medico-legal aspect placental examination play a vital role to come to a fair conclusion in any foul play. So placenta might be an organ to discard right after birth but it is a source of tremendous scientific research which many researchers have proved already. The recent development of many investigative procedures e.g. USG gives valuable and desired information about the placenta during the entire period of pregnancy to determine any fetal problem to resolve during neonatal period.[2] The wellbeing of the foetus depends on many factors during the pregnancy, but a healthy placenta is the most vital factor which can be visually assessed by tools for the same.[3,4] An abnormal size, shape of the placenta influences the fetal development in a complicated state, such conditions are Rh incompatibility, maternal diabetes, hypertension, elderly primigravida etc.[3,4] As the placenta can provide a pivotal role in wellbeing of fetus before & after birth as well as for the mother, so this study has been aimed to carry out with the objectives mentioned which will help the Gynaecologists as well as the neonatologists to focus on the improvement of maternal and fetal health.

MATERIALS AND METHODS

A descriptive observational type of study was undertaken in the Department of Anatomy, Dhubri Medical College & Hospital, Dhubri, Assam in collaboration with Department of Obstetrics & Gynaecology for a period of three months extending from June 2024 to Sept-october, 2024. Ethical clearance was obtained from Institutional Ethical Committee (No. DMCH/IEC/2024/18 dated 5th June, 2024) and also consent from the parents/guardian were taken by using a proforma describing all the purpose and methods of the study in local language. A total no. of 100 placentae were collected for the study soon after the delivery. Both normal delivery and caesarean section deliveries were included in the study. Right after collection, the placentae were cleaned under running tap water to remove the clots and a serial number was given to each specimen for further description. After tagging, the placentae were closely inspected for its shape, extra lobe, surfaces and attachment of the umbilical cord were noted down. Then the weight, diameter, thickness were measured with the help of a weighing machine, scale, a fiber glass measuring tape and a toothpick respectively. A fiber glass measuring tape was used to measure the placental diameter. The mean value of two distinct angles in each placenta was measured. For measurement of placental thickness toothpick technique was used. The placentae were pierced at the site where it was thickest along the perpendicular plane. The collected values were correlated to a transparent ruler calibrated in centimeters. Maternal surface was also examined for cotyledons and their number. Then all the data were noted down carefully and were tabulated accordingly. After the measurements were taken detagging followed by proper disposal was done.

Morphological parameters: Placentae were examined for placental completeness, placental shape, site of attachment of umbilical cord & vascular pattern, calcification and fibrinoid deposition.

Morphometric parameters: examination of the placentae for weight, diameter & thickness.

Statistical analysis: As the study was a descriptive observational type all the variables were expressed in percentages.

Inclusion criteria

All complete, uninjured placentae were included in the study collected after both normal delivery and caesarean section.

Exclusion criteria

Placentae which were damaged during delivery, intrauterine death, macerated or putrefied were excluded from the study.

RESULTS

The study was a descriptive observational type of study. A total no. of 100 placentae were collected and included for the study. Among them 32 were primigravidae whereas 68 were multigravida. Among them 46 gave birth to male babies whereas 54 were female babies. 13 pregnancies were complicated (e.g. anaemia, post dated pregnancy & diabetes). Among them most common underlying cause were 4 anaemic & 4 young mother followed by 3multiple births in

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short interval, 2 postdated pregnancy. We also studied the investigations and previous history of many such complicated pregnancies and correlated the laboratory investigations. The collected data were tabulated & calculated accordingly. As the study was an observational descriptive type of study all the variables were expressed in percentages.

Table 1: Showing the details of pregnancy and birthweight of the baby

Birth weight of the baby (gm)	No. of pregnancy, completed 37 weeks	No. of pregnancy less than 37 weeks	Complicated pregnancy
<2500	32	9	7
>2500	47	6	6

Table 2: showing the shape of the placentae

Shape of placentae	No. of placentae	Percentage (%)
Circular	79	79
Oval	16	16
Triangular/irregular	2	2
Accessory lobe	3	3

Among 100 placenta majority were circular in shape, 79% followed by oval in 16%, triangular in 2% and accessory lobe was present in 3%.

Table 3: Showing the diameter of the placentae

Diameter of placentae (cm)	No. of placentae	Percentage (%)
<15	9	9
15.1-17	56	56
17.1-19	28	28
>20.5	7	7

The maximum diameter of placenta was found 22.05 cm in a case of postdated pregnancy and least diameter of the placenta was 15.8cm in a case of multigravida & uncomplicated pregnancy in present study. About 28% placentae were found with a diameter of 17-19cm which is the major group of the placentae.

Table 4: Showing thickness of placentae

Thickness of placentae (cm)	No. of placentae	Percentage (%)
<1.75	4	4
1.76-2	51	51
2.1-2.25	33	33
>2.26	12	12

The thickness of the placenta was found approximately 2cm among 51% of placentae, 33% showed thickness within 2-2.25cm. 12% placentae were more than 2.26cm. the maximum thickness was 2.65cm found in a huge post dated placentae.

Table 5: Showing the weight of placentae

Weight of placentae (gm)	No. of placentae	Percentage (%)
<450	8	8
451-475	23	23
476-500	41	41
501-525	12	12
526-550	14	14
>600	2	2

In the present study the placentae, mostly all of them (67) weighted around 500-550 gms and 8 placenta weighted less than 450gms and 2 placentae weighted more than 600 gms among which one obtained from a postdated pregnancy and the other one collected from anaemic multigravida. The previous placenta also showed multiple areas of calcification and fibrinoid deposition. The placenta which were smaller in size and weight had more cotyledons were collected from incomplete 37 weeks pregnancy, compared to the palcenta obtained from 37 weeks completed pregnancy. Usually, cotyledons varied from 15 to19 in number on maternal surface at 37 weeks completed pregnancy. The cotyledons were smaller in size and number (usually 10-13) in placenta collected from before 37 completed weeks.

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Table 6: Showing the attachment of umbilical cord

Type of attachment of the cord	No. of placentae	Percentage (%)
Central	58	58
Eccentric	27	27
Velamentous	9	9
Marginal	6	6
Others	-	-

Table 7: Showing the vascular pattern of placenta

Type of vascular pattern	No. of placenta	Percentage (%)
Dispersed	48	48
Marginal	34	34
Mixed	18	18

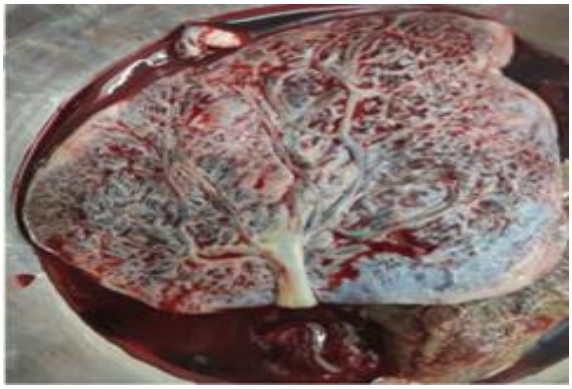

Figure 1: Triangular placenta

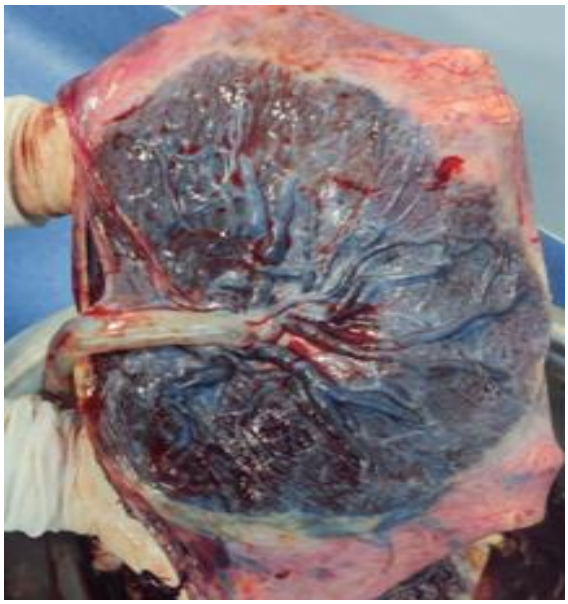

Figure 2: oval placenta with eccentric attachment of umbilical cord

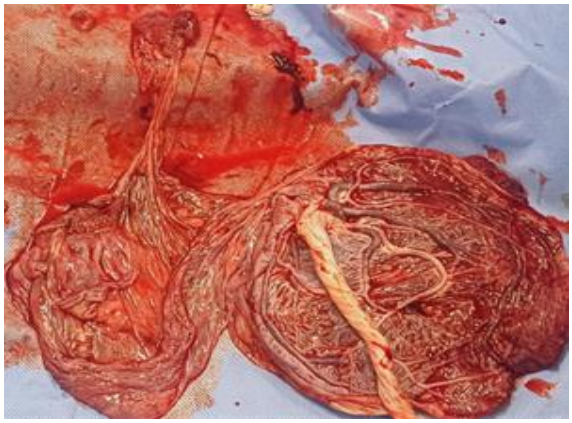

Figure 3: placenta with an accessory lobe and marginal attachment of cord and mixed vascular pattern

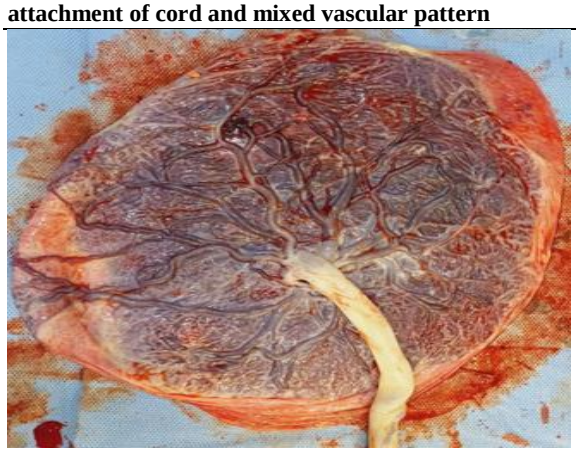

Figure 4: A large placenta (wt:613 gms) with eccentric cord attachment and with magistral vascular pattern

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Figure 5: Velamentous insertion of cord

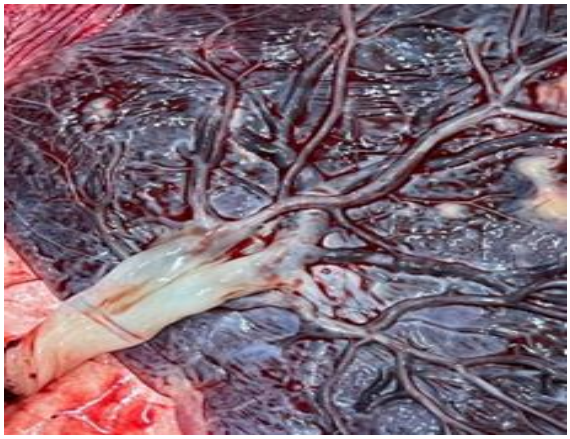

Figure 6: Dispersed vascular pattern with fibrinoid deposition in an post dated pregnancy

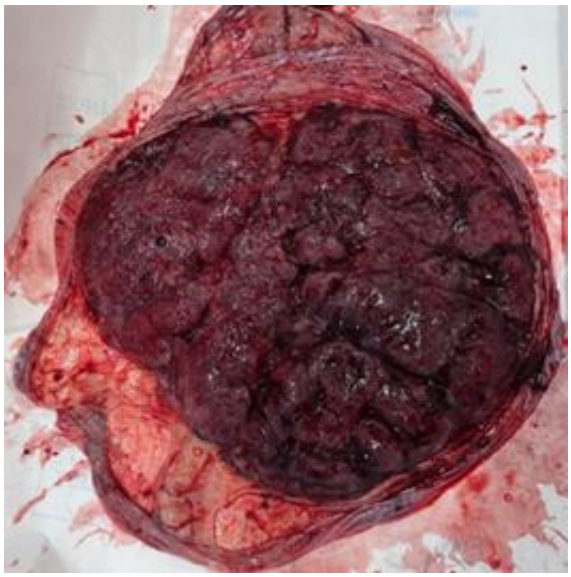

Figure 7: maternal cotyledons

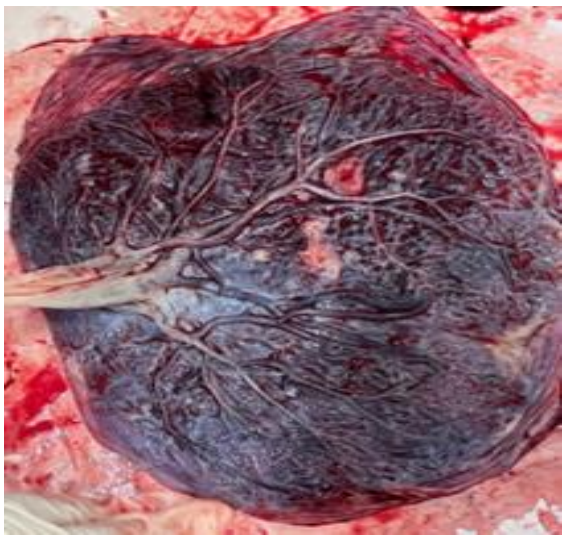

Figure 8: thickest placenta

DISCUSSION

The present study was a descriptive observational type of study. 100 nos of placenta were collected from the labour room and operation theatre after the caesarean section was over to conduct the study. Among 100 placentae, 79% placentae showed circular shape, 16% placentae were oval shaped whereas 2% placentae were triangular in shape, 3% showed presence of accessory lobe. Among the 2 triangular placentae one was not perfectly triangular, was irregular in shape. Dhinesh Kumar et al also observed circular (60%) being the most common shape of placenta in their study following oval (38%) and triangular shape (2%).[13] Priyanka Rana et al found oval was the most common shape (51.16%) of placenta in their study. 16(37.20%) had round and triangular shape was in 3(6.97%) placentae whereas 1 (2.32%) placenta was found irregular in shape.[8] Out of 43 placentae, 51.16% had oval, 37.20% placentae had round shape followed by triangular in 3(6.97%) placentae. Only 1 (2.32%) placenta each found to be irregular and multilobed. The percentage of the triangular placenta in the present study was 02%, oval in 36% and round shape in 57% was stated by Sarojamma et al,[9] Gupta Anshu et al also found round placenta in 60%, followed by oval, 24% & irregular in 16%.[14] In Ragunath et al study, placenta in most of cases was round in 93.7%cases, oval in 7% cases. They did not found any accessory lobes in their study.[15] Sarojamma et al. observed most common shape as round in 57%, 36% presented with oval shape and triangular in 7%. Out of 40 placental specimens, 08 specimens (18.60%) showed central type of cord insertion.[9] A multilobed placenta was observed out of 43 cases (2.32%) in Priyanka Rana et al study.[8] Accessory lobe was found in 13.33 % as reported by A. Ananthiet et al in their study.[7]) 3% Accessory lobes were observed in the present study among 100 placentae. The results of all above studies show round/circular shape most common which is also similar observation in our study. The maximum

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diameter of placenta was found 22.05 cm in a case of post dated pregnancy and least diameter of the placenta was 15.8cm in a case of multigravida & uncomplicated pregnancy in present study. About 28% placentae were found with a diameter of 15-17cm which is the major group of the placentae. Madhavi T et al reported the average placental thickness in their study was 2.04 cm, and the mean placental weight was determined to be 578.81 gram[16] Many studies had previously stated that every 2 cm increase in the diameter of the placenta is related to increase in the weight of the fetus.[17] But there was no such evidence found in our study. The diameter of the placenta had no any relation with the weight of the fetus. Siva Sree et al studied 500 placentae and observed that cord insertion is 71.94% eccentric, 20% had central and 7.63% had marginal and 0.43% had velamentous attachments.[18] In the present study the cord insertion was central type in 58%, eccentric type in 27%, Velamentous type in 9% & marginal in 6%. Donald N. Disalvo et al, did sonographic studies of placenta in 46 pregnancies & found the central type of cord insertion in 70.37% cases, 22.2% marginal type &7.41% velamentous type of insertion.[12] Manikanda R et al stated that central mode of insertion is the most common type ,74.5%, followed by marginal type of cord insertion, 16.4% & least common was 7.3% with furcated placentas and 0.9% of cases were velamentous insertion.[16] Gupta Anshu et al stated that magisterial pattern was found in 13.95% of placenta and was associated with oval shape constituting 25.58% of placentae. Mixed pattern was seen in 18.60% placentae and was associated with oval placentae (23.25%).[14] The disperse pattern was seen in 4.65% and was associated with oval and irregular placentae each respectively 2.32% as reported by Sarojamma et al,[8] Madhavi T et al the prevalence of central insertions was 44 (17.96%), eccentric insertions were 61.22%, peripheral insertions were 12.24%, and there were no cases of velamentous insertions.[19]

CONCLUSION

As we conclude, the outcomes of the study showed many different aspects of placenta in this part of the state where there is mixing of almost ten different communities with different geographical and genetic background. Globally, perinatal morbidity and mortality are common scenarios, and the burden is higher in low-resource areas. So study like this opens a door to a more specific arena of research which will help to improve the maternal and neonatal health of the entire state.

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