DOI: https://doi.org/10.53350/pjmhs02024181105

ORIGINAL ARTICLE

Gross Anatomical Variations of Placental Disc in Healthy Pregnancies among Local Population

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ABSTRACT

Background: The placental variations from one another based on factors such as organ division, fetal membrane insertion, and the location of implantation has already been distinguished. Our primary goal is to identify any gross anatomical variations of placentae in the local Pakistani female population who give birth vaginally in accordance with the pathological findings.

Objective: To find out the gross anatomical variants of placental disc in the Pakistani population.

Methodology: Hundred placentae were obtained by simple random sampling (probability) from the normal deliveries. Detailed gross morphology was carried out to find out the anatomical variants with values ≤ 5%. Analysis of data was done by using SPSS 20.

Results: Single lobed placentae were present up to 95%. Round shaped discs were present in up to 70% cases. 2% placentae with diameter between 220 to 229mm and 5% between 140 to 149mm were present as variants. Soft consistency presents in 99% of placentae. Chorionic vessels numbered 6 to 8 among 4% and 2% respectively. Presence of sub-amnionic cysts, subchorionic hemorrhage and white infarcts in 4%, 2% and 2% respectively as variants. Number of cotyledons as among every 2% with 24, 26 and 27 respectively and the cotyledons size as among 5%, 3% to be 2 to 2.5cm and 4.6 to 5.0 cm respectively were present as variants.

Conclusion: Both quantitative and qualitative variables exist in normal term placentae among local women in Pakistan. The presence of anatomical variants in the placental discs discerns non-pathological from other pathological events with poor outcome.

Keywords: Chorionic, Cotyledon, Placenta.

INTRODUCTION

Longo (1972) stated, "It is a fetal 'lifeline' that supplies an adequate maternal placental circulation for providing nutrients, transportation and metabolizing various substances adequately[1]. It is like a multifunctional immune surface between mother and fetus. It regulates all fetal programming for future[2]. The word placenta is derived from the Greek word plakous which means a flat cake. By definition, it is discoidal, hemochorial and deciduate morphologically. The ejected placenta is flattened discoid mass, circular or oval in shape[3]. Average normal measurements include volume 500ml, weight 470gm, diameter 185mm, thickness 23mm and surface area 30000mm. On naked eye examination, the fetal surface is smooth, shiny and transparent. Variegated appearance is because of the underlying chorion. Arrangement of umbilical vessels seems to be centrifugal over fetal surface under amnion. Arteries present superficial to the veins[4]. On the other hand, maternal surface is finely granular with about 15 to 30 bulging areas called cotyledons. Each cotyledon is supplied by major branches of distribution of the umbilical vessels. The grooves correspond to the base of incomplete septa. The disc margin is characterized by a sharply demarcated transition to fetal membranes[5].

Placental variants have been identified in the past by pathologists based on the division of an organ, insertion of fetal membranes, by an abnormal expression of fetoplacental genes and the site of implantation[6]. Any alteration from usual shape almost certainly explains molding or adaptation of tissue in response to the stress or any uterine abnormality in early development of this organ. The same is reflected with deviations from normal like bilobed placenta and placenta membranacea. Eccentric positioning of umbilical cord has also been associated with reduced placental competence[7]. Thus, gross morphological features of placenta not only reflect upon its function but also its performance. The efficiency of the organ directly not only influences the birth weight of newborn but also the surface area, volume and weight of the organ itself**.** The process of apoptosis is essential for the differentiation and proliferation of trophoblast into chorion which plays a significant role in the development of healthy and normal placenta. This may be the key mechanism influencing placental dysfunction. Changes in proapoptotic markers like high levels of caspase-8 and caspase-3, were as, lower levels of Bcl-2 an antiapoptotic marker in preeclampsia explains maternal oxidative distress associated with altered placental dimensions associated with abnormal morphology[8].

Over decades, most of the work on placenta is done by the histopathologists precisely among population with eventful pregnancies, so the purpose of this study is to define morphological variants in uneventful pregnancies. The aim of gross examination in general and quantization helps clinician to make a right diagnosis. It discerns normal variation from significant pathological events. Therefore, the main objective of this study is to sight out the gross anatomical variants of placentae in local female population in Pakistan with normal vaginal deliveries in alliance with the pathological findings, where the pathologists mark these lesions as explicitly non-significant.

Received on 12-08-2023
Accepted on 24-12-2023

METHODOLOGY

This study was conducted at CMH Kharian Medical College from January 2023 to June 2023, after approval by the institutional review board vide letter no. CKMC/IERB/AC-00121. By simple random sampling (probability) technique specimens were collected, after recruiting hundred subjects at Department of Obstetrics and Gynecology. With consideration from institutional review board, inclusion and exclusion criteria, an informed consent and sociodemographic information with antenatal record were obtained. Following delivery, within 5 minutes samples were dipped in containers with 2500ml. of 12% formalin for fixation with layer of cotton placed towards the base to avoid de-shaping of cotyledons. The samples were then brought to the anatomy department. Linear cuts were given towards maternal surface of placental disc about 1cm. deep for proper fixation at the thickest point. After fixation grossing was carried out and data regarding both surfaces were recorded in tabulated manner. Variant is

defined as relatively unusual morphological finding seen in ≤ 5% of the general population[9].

Statistical Methods: Data was collected and entered by using SPSS 20. Percentages and graphs were given for qualitative variables, while, mean± SD were given for quantitative variables. 95% Confidence Intervals were given for quantitative as well as qualitative variables.

RESULTS

The gross morphological features of placental disc are listed in Table I. Single lobed (95%) placental discs were taken as normal, bilobed (5%) as variants (Fig.1). Discs with round (70%) and oval shape (17%) were taken as normal, whereas discs round with an extension (5%), oval with a notch (5%) and round with a notch (3%) were the variants (Fig.2). 83% had discs with diameter between 150 to 189mm, 5% with diameter between 140 to 149mm (less than 150mm.). Each 5% with diameter between 190 to 199 mm and 200 to 209mm respectively (greater than 189mm) and 2% with diameter between 220 to 229mm (greater than 189mm.). Mean placental diameter was found to be 172.04 ± 16.820. 99% discs had soft consistency and 1% of the disc was firm. On cut-section placental thickness among 96% of the disc ranged between 15 to 32mm, 4% of the disc ranged between 33 to 40mm. On fetal surface-34% had 3 arteries,48% had 4, 8% had 5, whereas, each 4% had the number of branches 6 and 7 respectively and 2% had 8. In four placentae, subamnionic fibrin cysts were present and among 96%, it was absent.

Among 92 placentae the number of cotyledons ranged between 14 to 23. Two placentae had 12 and among six placentae, two had 24, another two had 26 and remaining two had 27. Mean number of cotyledons was 20.94 ± 4.21. Among 5% the size of the cotyledon was 2.0 to 2.5 cm, 89% ranges between 2.6 to 4.0 cm, whereas, in six placentae, each 3% of the cotyledon range between 4.1 to 4.5cm and 4.6 to 5.0cm respectively. In two placentae sub-chorionic hemorrhage was present, while in 98% it was absent. Among 2% white infarct was present, in remaining 98 placentae, it was absent.

Table 1: Shows as anatomical variants of placental disc with percentages, 95% Confidence Intervals and Standard Deviations for mean calculated from hundred specimen.

S.No.	Quantitative Variables		95%CI	%
1	Number of lobes	single	90.7-99.3	95
		bilobed	0.7-9.3	5
			95%CI for Mean & SD for Mean	
2	Diameter (mm)		168.7-175.38 ±16.820	
3	Thickness (mm)		22.93-25.03 ±5.301	
4	Number of chorionic vessels		3.8-4.24 ±1.128	
5	Number of cotyledons		18.58-19.94 ±3.44	
6	Size of cotyledons		3.25-3.51 ±0.63	
S.no.	Qualitative Variables		95%CI	%
1	Shape of disc	Round	61-79	70
		Oval	9.6-24.4	17
		Round with extension	0.7-9.3	5
		Oval with notch	0.7-9.3	5
		Round with notch	0-6.3	3
2	Consistency	Soft	97-100	99
		Firm	0-3	1
3	Sub-amniotic fibrin cyst	Present	0.2-7.8	4
		Absent	92.2-99.8	96
4	Sub-chorionic hemorrhage	Present	0-4.7	2
		Absent	95.3-100	98
5	White infarct	Present	0-4.7	2
		Absent	95.3-100	98

Fig. 1: Photograph of bilobed placenta as anatomical variant.

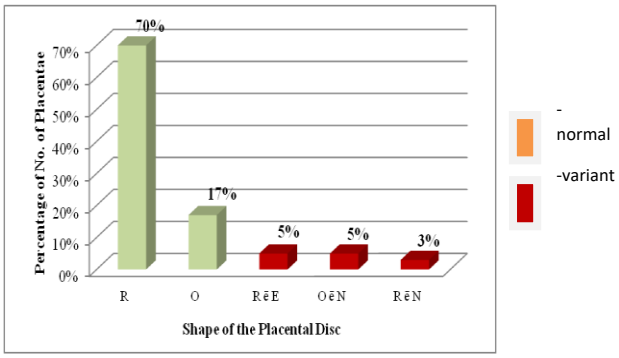

Fig. 2: Bar chart showing the percentage of different shapes of the placental discs as normal and its anatomical variants. R= round, O =oval, R ē E= round with extension, O ē N = oval with notch.

DISCUSSION

According to our results, bilobed placentae were up to 5%taken as anatomical variants. These results are comparable to those of Kaplan and Sarikaya, who described the possibility of bilobed placentae which can lead to postpartum hemorrhage and velamentous insertion of the cord respectively[10,11]. Shape of the disc is comparable with that of Kaplan, who described it to be circular or oval, it could be variable from round to oval or circular discoidal[10]. These results were inconsistent with those of Cohen et al, Sarikaya and Akhlaq et al. where diameter of placental disc on average is higher by 220mm for the former two and diameter of 14.26 ± 00.19cm for later is lower[11,12,13]. Ninety-nine placentae were soft when fresh, only 1% placenta appeared to be firm. The results are near to those of Sarikaya and Nagi[11,14]. The thickness of disc, in 4% placentae ranged between 33 to 40mm as anatomical variants. Our findings are inconsistent with those of Kaplan and Sarikaya[10,11]. There the thickness ranges between 2.0 to 2.5cm, while it was considered that the thickness less than 2.5cm is associated with intrauterine growth retardation of fetus, and thickness more than 4cm is associated with maternal complications like diabetes, fetal hydrops and intrauterine infections[14].

Number of chorionic vessels as variant ranges between 6 to 8 among 4% and 2% placentae respectively. This is consistent with the study of Cohen et al. and Sarwar et al.[12,16]. Sub amniotic

fibrin cysts among 4% placentae explains what Writters et al. described as thin wall of trophoblastic cells, fluid or hemorrhagic content and their size and number determine the potential for a high-risk pregnancy[17]. Regarding the number of cotyledons, the mean value 19.26± 3.44 is higher than given by Karadeniz et al.[18]. According to Cohen et al the size depends on the number of fetal lobules in a placentome[12]. 2% placentae with sub-chorionic hemorrhage as variant explain the chorionic bleeding described by Kaplan[10]. Values for white infarct are lower than given by Akhlaq et al. and is associated with intrauterine growth retardation[13].

CONCLUSION

The data confirmed both the quantitative and qualitative variables that exist in normal term placentae among local women in Pakistan. This study will help in better understanding of the overlap between normal anatomical variations in placental morphology and the pathological ones. Variants that occur in isolation may be clinically insignificant but they share an altered phenomenon that further needs to be investigated in relevance with internal environment as this organ is involved in the fetal programming, which may be reflected in the development during early childhood.

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This article may be cited as: Chughtai A, Bashir Y, Munawar S, Gul H, Malik ZI, Mohsin S: Gross Anatomical Variations of Placental Disc in Healthy Pregnancies among Local Population. Pak J Med Health Sci, 2024; 18(1): 105-107.