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Anatomy of *Apara* (placenta) - A Review

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ABSTRACT

The placenta is almost circular disc and flat like structure. The matured placenta is 15-18cms in diameter, 23mm in thickness and about 500gms in weight. The placenta has two surfaces, maternal and foetal. The maternal surface is attached to endometrium whereas the foetal surface is covered with amnion which is white shiny and mottled in appearance. The maternal surface consists of 20 distinct lobules known as cotyledons. Each lobule consists group of villi. Which is separated by septum known as placental septum. The placenta store nutrients such as carbohydrates, proteins, calcium, iron etc. Which are released into the foetal circulation when are required. Through the placenta transportation of oxygen, water, electrolytes, nutrition from mother to foetus and waste products like urea, uric acid and carbon dioxide and other produced by foetus are excreted to the maternal blood. According to Ayurveda the placenta is formed by the accumulation of *Rakta* (Blood). When the orifices of minute *Artavavaha Strotas* are occluded by growing foetal mass, menstruation stops, because of same cause. Unexpelled *Artava* ascends up due to occlusion of down ward passage and accumulates to form *Apara* (Placenta).

Key words: Ayurveda, *Apara*, Placenta, Anatomy, Endometrium, *Artava Vaha Strotas*.

INTRODUCTION

The placenta is a disc shaped organ average 15-18cm in length and 23cms in thickness, and weighs about 500gms. It connects to the foetus by an umbilical cord of approximately 55-60cms in length that contains two arteries and one vein. The umbilical cord inserts into the chorionic plate. Vessels branch out over the surface of the placenta and further divide to form a network covered by a thin layer of cells. This results in the formation of villus tree structures. On the

maternal side, these villous tree structures are grouped into lobules called cotyledons. According to *Ayurveda*^{[1],[2]} the placenta forms when the orifices of minute *Artavavaha Strotas* are occluded by growing fetal mass, menstruation stops, because of the same cause. unexpelled *Artava* ascends up due to occlusion of down ward passage and accumulates to form *Apara*. It is also called as *Jarayu*. The accumulated *Rasa* leads to the formation of umbilical cord (*Garbha Nadi*).

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DISCUSSION

Formation of *Apara*

As per *Acharya Sushruta*^[3] in woman who have conceived, the *Artava* (menstrual blood) get blocked. The obstructed in its downwards flows moves upwards and helps in the development of *Apara* (Placenta). According to *Acharya Charaka*^[4] the *Garbha* (Foetus), without *Kshudha* (Hunger), and *Pipasa* (Thirst), depends upon *Garbhini* (Mother), for its maintenance entirely, by the mechanism of function of *Shukra* and *Shonita* in *Garbhashaya*. This can be correlated with altered functions of

hypothalamic-pituitary ovarian axis by the growing zygote by formation of HCG and stoppage of menstruation and proliferation of decidua leading to placentation. At the eighth day after fertilization the trophoblast is differentiated into two layers viz; Cytotrophoblast and Syncytiotrophoblast. The cytotrophoblast consists of well-defined cells, whereas syncytiotrophoblast has multiple nucleus with common cytoplasm, Syncytiotrophoblast secretes enzyme which can digest and liquify the endometrium that enable the blastocyst to enter into the uterine wall. In this way the blastocyst gets buried in the endometrium. As syncytiotrophoblast expands, small spaces containing maternal blood are formed within it which are known as lacunae. Extra embryonic mesoderm and two layers of trophoblast such as cytotrophoblast and syncytiotrophoblast together form chorion. The chorion and decidua basalis together form Placenta.

The placenta has both fetal and maternal origin, chorionic belongs to fetal part and decidua basalis belong to maternal part. During embryonic life the chorionic develops finger like projections into the decidua basalis. They are called as chorionic villi. The chorionic villi continue to grow until they get bathed in maternal blood, present in intervillous space called lacunae, where exchange of materials i.e., nutrition and gases occur between mother and foetus. The maternal blood enters the intervillous space of the placenta through spiral arteries, branches of uterine artery. It bathes the chorionic villi and flows peripherally to the marginal sinuses which leads to the uterine veins. The development of placenta is accomplished by the end of 3rd month of pregnancy.^[5]

Structure of the Placenta^[6]

1. The placenta is almost circular disc flat like structure when fully formed.
2. The matured placenta is 15-20cms diameter, 23mm thickness and about 500gms in weight.
3. It has two surfaces viz; maternal and fetal. The maternal surface is directly attached with

endometrium. The fetal surface is covered with amnion which has white and shiny appearance.

4. The maternal surface consists of about 20 lobules known as cotyledons. Each lobule consists of group of villi separated by a septum known as placental septum.

Functions of Placenta^[7]

- **Transportation** - Through the placenta transportation of oxygen, water, electrolytes and nutrition occurs from mother to foetus and waste products like urea, uric acid, carbon dioxide and other produced by foetus are excreted to the maternal blood.
- **Barrier** - It acts as barrier and prevents many microorganisms and harmful substances such as drugs to enter into the foetus from mother. However, most viruses like HIV and some bacteria like tuberculosis may cross the placental barrier to affect the foetus. Some drugs are contraindicated in pregnancy can cross the placenta to cause congenital anomalies.
- **Storage** - The placenta stores nutrients such as carbohydrates, proteins, calcium, iron etc which are released into the fetal circulation when are required.
- **Endocrine** - It produces several hormones those are necessary in pregnancy. Viz; Estrogen, progesterone, HCG, HCS (Human chorionic somatotropin) or HPL (Human placental lactogen), relaxin (Secreted by ovary and placenta). The HCL and HPL stimulates development of breast for lactation, It has anti insulin effect on mother as it increases blood glucose and amino level in the maternal blood to go to the fetal circulation.
- **Immunity** - Maternal antibodies against some infections such as measles, diphtheria, tetanus, pertussis etc. reach the foetus through placenta called passive immunity. To provide against such diseases after birth up to some month. As maternal and fetal circulations are separated i.e.,

no intermixing of blood, there is no chance of antigen and antibody reaction.

Apra Vikruti - Abnormal Placenta^[8]

The Apra Vikruti is of 3 types;

According to shape - Normal shape of placenta is like that of a disc. The shape of abnormal placenta may be of following types;

- **Bidiscoidal** - It has two discs but both have common umbilical cord.
- **Lobed** - It is divided into many lobed
- **Diffuse** - In this condition chorionic villi spread all around the blastocyst; the placenta is fused in the decidua; it is very thin and cannot assume the shape like a disc.
- **Placenta Succenturiata** - Here a small part of placenta is separated from mother placenta and attached at a distance from it.
- **Fenestrated** - Sometimes central part of placenta is deficient in villous tissue (Chorionic villi) is appeared as a presence of hole in the placenta; this is known as fenestrated placenta, Clinical it a retained part of placenta during third stage of labour.
- **Circumvallate** - In this the peripheral edge of the placenta is covered by a circular fold of decidua.
- **Placenta Previa** - When the placenta is implanted in the lower segment of uterus, the condition is known as placenta previa. It may lead to painless bleeding during 3rd trimester.
- **Placenta Accreta, Increta and Percreta** - These conditions arises when placenta penetrate the myometrium; this leads to retained placenta.
- **Calcification of Placenta** - It is seen in post maturity.
- **Inflammation** - Plecentitis is seen in premature or early rupture of membranes.

According to the attachment of Umbilical Cord^[9]

- Normally the umbilical cord is attached to the placenta at the center. Rarely the cord may be

attached away from the center. Accordingly, the abnormalities are; Marginal and Furcate. In the marginal the cord is attached to the margin of the placenta. It is also known as battle dore placenta. In the Furcate the blood vessels of umbilical cord divide before reaching the placenta.

- **Velamentous Insertion** - When a branch of umbilical vessels goes to amniotic membranes and splits into branches reaching the placenta, the condition is known as velamentous insertion. This causes haemorrhage followed by rupture of membranes.

CONCLUSION

The placenta is almost circular disk and flat like structure. The matured placenta is 15-18cms in diameter, 23mm thickness and about 500gms in weight. The placenta has two surfaces maternal and fetal. The maternal surface is attached to endometrium whereas the fetal surface is attached with amnion which is white and shiny in appearance. According to Ayurveda the placenta form by the accumulation of *Rakta* (Blood). When the orifices of minute *Artavavaha Strotas* are occluded by growing fetal mass, menstruation stops, because of the same cause, unexpelled *Artava* ascends up due to occlusion of downward passage and accumulates to form *Apra* (Placenta).

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