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Original Article

Variation of Human Placental Attachment of Umbilical Cord

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Abstract

Introduction: Placenta function as a fetomaternal organ and umbilical cord is a vital lifeline connecting fetus and placenta. Variation of human placental attachment of umbilical cord is important for better perinatal analysis. The present study compared with different study done previously.

Objective: This study was conducted to conclude the various human placental attachment of umbilical cord.

Materials and Methods: In this study, a total of 78 specimens (human placenta attached with umbilical cord) collected from labor room in the Department of Obstetrics and Gynecology, Government Medical College, Ambikapur, Surguja, Chhattisgarh, India. The human placenta along with its attachment was observed grossly and photograph was taken with camera. The data were analyzed and written in tabulated form.

Result: In this study, 45 (57.6%) showed ecentral attachment, 25 (32.05%) exhibit central attachment, 07 (8.97%) showed marginal attachment, and 01 (1.28%) exhibits furcated attachment of umbilical cord with placenta. There were no velamentous types of attachment present in this study.

Conclusion: This study provides knowledge about attachment of umbilical cord with placenta, hence, the present study useful for Clinicians, Gynecologist, Anatomist, Radiologist, Surgeon, and Physician for proper clinical diagnosis and treatment of disease.

Key words: Central, Ecentral, Furcated, Marginal, Placenta, Umbilical cord, Velamentous

INTRODUCTION

The word placenta comes from Latin - flat cake and Greek -"Plakous" which means "flat, slab like." The human placenta is a discoid, choriodeciduate organ which functions as a fetomaternal organ with two components. They are fetal portion of placenta (Chorion frondosum) bearing mainly chorionic villi develop from blastocyst that forms fetus, and maternal portion of placenta (Decidua basalis) develops from maternal uterine tissue. The human placenta connects the fetus with uterine wall of the mother.[1] The human placenta subdivided into number of lobes by septa that grow into intervillous space from maternal side. Each lobe of placenta called maternal cotyledon. If the placenta viewed from maternal side, it is rough, irregular, and 15–20 polygonal area called cotyledon and appears as convex areas bounded by groves. The fetal surface is smooth, shiny, translucent covered by amnion, chorionic plate, and provide attachment of umbilical cord.[2]

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The full-term human placenta is discoid with a diameter of 15–25 cm, is approximately 3 cm thick and weight about 500–600 g. Human placenta covers approximately 15–30% of internal surface of uterus.[3] In human placenta, maternal blood circulates through the intervillous space and fetal blood circulate through blood vessels in the villi. The maternal and fetal blood do not mix with each other and they are separated by membrane composed of four layers: They are from inside to outside are (1) endothelial lining of fetal vessels,

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(2) connective tissue in the villus, (3) cytotrophoblastic layer, and (4) syncytiotrophoblast. The total area of this membrane is 4–14 sqm. The main function of human placenta is exchange of metabolic and gaseous product such as oxygen, carbon dioxide, water, electrolytes, and nutrition. Production of hormone such as progesterone (maintenance of pregnancy after 4 months) and estrogens predominantly estriol (promote uterine growth and development of mammary gland).[4]

Umbilical cord develops from the body stalk and has different structure at different stages of development. Fully developed umbilical cord is about 45–50 cm in length and 1–2 cm in diameter. It contains two umbilical arteries and one umbilical vein. These vessels are embedded in the soft jelly extraembryonic mesoderm called Wharton jelly. The umbilical cord appear twisted helical may be due to fetal movement or unequal growth of vessels.[5]

The umbilical cord is normally attached to the placenta near the center, but it may attach ecentral (attached near center) and marginal (attached near margin also called Battledore placenta); it is related with IUGR, preterm labor, and furcate (blood vessels divide before reaching placenta); it is associated with early delivery because they are heavier more voluminous villi with more trophoblast and syncytial knots, velamentous (blood vessels attached to amnion and ramify before reaching the placenta); and it is allied with low birth weight, low Apgar score, growth retardation, esophageal atresia, spina bifida, and VSD.[6,7]

The current study describes the variation of human placental attachment of umbilical cord, hence, this study useful for Clinicians, Gynecologist, Anatomist, Radiologist, Surgeon, and Physician for proper clinical diagnosis and treatment of disease.

MATERIALS AND METHODS

The present study was conducted in the Department of Obstetrics and Gynecology, Government Medical College, Ambikapur, Surguja, Chhattisgarh, India. The human placenta with attached umbilical cords was collected soon after the delivery. The patient history was taken from hospital record. A total of 78 human placenta specimens were studied. The human placenta along with its attachment was observed grossly and photograph was taken with camera. The data were analyzed and written in tabulated form.

RESULTS

The present study was done on 78 human placenta attached with umbilical cord, out of which 45 (57.6%) showed ecentral attachment [Figure 1], 25 (32.05%) exhibit central attachment [Figure 2], 07 (8.97%) showed marginal attachment [Figure 3], and 01 (1.28%) exhibits furcated attachment of umbilical cord with placenta [Figure 4]. There were no velamentous types of attachment present in this study. Distribution of umbilical cord attachment with placenta given in tabulated form in Table 1.

DISCUSSION

Placenta is a fetomaternal organ and variation of attachment of placenta with umbilical cord having great

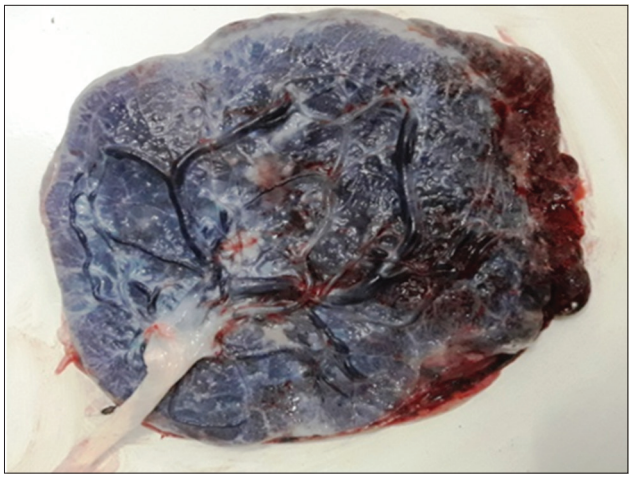

Figure 1: Ecentral

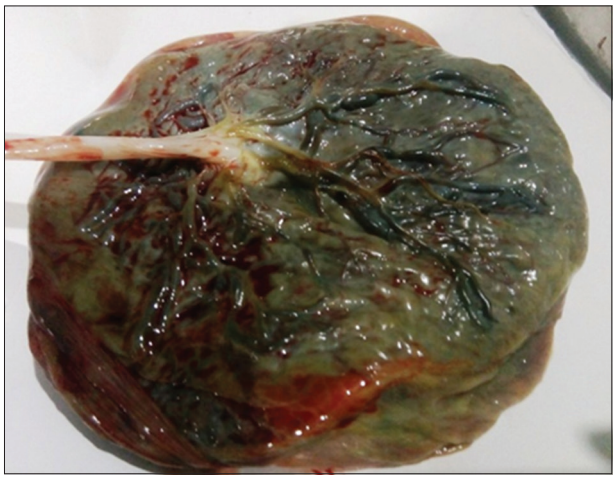

Figure 2: Central

Table 1: Distribution of umbilical cord attached with placenta

Umbilical cord attached to placenta	*n* (%)
Ecentral	45 (57.6)
Central	25 (32.05)
Marginal	07 (8.97)
Furcate	01 (1.28)
Velamentous	-
Total	78 (100)

Table 2: Comparative studies of umbilical cord attached with placenta among the various study of world

Studied By	Year	Number of specimen	Umbilical cord attached with placenta				
			Ecentral (%)	Central (%)	Marginal (%)	Furcate (%)	Velamentous (%)
Donald *et al.*[10]	1998	54	-	70.37	22.22	-	7.41
Sepulveda *et al.*[11]	2003	825	-	93.69	5.21	-	0.96
Waldo Sepulveda *et al.*[12]	2009	138	-	92.02	7.2	-	0.75
Manikanta *et al.*[6]	2012	110		75.45	16.36	7.27	0.9
Asra *et al.*[8]	2015	39	54	36	8	-	2
Arora *et al.*[9]	2015	32	59.38	18.75	15.62	3.12	3.12
Yousuf *et al.*[7]	2016	150	66	24	8	-	2
Present study	2018	78	57.6	32.05	8.97	1.28	-

Figure 3: Marginal

Figure 4: Furcated

clinical consequence. The present study was done on 78 human placenta, and we have got maximum number of specimen belong to ecentral, i.e., 45 (57.6%) attachment followed 25 (32.05%) central, 07 (8.97%) marginal, and 01 (1.28%) furcated. In this study, there was no velamentous attachment.

In this study, 45 (57.6%) were ecentral attachment which was correlated with the study of Asra *et al.*,[8] Arora *et al.*,[9] and Yousuf *et al.*,[7] whereas 25 (32.05%) central which was correlated with the previous study of Asra *et al.*,[8] Arora *et al.*,[9] and Yousuf *et al.*[7]

In our study, 07 (8.97%) showed marginal attachment, which was associated with the previous study Donald *et al.*,[10] Sepulveda *et al.*,[11] Waldo Sepulveda *et al.*,[12] Manikanta *et al.*,[6] Asra *et al.*,[8] Arora *et al.*,[9] and Yousuf *et al.*[7]

In our study, 01 (1.28%) explains furcated attachment of umbilical cord with placenta which was correlated with the study of Manikanta *et al.*[6] and Arora *et al.*,[9] whereas velamentous attachment absent in current, but it is present in previous studies such as Donald *et al.*,[10] Sepulveda *et al.*,[11] Waldo *et al.*,[12] Manikanta *et al.*,[6] Asra *et al.*,[8] Arora *et al.*,[9] and Yousuf *et al.*[7] The present studies along with various previous study displayed in Table 2.

CONCLUSION

This study reveals the variation of human placental attachment of umbilical cord and ecentral type of attachment is the most common of all. Variation in the attachment associated with various abnormalities such as preterm labor, low birth weight, growth retardation, esophageal atresia, spina bifida, and VSD, hence, this study useful for Clinicians, Gynecologist, Anatomist, Radiologist, Surgeon, and Physician for proper clinical diagnosis and treatment of disease.

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