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Research article

PREVALENCE AND PATTERN OF ABNORMALITIES OCCURRING IN PLACENTA AND UMBILICAL CORD

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ABSTRACT

A hospital based cross sectional study has been conducted in 975 cases to evaluate the prevalence and pattern of Placental and Umbilical cord abnormalities. All the Placentas with Umbilical cords were examined for different abnormalities immediately after delivery. Out of 975 specimens, a total of 262 (26.87%) were identified to have various types of abnormalities. Of which, 232 (23.79%) specimens showed single abnormalities and the remaining 30 (3.07%) specimens were with multiple abnormalities (more than one abnormalities in each specimen). Prevalence of most of the abnormalities in the present study is in co ordinance with previous studies and all the abnormalities are distributed among the specimens in two different forms i.e. specimens with any single abnormally and specimens with multiple abnormalities.

Keywords: Placental abnormalities, Umbilical Cord abnormalities, IUGR, Circumvallate, Velamentous, Battledore Placenta

INTRODUCTION

The Placenta and Umbilical cord plays an efficient role alongside maternal health condition and genetics of the parents in controlling the growth and health of the developing fetus by holding nutritive, respiratory, endocrine, immunological and excretory functions. Any abnormality in the Placenta and Umbilical cord may lead to the impairment of the fetal growth and health by disturbing the fore said functions.

The literature review of Placenta and Umbilical cord abnormalities suggests its strong association with different conditions of the fetus like IUGR, Pre Term delivery, IUD, Fetal Anomalies and so on[1].

In such condition, we felt the necessity of knowledge on the prevalence and pattern of abnormalities among Placenta and Umbilical cord, which will reinforce the prenatal care by health providers in addressing the adverse outcome caused by these abnormalities.

The current study has been designed to estimate the prevalence and pattern of different abnormalities occurring in Placenta and Umbilical cord, to address the wide variations regarding, in the existing literature.

MATERIAL AND METHODS

A hospital based cross sectional study was conducted in the Department of Obstetrics and Gynaecology, Sri Ramachandra Medical College and Research Institute, Chennai, over a period of 15 months (April 2012 – June 2013).

Institutional Ethical Committee (IEC) approval has been acquired for the study. A total of 975 patients, who met with selection criteria were enrolled in the study after their written Informed Consent.

Selection Criteria: All the pregnancies of $\geq$ 32 weeks of Gestational Age onwards. Specimens (Placenta with Umbilical Cord) were collected immediately after the delivery. Chorioamniotic Membranes were examined for the Blood Vessels or any Placental masses. Then, all the Placental discs were examined for the insertion of Chorioamniotic Membranes, Umbilical Cord Insertion and extra lobes. Then the Umbilical Cord length (i.e. length of the Cord with Placenta and Baby) has been measured with an Inch Tape. All the Umbilical Cords were checked for the presence of Knots and Coiling. Finally Umbilical Cords were severed transversely at its Placental end and examined for the presence of Wharton's Jelly and number of Umbilical Vessels.

DATA were recorded and analyzed. Specimens with abnormalities were photographed.

RESULTS

Table 1: Placental and Umbilical cord abnormalities

Type of abnormality	Number of abnormalities (292)	Percentage (%) in 975 cases (29.74%)	Percentage (%) of each abnormality among total abnormalities (In 292 Abnormalities)
PLACENTAL [82 (8.41%)]			
Bilobed	11	1.12	3.76
Accessory lobe	19	1.96	6.5
Placenta extrachorialis			
Circumvallate			
Circumvallate Complete	12	1.23	4.1
Circumvallate Partial	13	1.33	4.45
Circummarginate			
Circummarginate Complete	13	1.33	4.45
Circummarginate Partial	14	1.43	4.79
UMBILICAL CORD [210 (21.53%)			
Marginal	72	7.4	24.65
Velamentous	9	0.9	3.08
Furcate	7	0.7	2.39
Single Umbilical Artery	7	0.7	2.39
False Knots	42	4.3	14.38
True Knots	2	0.2	0.68
Uncoiled Cords	18	1.84	6.16
Absent Jelly	7	0.7	2.39
Short Cords (≤ 35cm)	24	2.46	8.21
Long Cords (≥75cm)	22	2.25	7.53

Table 2: Specimens with multiple abnormalities

Type of combined abnormalities	Number of specimens (30)	Percentage in 975 specimens (%)(3.07)	Percentage of each abnormality among all multiple abnormalities in 30 specimens
Marginal Insertions and Short Cord	7	0.71	23.33
Marginal Cords with Complete Circumvallate	5	0.51	16.66
Single Umbilical Artery with Uncoiled Cords	3	0.3	10
False Knots with Uncoiling Cords	2	0.2	6.66
Marginal with Complete Circummarginate	2	0.2	6.66
False Knots with Short Cords	2	0.2	6.66
Marginal Insertions with Accessory Lobes	2	0.2	6.66
Marginal with Partial Circummarginate	1	0.1	3.33
Velamentous with Bilobed	1	0.1	3.33
False knots with Bilobed	1	0.1	3.33
Short cord with Partial Circummarginate	1	0.1	3.33
Marginal Cords with Uncoiled Cords	1	0.1	3.33
True knots with Partial Circumvallate	1	0.1	3.33
Long Cord with Bilobed	1	0.1	3.33

Fig 1: Marginal Insertion (Arrow)

Fig 2: Velamentous Insertion (Arrow showing the Umbilical cord insertion on Chorioamniotic membranes)

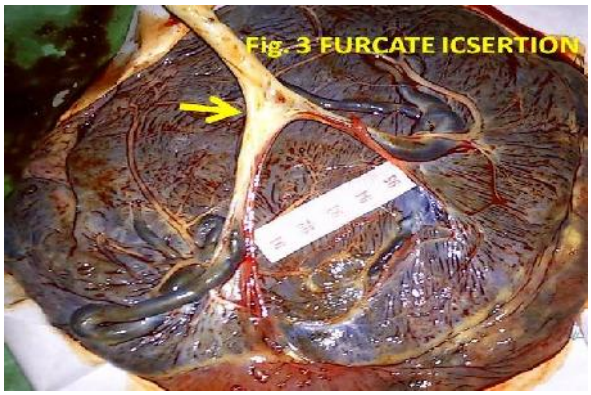

Fig 3: Furcate Insertion (Arrow showing the cord bifurcation before reaching Placenta)

Fig 4: Single Umbilical Artery Upper and Lower (Arrows sowing Umbilical Vessels)

Fig 5a: True Knot

Fig 5b: False Knot

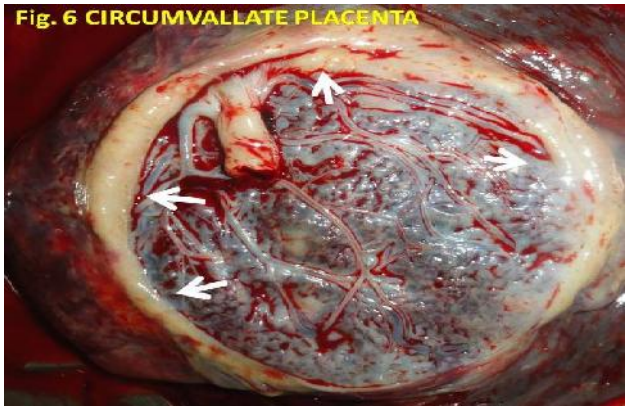

Fig 6: Circumvallate Placenta Arrows showing the circumvallation

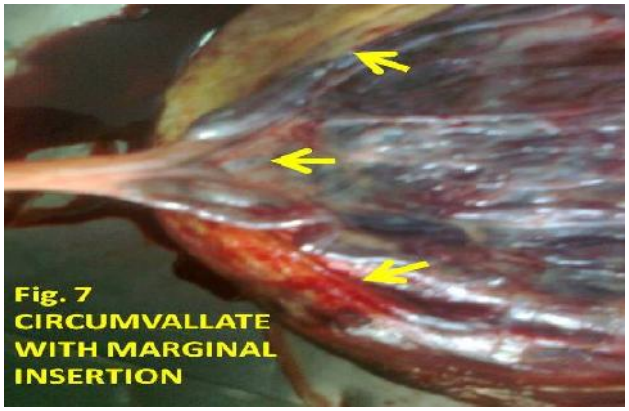

Fig 7: Circumvallate with Marginal Insertion Upper and Lower

(Arrows showing the Circumvallation middle arrow showing the Marginal Insertion of Umbilical Cord)

Out of 975 specimens, a total of 262 (26.87%) were with different abnormalities, among 262 specimens with abnormalities, 232 (23.79%) showed single abnormalities and 30 (3.07%) specimen [Table 2] were with multiple abnormalities (two abnormalities in each specimen).

In the total 292 abnormalities 82 (8.41%) were Placental and 210 (21.53%) were Umbilical Cord abnormalities.

DISCUSSION

Most of the Placental and Umbilical cord abnormalities are quoted to have an association with IUGR, IUD, Low Birth Weight, Small for Gestational Age, Pre Term delivery, Congenital anomalies and so on[1].

In the review of literature, Placenta Previa, Abruptio placentae, Cord prolapse, Malignancies, Tumors and pathology of Placenta and Umbilical cord also included under the heading of abnormalities[2]. We have omitted the above conditions in the current study by adding only developmentally malformed conditions under the heading – Abnormalities.

In our study all the abnormalities (29.7%) are classified into two categories:

1. By affected organ wise:
   a. Placental abnormalities
   b. Umbilical cord abnormalities
2. Considering the number of abnormalities in each specimen:
   a. Specimens with any single abnormality
   b. Specimens with multiple abnormalities

We have not compared Placental and Umbilical cord abnormalities as a whole with existing literature as the reason mentioned earlier that Placental and Cord pathology also included under the heading - abnormalities. Instead, we compared the individual abnormalities of Placenta and Umbilical cord in the subsequent text.

Different types[1] of Umbilical cord abnormalities are as follows, Short cords (<35 cm), Long Cords

(>75 cm), 2 Vessels cords, Multi Vessels cords, Straight cords (Uncoiled cords), Hypo & Hyper coiled cords, Cords without Wharton's Jelly, Velamentous, Marginal/Battledore Placenta and Furcate cords. Among these, we have excluded Hypo and Hyper coiled cords as there was much fluctuation in the number of coils with time, postnatally.

Different types of Umbilical cord abnormalities observed in our study are Marginal (Fig. 1), Velamentous (Fig. 2), Furcate cords (Fig. 3), Single Umbilical Artery (Fig. 4), True Knots (Fig. 5a) and False Knots (5b) occurred in 7.38%, 0.92%, 0.71%, 0.71%, 0.20% and 4.3% rates respectively.

Michale K Fritsch[3] and Cunningham et al[4] mentioned the prevalence of Marginal cord as 7%, which is coinciding with our study.

Jason H Collins et al[5] quoted the prevalence of Velamentous as 0.5 – 2.7%, Furcate as 0.5 – 1%. Jason H Collins et al[5], Michale K Fritsch[3] and Fernando Heredia et al[6] stated the prevalence of Umbilical cords with Single Umbilical Artery as 0.2 –2%. Whereas True Knots occurs in the rate of 0.3 – 2.1%[1,7,8]

The present study showed Uncoiled, Long and Short cords in 1.84%, 2.25% and 2.46%. But Jason H Collins et al[3] placed the occurrence of Uncoiled cords at 4.3% and 5%, Michale K Fritsch[5], BalkawadaNileshUnmesh et al[9] found the prevalence of Long and Short cords in 5 - 5.3% and 5.9% respectively. Jason H Collins, et al[1] mentioned the prevalence of Short cords at 3%.

Among the 8.41% of Placental abnormalities in our study, Bilobed (Placenta Bilobata) were 1.28%, Accessory lobes (Placenta Succenturiata) were 1.96% and Placenta Extrachorialis with 5.33% of prevalence. Placenta Succenturiara have been classified into Complete and Partial Circumvallate (Fig. 6) (occurred in 1.22% and 1.33%) and Complete & Partial Circummarginate (occurred in 1.33% and 1.43%) placenta. Michale K Fritsch[3] quoted the occurrence of Bilobed Placenta at 2 - 8%. Whereas Michale K Fritsch[3] and Joan M. Mastrobattista et al[10] stated the prevalence of Accessory lobe as 5 - 6%, which are not in correlation with the present study.

Michale K Fritsch[3] mentioned the prevalence of Complete and Partial Circumvallate Placenta in co -ordinance with our study as 1 - 5% but his finding of Circummarginate Placenta as 25% are not in correlation with the present study. Robert D. Harris et al[11] found the rate of occurrence of Complete Circumvallate Placenta at 2% and Partial Circumvallate at 19%, in line with present study findings.

Prevelance of Circummarginate is poorly quoted in the literature. In the available literature it has been coined as 25% [Michale K Fritsch[3]] which is far high from the present finding.

Nevertheless in the literature, we encountered specimens with multiple abnormalities in 3.07% of cases. All these specimens (Table. 2) showed the combination of two different abnormalities in each. According to the author's opinion, the degree of impairment of blood supply to the developing fetus or impairment of the fetal heath will be higher in this kind of cases.

Among all the abnormalities Umbilical cord abnormalities occurred in higher rate (71.9%), in which Marginal Insertion/Battledore cords were predominant (24.65%). In Placental abnormalities, Partial Circummarginate Placentas (4.79%) occurred in higher rate. Amides specimens with multiple abnormalities combination of Marginal with Short cords (23.33%) were predominant.

The limitation of this study is that it is a hospital based study and further research on evaluating the outcome in above abnormalities, with high sample is recommended.

CONCLUSION

The prevalence of Placental and Umbilical cord abnormalities in the present study is in line with earlier studies.

Umbilical cord abnormalities are more predominant (71.9%) among the Placental and Cord abnormalities. Occurrence of Marginal cords/Battledore cords (24.65%) is more among Umbilical cord abnormalities. Similarly prevalence of Partial Circummarginate placentas

(4.79%) is higher among Placental abnormalities (28.1%).

Specimens with multiple abnormalities were found in 3.07%, which has not been reported in the literature to the best of our knowledge.

The frequency of occurring Marginal with Short cords (23.33%) is high among the specimens with multiple abnormalities.

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Conflict of interest: None declared

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