

VARIATIONS IN PLACENTAL ATTACHMENT OF UMBILICAL CORD

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ABSTRACT

The purpose of this study was to evaluate the variations in the placental attachment of umbilical cord by dissection method. The Placental attachment of Umbilical Cord was examined after careful dissection of membranes in 110 specimens. Various types of Umbilical Cord insertions were noticed and measured its distance from placental margin. Details were recorded and analyzed. A total of 110 specimens were observed, of which 83(75.45%) showed normal, 18(16.36%) were marginal, 8(7.27%) showed furcate and only 1(0.9%) specimen was velamentous insertion. As other congenital anomalies are often associated with umbilical cord insertion anomalies, early diagnosis of the latter would give an insight into the former.

Key Words: Umbilical Cord, Insertion, velamentous, Marginal, Furcate.

INTRODUCTION:

The umbilical cord is a cord like structure, which connects the foetus with the foetal surface of placenta. Normally umbilical cord contains two arteries and one vein surrounded by Wharton's jelly, all enclosed in a layer of amnion.

The cord deserves attention right from the first trimester. The probability of identifying congenital anomalies will be much higher with careful cord assessment in the earlier period of gestation¹. Abnormalities in the development and site of insertion of umbilical cord can cause problems which have the potential to affect maternal and foetal health and well being^{2,3,4}.

Variations in the site of insertion of umbilical cord are thought to result from the process known trophoblast migration⁵ in which the chorionic frondosum or the early placenta "migrates" with advancing gestation to ensure a better blood supply from a more richly vascularised area⁶.

The umbilical cord normally inserts to the central portion of placenta, well away from the placental edge^{5,7}. The umbilical cord insertion to the placenta is divided as central/eccentric, marginal and velamentous, as it relates to the chorionic plate⁸. Another type of variation is furcate insertion, in which umbilical cord branch before its insertion to placenta⁹.

If the umbilical cord is inserted within 2cms from the placental edge, it is considered as marginal

insertion^{10,11} which is approximately 7%¹². This is associated with IUGR¹³, preterm labour¹⁴ and development of velamentous type as a result of trophoblast migration¹⁰.

In velamentous type, cord inserts to the chorio-amniotic membranes of placenta rather on to the placental mass^{15,16,17}. Incidence of velamentous is 1.1% in singleton births and 8.7 to 16% in twin deliveries⁸. This anomaly is associated with low birth weight, growth retardation, low APGAR scores, abnormal foetal heart patterns and congenital anomalies⁸ like esophageal atresia, obstructive uropathies, congenital hip dislocations, asymmetrical head shape, spina bifida, VSD, single umbilical artery, bilobed placenta and trisomy 21^{5,17}. This insertion has been shown to correlate with advanced maternal age and multiparity⁸. Vasa previa is the most common complication¹⁸.

Furcate placenta has statistically greater volume than normal volume of villi, villous trophoblast and syncytial knots. Furcated placentae are more prone to early delivery because they are heavier, having more voluminous villi with more trophoblast and syncytial knots than normal¹⁹ and is found in 0.5 to 1% of all births²⁰.

MATERIALS AND METHODS:

This work has been conducted in the Department of Anatomy, PIMS, Puducherry, during the year 2010.

Collection of specimens: A total of 110 specimens (placentae with intact umbilical cord) without any externally identifiable pathology were collected from the Dept of Anatomy which were already obtained from the Dept of OBG, PIMS and preserved in buffered 10% neutral formalin.

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S.No	Author (s)	Method of study	Total number of specimens	Variations		
				Type	Number	Percentage
1	Donald N. Di Salvo et al ²¹	Sonography	54	Normal Marginal Velamentous	38 12 04	70.37 22.22 7.41
2	W.Sepulveda et al ²²	Colour Doppler Ultra sound	825	Normal Marginal velamentous	774 43 08	93.81 5.21 0.96
3	Waldo Sepulveda et al ²³	Sonography	138	Normal Marginal velamentous	127 10 01	92.02 7.2 0.75
4	Jason H Collins et al ²⁴	According to literature		Furcate		1
5	Current Study	Dissection	110	Normal Marginal Velamentous Furcate	83 18 01 08	75.45 16.36 0.9 7.27

TABLE I: COMPARISON OF PREVIOUS STUDIES WITH CURRENT.

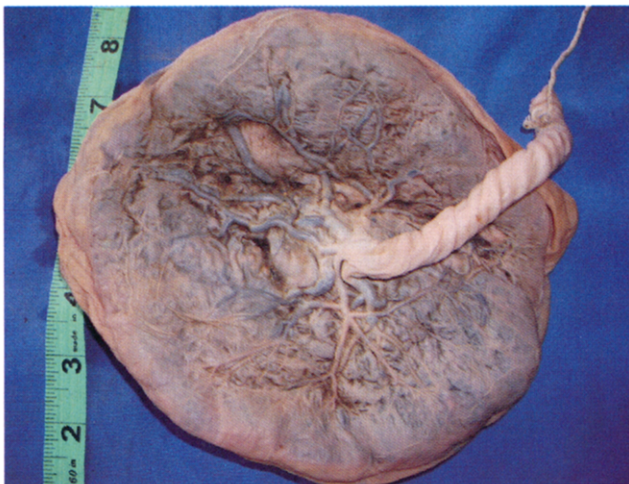


Fig 1: NORMAL INSERTION

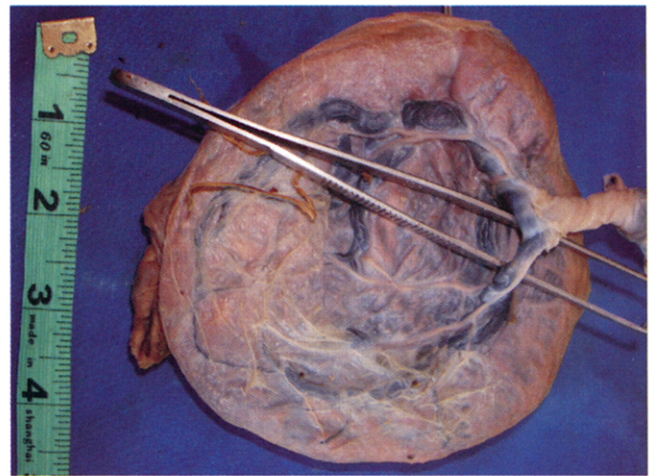


Fig 3: FURCATE INSERTION

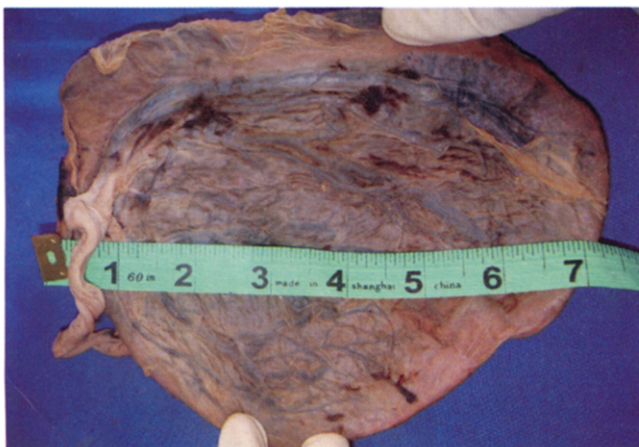


Fig 2: MARGINAL INSERTION



Fig 4: VELAMENTOUS INSERTION

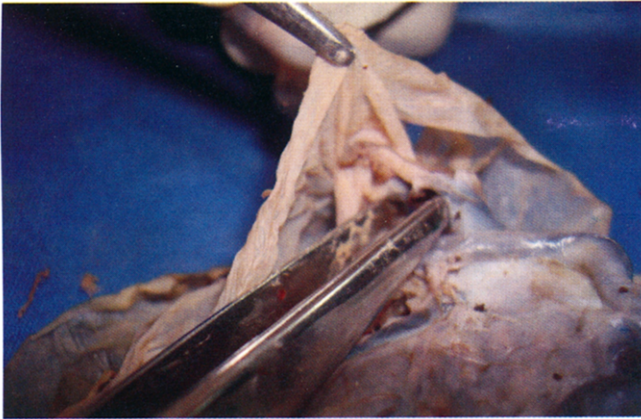


Fig 5: VELAMENTOUS INSERTION (CLOSER VIEW)

Method of study:

Specimens were cleared, dissected and observed carefully for placental attachment of umbilical cord.

Variations in the type of insertion of umbilical cord were recognized, and measured its distance from the placental margin and photographed. Details were recorded and analyzed.

RESULTS:

We have observed 110 specimens for the pattern of placental attachment of umbilical cord as stated earlier in the materials and methods.

Among the 110 specimens, 83 (75.45%) placentas showed the centrally and eccentrically presented umbilical cords, which was considered as normal (fig-1). Remaining 18 (16.36%) specimens showed the umbilical cord attached on the placental mass less than 2cms from the placental edge and were considered as marginal insertions (fig-2). In 8 (7.27%) specimens we found furcate insertion (fig-3) and only one specimen (0.90%) is velamentous insertion (fig-4 & 5).

DISCUSSION:

Abnormalities in the placental attachment of umbilical cord has been associated with number of complication of pregnancy and foetal outcome due to compression or rupture of unsupported umbilical vessels¹⁵. These abnormalities are also associated with IUGR¹³ and preterm labour¹⁴. Not always but frequently these anomalous insertions are associated with congenital anomalies^{5,17} like oesophageal atresia, obstructive uropathies, congenital hip dislocation, spina bifida, VSD, single umbilical artery and so on.

In the present study we have evaluated the different abnormalities in the placental insertion of

umbilical cord in 110 specimens by dissection method, which may be clinically important as stated earlier.

Among the 110 specimens, 83 (75.45%) showed normal (central /eccentric) type of insertion. The remaining 27 (24.55%) specimens showed abnormal placental insertion of umbilical cord, these include

- a) Marginal insertion
- b) Velamentous insertion
- c) Furcate insertion

Donald N. Di Salvo et al²¹ conducted a sonographic studies in 46 pregnancies which included 38 singletons and 8 twins for a total of 54 placental cord insertions. They observed 38 (70.37%) normal insertions, 12 (22.22%) marginal and 4 (7.41%) velamentous insertions among the 46 pregnancies.

W.Sepulveda et al²² found 774 (93.81%) normal insertions, 43(5.21%) marginal insertions and 8 (0.96%) velamentous insertions among a total of 825 pregnancies by colour Doppler ultrasound study.

Waldo Sepulveda et al²³ assessed the placental insertion of umbilical cord in 138 specimens by ultrasonography and reported 127 (92.02%) normal, 10 (7.2%) marginal and 1 (0.75%) velamentous type of cord insertions.

Jason H Collins et al²⁴ quoted the incidence of furcate insertion as 1% in the literature.

In the current study, in 110 specimens by dissection method, we found 83 (75.45%) normal, 18 (16.36%) marginal, 8 (7.27%) furcate insertions and finally only one (0.9%) velamentous insertion of umbilical cord.

Present study is compared with previous studies in table I

These variations (eccentric, marginal and velamentous) in the placental attachment of umbilical cord are probably as a result of trophoblastism⁵.

CONCLUSION:

Our study concludes that

1. Often these umbilical cord insertion anomalies are also associated with other congenital anomalies. Therefore early prenatal diagnosis of umbilical cord insertion anomalies gives an insight into other congenital anomalies.

2. These abnormal placental attachments of umbilical cord are one of the causes of intra uterine death of foetus due to tear of umbilical vessels during labour. Therefore early prenatal

ultrasonographic determination of these anomalies would prompt on extra care during labour.

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