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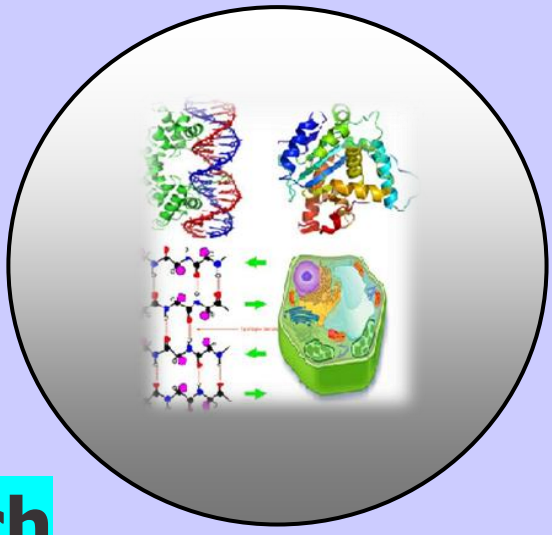

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Study of Arterial Pattern of Normal Placenta by Corrosion Cast Method and to Correlate it with its Volume

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ABSTRACT

The placenta is a mirror of maternal and fetal status. The aim of this study is to find out the arterial patterns of normal placenta by corrosion cast method and to correlate arterial pattern with the volume of placenta.

We collected 100 normal placentae from the Department of Obstetrics and Gynaecology, S.N. Medical College and Lady Lyall Hospital, Agra.

Among 100 placentae, which were studied, dispersed variety of arterial pattern is found in 68 placentae and magestrial variety of arterial pattern is found in 32 placentae.

Mean volume, found in dispersed variety is 495 ml and maximum and minimum volumes in this variety are 540 ml and 450 ml respectively. Mean volume, found in magestrial variety is 470 ml and maximum and minimum volumes in this variety are 500 ml and 420 ml respectively.

Mean volume in dispersed variety is 495 ml, which is more than the mean volume in magestrial variety which is 470 ml.

Keywords: Placenta, Dispersed, Magestrial and Volume.

INTRODUCTION

The placenta is an organ that connects the developing foetus to the uterine wall and is responsible for maintaining the pregnancy and for promoting normal foetal development. Placenta is connected to foetus via umbilical cord, which inserts into the placenta at central, at eccentric or at marginal position (Di Salvo DN et al 1998).

The umbilical cord contains two arteries and one vein. The two umbilical arteries are usually fused together via Hyrtl's anastomosis just proximal to umbilical cord insertion.
The anastomosis is of two types: Transverse anastomosis and Fusion anastomosis.

Two types of arterial patterns are found-

1. Magestrial or Monopodial or Conveying or distributing vessel tree
2. Disperse or Dichotomous or Delivering vessel tree

The volume of normal placenta at term ranges from 450 to 500 ml. (Aherne W, Dunnill MS 1966).
Many studies are done to find out the relation between volume of placenta and maternal and foetal disorders. As it was found by De Paula et al (2009), that in cases of intrauterine growth retardation (IUGR) and pregnancy induced hypertension (PIH), the volume of placenta is significantly reduced. Present study is done to correlate arterial pattern of placenta with its volume.

MATERIAL AND METHODS

Material

We collected 100 full term placentae of normal cases from the Department of Obstetrics and Gynaecology, S.N. Medical College and Lady Lyall Hospital, Agra.
Selection of cases- Placenta was taken from full term pregnant mothers only. Mothers suffering from following diseases were excluded-

1. Anaemia
2. Hypertension
3. Hepatitis
4. HIV

Method

Placentae were washed with water, amniotic membranes were trimmed off. Umbilical cord was cut short, leaving 5 cm of its length attached to the placenta.

For each placenta following procedures were followed-

1. Measurement of placental volume
2. Preparation of corrosion cast
3. Determining the arterial pattern

1. Measurement of placental volume

Placental volume was measured by a measuring jar in milliliter by displacement method.
Measuring jar was half filled by water and the initial volume at this level was recorded. Then placenta was immersed in water and final volume at this level was also recorded. Finally the volume of placenta was calculated by subtracting the initial volume from the final volume. (Photograph 1)

Photograph 1. Measurement of volume of placenta.

After measuring the volume we prepared the cast by corrosion cast technique.

2. Preparation of corrosion cast

We prepared the cast by using injection technique, after washing the placenta and sqeezing out the blood thoroughly.

Injection Technique (Bacsich P and Smout C.F.V.1938)

Injection technique was used to prepare cast. A 15 gauge needle was inserted in one of the umbilical artery, which is tied with thread. 15 to 20 ml of butyl butyrate dye was injected in the arterial tree. After injection, needle was taken out and thread around the artery was firmly tightened. The same procedure was repeated with other artery. Color of dye was red in one umbilical artery and black in other. Then we kept the placenta in 10% formalin for fixing the material for one day and later in 30% KOH for seven days at 40^0C. Casts were ready and observed for arterial pattern.

3. Determining the arterial pattern

The arterial patterns are of two types (Schordania J. 1929).

A. Disperse Pattern

Here artery gives branches dichotomously, which fills each half of placenta with arteries of gradually diminishing caliber (Photograph 2).

Photograph 2. Disperse type of arterial pattern.

B. Magestrial Pattern

Here artery gives branches in monopodial manner, where caliber of umbilical artery remains same as far as the margin of placenta before their calibre diminishes. (Photograph 3)

Photograph 3. Magestrial type of arterial pattern.

OBSERVATIONS

Following observations were made

Table 1. Placental Arterial Pattern

S. No.	Pattern	Number	Percentage
1.	Dispersed	68	68%
2.	Magestrial	32	32%

Table 2. Placental Volume with Arterial Pattern

S.No.	Pattern	Mean Volume (ml)	Maximum Volume (ml)	Minimum Volume (ml)
1.	Dispersed	495	540	450
2.	Magestrial	470	500	420

RESULTS

We observed (Table-1) the normal pattern by corrosion cast. Out of 100 placenta, we found that 68 placenta i.e. 68% were of dispersed variety (Photograph 2) and 32 placenta i.e. 32% were of Magestrial variety (Photograph 3).

From Table-2 it is clear that the mean volume in dispersed variety was 495ml and that in magestrial variety was 470ml. Maximum and minimum volume in dispersed and magestrial variety were 540ml (max.), 450ml (min.), 500ml (max.) and 420ml (min.) respectively.

DISCUSSION AND CONCLUSION

According to Aherne and Dunnill M.S. (1966), the volume of the normal placenta at term is usually stated to lie between 450 and 500 ml. They found average placental volume as 488 ml. Chung and Park (1947), recorded average placental volume as 596 ml in their study.

According to Udainia A. and Bhagwat S.S. (2004). “Placenta is a mirror which reflects the intrauterine status of the foetus”.

Study of placental volume can be helpful in diagnosing the cases of intrauterine growth retardation (IUGR) and pregnancy induced hypertension (PIH), as the volume of placenta get significantly reduced in such cases as revealed by De Paula et al (2009).

Hafner et al (2001), stated that measurement of placental volume in first and second trimester of pregnancy enables identification of impaired trophoblast invasion and helps in predicting the development of IUGR and PIH.

In our study, we found that the minimum and maximum volume, were 420 ml and 540 ml respectively and the mean volume was 480 ml. As per my knowledge, no study has been done to correlate the arterial pattern with the placental volume. So we did this study to find out the correlation between the arterial pattern and the placental volume.

In this study we found that

Out of 100 placentae, 68% placentae were found to be having dispersed arterial pattern, while only 32% placentae were found to be having magestrial pattern. We found the mean volume of placenta with disperse pattern was 495 ml, while with magisterial pattern it was 470 ml. Hence it is concluded that the placentae with disperse pattern is more common (68%) than the placentae with magestrial pattern (32%) and the placentae with disperse pattern were found to have more mean volume (495 ml) as compared to placentae with magisterial pattern (470 ml).

Conflicts of interest

All authors have none to declare.

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