

'Fertilization to Implantation' Described By Sushruta: A Literature Study

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Abstract

Embryology is science dealing with formation & development of zygote till delivery of fetus. Ayurveda scholars like Charaka, Sushruta have described embryology in detail as Garbhavkranti. Sushruta in 5th chapter of sharirsthana mentioned about stages after fertilization till implantation. The study reveals that Sushruta had perfect idea about the embryological development and he had perfectly described same.

Keywords: Embryology; Fertilization, Implantation.

Introduction

It is been said that Sushruta has described anatomy perfectly other than anyone [1]. The description of anatomy along with embryology is seen in sharirsthana.

The fertilization of shukra (male gamete) and shonita (female gamete) in garbhashaya (uterus) with the presence of aatma (soul) results in formation of Garbha [2]. This description perfectly matches the description of zygote formation. After the fertilization the zygote migrates towards uterine cavity.

The further development is monitored by panchmahabhuta [3]. The vaayu mahabhuta being dominant mainly divides the cells. Teja mahabhuta participates into intra embryonic development. Jala mahabhuta increases the intra cellular fluid levels. Prithvi mahabhuta increases the cellular density. Akash mahabhuta mainly increases inner space resulting growth.

When Garbha develops the body parts like extremities, face, neck, etc. it is called as Sharir (fetus) [4].

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Materials & Methods

For the critical analysis the literature study was performed. Sushruta along with dalhan commentary was studied in detail. Modern embryology was also studied with reference to development from the stage of fertilization till implantation.

Discussion

Embryology describes that at the time that morula enters the uterine cavity, the fluid begins to penetrate through zona pellucida into inter cellular spaces become confluent and finally a single cavity blastocoele is formed. At this time embryo is known as blastocyst. The blastocyst implants in the endometrium along the posterior wall or the anterior wall of the uterus [5].

The trophoblastic cells over embryoblast pole begin to penetrate between the epithelial cells of uterine mucosa. The uterine mucosa promotes the proteolytic action of blastocyst. At the beginning of the second week the blastocyst is partially embedded into endometrial stroma. The trophoblast differentiates into inner cytotrophoblast and syncytiotrophoblast. The maternal sinusoids are eroded by the syncytiotrophoblast, maternal blood enters the lacunar network and by the end of second week primitive uteroplacental circulation begins which subsequently leads to the growth and development of the embryo.

Now in comparison to this we will assess the description given by Sushruta with little perspective.

1. *Vaayu Vibhajati* - cell division is the first development occurring in zygote. After fertilization the single cell zygote divides into 2 cells later 4, 8 cells and so on 16 or 32 cell stage is known as morula [6,7]. Vaayu mahabhuta mainly divides the cells which lead to the growth.
2. *Tej Pachati* - tej mahabhuta usually responsible for digestion or transformation. But here we can correlate this to activity of syncytiotrophoblast which secretes some fluids which erodes the mucosal membrane and results in capillary bleeding. This is an important event during second week of development.
3. *Aap kledayanti* - jala mahabhuta has the function of kledana. As result of erosion by syncytiotrophoblast establishing an interface between maternal blood and embryonic extracellular fluid, facilitating passive exchange of material between the mother and the embryo.
4. *Prithvi Sahanti* - Prithvi mahabhuta gives density to Garbha. As the primitive uteroplacental circulation is established the inner cell mass i.e. embryoblast and outer cell mass i.e. trophoblast proliferate. The further cell division results in increase of cellular mass which is due to action of Prithvi mahabhuta.
5. *Akash vivardhayati* - akash mahabhuta increases the inner space. In the later stages the three germinal layers are formed which results in development of various organs and the systems. The development of thoracic, abdominal, cranial cavity etc as the important landmarks of development. Hence increase in the size and shape of foetus can be considered as activity of akash mahabhuta.

Conclusion

This description perfectly describes the all activities occurring during fertilization to implantation stage. Fertilization is an important event and further cell division leads to growth of embryo. All stages of fertilization to implantation are described by the Sushrutacharya as described in modern embryology. This proves greatness of ancient knowledge which perfectly matches the modern embryology.

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