

**A CLINICAL REVIEW ON APARA NIRMITI (PLACENTA FORMATION) AND ITS
ABNORMALITIES****¹Dr. Prashant Chandrakant Sarade, ²Dr. Ganesh Sopanrao Kapse and ³Dr. Sagar Fulaji Magar**¹Asst. Prof. in Swasthavritta & Yoga, at SST Ayurved College, Sangamner.²Asst. Prof. in Rachana Sharir, at SST Ayurved College, Sangamner.³Asst. Prof. in Panchkarma, at SST Ayurved College, Sangamner.***Corresponding Author: Dr. Prashant Chandrakant Sarade**

Asst. Prof. in Swasthavritta & Yoga, at SST Ayurved College, Sangamner.

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INTRODUCTION

Ayurveda has been a part of the culture of India and as such is mixed up in the entire Indian documents. The shastras has given its own manner of explaining the ancient rituals which has a significant scientific impact on the health of the human beings. Considering woman as a vital entity for reproduction, Acharyas have given more importance to well being of woman. The classics have given detailed quotes on the rules to be followed through out the prenatal, antenatal and postnatal period of conception.

Acharya Charakahas described the nourishment of 'Garbha' through 'Apara'In 'Sharirvichay Sharira Adhyaya'of Sharirasthanain Charak Samhita. Acharya Sushruta described the 'Apara utpatti'in the Adhyaya 'Garbhvyakaran Sharir'of Sharirsthana. He explained that in a pregnant woman the Artava is obstructed by the Garbha ascends upward, and a part of it accumulates and by going up forms the Apra.

Acharya Bhoja says that, Garbha obstructs both rasa and raktavaha nadi and jarayu is born out of rakta. Acharya Indu says that apart from accumulation of Artava, diet used by mother also contributes to the gradual formation of placenta. Due to gradual formation, it is called as Apra. Acharya Vagbhata in Ashtanga Sangraha has described the synonym Jarayu for Apra.

Incidence of placental abnormalities has increased nowadays. Placenta previa and abruptio placenta are more common abnormalities affecting 25-40% and 15% of pregnancies respectively. Detailed examination of placenta can give useful information in determining pregnancy outcome.

According to modern science it is proven that maternal genes plays an important role in placental expression. Also, many studies have shown the association of specific genes with the phenotype of a particular Prakriti and the association of genomic variations with classification of Prakriti. As placenta is an organ of fetomaternal origin, it may have a relation with maternal prakriti.

Ayurvediya review

Sushrutacharya has described in sharirsthana of 4/23, the Apra-Utpatti as follows.

गृहीतगर्भाणामार्तववहानाम् स्रोतसां वत्मानि अवरुध्यन्ते गर्भेण, तस्माद् गृहीतगर्भाणाम् आर्तवं न दृश्यते, ततस्तदधः प्रतिहतं उर्ध्वमागतं अपरं चोपचियमायमानं अपरा इत्याभिधियते ।

According to Sushruta, in pregnant woman the Artava gets obstructed by the Garbha, therefore Artava is not visible though it is present. The Artava is thus obstructed in its downwards flow, ascends upward, and a part of it accumulates and by going up forms the Apra, the remaining portion goes higher up to the breasts and helps in formation of corpulent and protruded breasts.

He further stated that the obstruction of Artavaha srotas, the obstruction in the process of decline of corpus luteum, and the source of Artava (ovum) is taken, and then the description becomes very clear as the progesterone secreted by corpus luteum is very impotent for implantation.

Acharya Vagbhat has explained, the fetus gets nutrition through the Nabhi Nadi (umbilical cord) which is attached to the centre of the Apra and it is responsible to bring the nutritional products to the embryo. Sushruta further quoted that in intrauterine life of the fetus, Apra has been held responsible for the act of respiration and excretion; all these acts are dependent on mother's health.

Definition

Placenta is a fleshy structure that develops mostly from fetal chorionic tissue (arising from trophoblast.) and maternal decidua during pregnancy. It lies implanted on the uterine wall. It is connected with foetus through umbilical cord in the amniotic cavity. It maintains pregnancy and carries vital foetal functions.

Formation of placenta (According to modern science)

✚ Implantation

After the ovum is shed from the ovary, it travels through the uterine tube towards the uterus. If fertilization occurs, segmentation of the ovum begins. By the time the fertilized 'ovum' reaches the uterus, it has already become a morula. The morula is still surrounded by the zona pellucida which prevents it from 'sticking' to the wall of the uterine tube. The cells lining the surface of the morula, constitute the trophoblast. The trophoblast has the property of attaching itself to, and invading, any tissue it comes in contact with. Once the zona pellucida disappears, the cells of the trophoblast stick to the uterine endometrium. This is called implantation.

In humans, implantation begins on the 6th day after fertilization. The trophoblast of the human blastocyst invades the endometrium of the uterus. The blastocyst burrows deeper and deeper into the uterine mucosa till the whole of it comes to lie within the thickness of the endometrium. This is called interstitial implantation. The process of implantation is aided by proteolytic enzymes produced by the trophoblast. The uterine mucosa also aids the process. The trophoblastic cells which are situated over the inner cell mass, start penetrating the epithelium of the endometrium. The implantation results due to mutual interaction between trophoblastic cells and endometrium. This interaction is mediated by the receptors present on uterine epithelium and the secretion of 'Lselectin' and 'intergrins' by the trophoblast cells.

✚ Decidua

After the implantation of the embryo, the uterine endometrium is called the decidua. When the morula reaches the uterus, the endometrium is in the secretory phase. After implantation, the features of the endometrium, which are seen during the secretory phase of the menstrual cycle, are maintained and intensified. The stromal cells enlarge, become vacuolated, and store glycogen and lipids. This change in the stromal cells is called the decidual reaction. The portion of the decidua where the placenta is to be formed (i.e. deep to the developing blastocyst) is called the decidua basalis. The part of the decidua that separates the embryo from the uterine lumen is called the decidua capsularis. The decidua basalis consists predominantly of large decidual cells which contain large amounts of lipids and glycogen (that presumably provide a source of nutrition for the embryo). Capsularis, while the part lining the rest of the uterine cavity is called the decidua parietalis. The decidua basalis consists predominantly of large decidual cells which contain large amounts of lipids and glycogen

(that presumably provide a source of nutrition for the embryo). The decidua basalis is also referred to as the decidual plate, and is firmly united to the chorion. At the end of pregnancy, the decidua is shed off, along with the placenta and membranes. It is this shedding off which gives the decidua its name.

✚ Formation of chorionic villi

The essential functional elements of the placenta are very small finger-like processes or villi. These villi are surrounded by maternal blood. In the substance of the villi, there are capillaries through which the fetal blood circulates. Exchanges between the maternal and fetal circulations take place through the tissues forming the walls of the villi. The villi are formed as offshoots from the surface of the trophoblast. As the trophoblast, along with the underlying extra-embryonic mesoderm, constitutes the chorion, the villi, arising from it, are called chorionic villi. The chorionic villi are first formed all over the trophoblast and grow into the surrounding decidua. Those villi related to the decidua capsularis are transitory. After some time these degenerate. This part of the chorion becomes smooth and is called the chorion laeve. In contrast, the villi that grow into the decidua basalis undergo considerable development. Along with the tissues of the decidua basalis these villi form a disc-shaped mass which is called the placenta. The part of the chorion that helps to form the placenta is called the chorion frondosum.

The essential features of the formation of chorionic villi are as follows. The trophoblast is at first made up of a single layer of cells. As these cells multiply, two distinct layers are formed. The cells that are nearest to the decidua (i.e. the most superficial cells) lose their cell boundaries. Thus, one continuous sheet of cytoplasm containing many nuclei is formed. Such a tissue is called a syncytium. Hence, this layer of the trophoblast is called the syncytiotrophoblast or plasmotrophoblast.

Deep to the syncytium, the cells of the trophoblast retain their cell walls and form the second layer called the cytotrophoblast (also called Langhan's layer). The cytotrophoblast rests on extra-embryonic mesoderm. All these elements (syncytium, cytotrophoblast and mesoderm) take part in forming chorionic villi. The following three stages in formation of chorionic villi are seen:

1. Primary villi consist of a central core of cytotrophoblast covered by a layer of syncytiotrophoblast. Adjoining villi are separated by an intervillous space.
2. Secondary villi show three layers: outer syncytiotrophoblast, an intermediate layer cytotrophoblast, and an inner layer of extraembryonic mesoderm.
3. Tertiary villi are like secondary villi except that there are blood capillaries in the mesoderm

Further development of the placenta

The placenta now becomes subdivided into a number of lobes, by septa that grow into the intervillous space from the maternal side. Each such Lobe of placenta is often called a maternal cotyledon. If the placenta is viewed from the maternal side, the bases of the septa are seen as grooves while the cotyledons appear as convex areas bounded by the grooves. These lobes generally number 15 to 20. Each lobe contains a number of anchoring villi and their branches. One such villus and its branches constitute a fetal cotyledon. The placenta now forms a compact mass and is disc shaped. At 5th week menstrual age gestation sac throws chorion buds (primary villi only two layer of trophoblast) on all sides. During 6-8 week menstrual age chorion on side of decidua basalis form secondary (with mesoderm) and tertiary (with blood vessels) villi which multiply and proliferate to form chorion frondosum. By 10-12th week menstrual age, definitive placenta forms from chorionic frondosum with placental villi containing foetal blood-vessels. By 8th week placental site can be located by ultra sound.

Abnormalities of the placenta

A. Placenta Previa:- When placental implantation occurs in the lower segment of uterus reaching the cervical or when incompletely covered by one edge it is called placenta previa. It is seen in usually < 0.5 percent of deliveries. Placenta previa often results in premature separation of the placenta that leads to profuse vaginal bleeding, premature labour or sometimes both.

B. Placenta Accreta, Increta and Percreta:- Placenta accreta is implanted on uterine smooth muscle where it is limited to the superficial myometrium. Placenta increta extends into the myometrium and percreta extends through the myometrium and goes through the uterine serosa. The complications (ante partum) of placenta accreta include vaginal spotting, concealed haemorrhage, and even rupture of uterus which is confined mainly to placenta percreta.

C. Superficial Implantation:- This is an underlying abnormality in pre eclampsia that affects < 3% of all pregnancies. It is more common in nulliparous than the multiparous women. Other related problems are fetal growth restriction, maternal thrombophilia and abruptio placenta.

D. Shape abnormalities

- **An accessory lobe-** Separated from the main body by membranes.
- **Multilobation-** Shows membranous indentations of placental disc involving 50% of its diameter.
- **Atrophy-** Placental thickness is reduced by 50 percent; involving more than 10% of placental disc.

E. Peripheral Cord Insertion

- **Velamentous (membranous) insertion:** occurs in 1.3 – 1.6 percent.
- **Marginal insertion:** occurs in 6 – 9 percent gestations.
- **Peripheral insertion:** Accentric umbilical cord insertion.

F. Placental Calcification:- Calcium salts may be deposited throughout the placenta, but are the most common on the basal plate. Calcification occurs with advancing gestation. The causes include trophoblastic aging or impairment of utero placental circulation.

G. Abruptio placentae:- Placental abruption is when a part or all of the placenta separates prematurely from the uterine wall and is an important cause of ante partum haemorrhage. It is thought to occur following a rupture of maternal vessels within the basal layer of the endometrium, blood accumulates and causes the placenta to split from the basal layer – any detached portion is unable to function which can lead to rapid foetal compromise.

DISCUSSION AND CONCLUSION

Aplara is the only organ between mother and fetus which supplies the Ahara rasa for proper growth of fetus. Any abnormality in Aplara causes fetal and maternal hazards. Charakacharya has described the nourishment of Grabha through Aplara. He has given synonym of Aplara as Amara.

In modern literature detailed description of formation and embryological development of placenta and umbilical cord, Anatomical structure of placenta, functions of placenta and abnormalities of placenta have been explained. Gene expression pattern in human placenta has given.

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