

Attachment Placental Disorders: Placenta Accreta

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Proper placentation is a condition for the normal course of pregnancy, that is, the future health of the mother and the fetus. In the 18th century, the Hunter brothers first described spiral arteries, but substantial advances in the knowledge of the mechanism of placentation occurred in the late 20th century, with the introduction of cytokeratin immunohistochemical studies. These examinations finally confirmed the trophoblastic origin of the endovascular and intramural cells in the wall of the spiral arteries [1,2]. The unique process of vascular remodeling in human placenta is regulated in two ways: by the decidua and by the trophoblast itself.

The chorion normally attaches to the endometrial decidua, but if the decidua is thinned or denuded, the chorion may attach directly to the myometrium- abnormally. Clinically, Placenta accreta or abnormally invasive is describes as clinical situation where the placenta does not detach spontaneously after delivery and cannot be forcibly removed without causing massive and potentially life-threatening bleeding [3].

The degree of abnormal placentation is classified according to the depth of myometrial invasion:

1. Placenta accreta (PA)- The chorionic villi attach to the myometrium, rather than being restricted within the decidua basalis (75%).
2. Placenta increta (PI)- The chorionic villi invade into the myometrium (18%).
3. Placenta percreta (PP)- The chorionic villi invade the myometrium through the serosa (7%) [4,5].

The incidence of PA is increasing worldwide, most likely due to an increase in the incidence of caesarean sections.

PA spectrum disorder occurs in around 1.7 per 10,000 pregnancies. The incidence increases with the presence of risk factors. The most commonly described risk factor is the association of previous caesarean delivery and low-lying placenta or placenta previa. Major risk factors are a history of placenta previa, assisted reproductive techniques, previous caesarean section, advanced maternal age, smoking, hypertension, multiparity and a history of endo-uterine maneuvers [5,6]. PA is also related to: Fibroids, Asherman Syndrome, endometrial ablation, dilatation and curettage, myomectomy, congenital uterine anomalies etc [7,8].

The exact pathogenesis of placenta accreta is unknown, but several theories have been proposed to explain why and how PA occurs. A proposed hypothesis includes an abnormal decidual development or abnormal (excessive) trophoblastic invasion or a combination of both. These pathological mechanisms usually are consequences of previous instrumentation, as described above [9].

The abnormal expression of growth, angiogenesis, and invasion-related factors in the trophoblast populations are the possible main factors responsible for the development of placenta accrete [10].

On the other hand, Earl, *et al.* reported that the immunophenotype of extravillous trophoblastic populations in PA is identical as in normal placenta. The overactive trophoblastic invasion plays a major role in the pathogenesis of PA, and the absence of decidua is of greater importance in the pathogenesis [11]. Tantbirojn, *et al.* explained invasion of larger vessels in the outer myometrium and near the serosa to be determined by access rather than a preexisting defect in trophoblastic growth that would produce uncontrolled invasion through the entire depth of the myometrium in cases of accreta. The authors propose that PI and PP more likely arise due to dehiscence of a scar, which gives cells from the trophoblast column better access to large outer myometrial vessels [12]. Other authors [8] showed that an induced sharp decidual incision (cesarean section) increased significantly the invasion potential of the trophoblastic cells. In addition, complete re-approximation of the incised edges of the decidua *in vitro* condition, made the incised decidua to behave similarly to intact decidua while restricting once again the extent of the invasiveness. Using the same cohort of trophoblast cells, while changing only the decidual anatomic characteristics, the invasion potential of trophoblastic cells *in vitro* changed accordingly emphasizing the role of decidua on the invasion potential [8].

Abnormal placentation is considered as an underlying cause of various pregnancy complications such as miscarriage, preeclampsia and intrauterine growth restriction, the latter increasing the risk for the development of severe disorders in later life such as cardiovascular disease and type 2 diabetes [13]. Due to the high morbidity associated with this condition, accurate prenatal diagnosis of PA plays a crucial role in the treatment of these situations. Antenatal ultrasonography is used to support the diagnosis and guide clinical management leading to favorable outcomes. Magnetic resonance imaging can be helpful when the placenta is difficult to visualize on ultrasound due to the patient's body habitus or to a posterior location of the placenta [14].

Ultrasound signs which suggest of PA can be detected in all trimesters. In the first trimester, implantation of the gestational sac in the lower uterine segment or in the area of the caesarean section scar is one of the predictive signs. Ultrasound signs suggesting PA in the second and third trimesters are: multiple vascular lacunae, loss of normal hypoechoic retroplacental zone, abnormality in uterine-serosa-bladder interface, retroplacental myometrial thickness of < 1 mm), turbulent blood flow with Color Doppler through lacunae, invasion of myometrium, serosa, or bladder (extension villi into myometrium, serosa, or bladder) [5,14].

European working group on abnormally invasive placenta suggests an ultrasound scoring system that includes 9 ultrasound signs and one anamnestic parameter (number of previous cesarean sections). Each parameter is scored with 0, 1 or 2 points. The sum of the points of the ten parameters reflects the weight of the PA with a maximum score of 20 points [14].

Management of PA and other placental abnormalities varies from center to center, but also by the degree of invasiveness of the placenta. Pregnant women diagnosed with PA give birth by caesarean section. It is best to have it elective, as opposed to an emergency caesarean section. Timely diagnosis of PA enables planning of pregnancy termination and appropriate multidisciplinary approach (experienced specialists in gynecology and obstetrics, transfusionologist, urologist, anesthesiologist, neonatologist and interventional radiologist, in case of need for pelvic artery catheterization) [14].

One of the basic postulates in the treatment of PA is non-removal of the placenta whether it is a postpartum hysterectomy or conservative treatment. Any attempt to remove a deep-seated placenta from an already thinned myometrium will lead to life-threatening hemorrhage. Postpartum hysterectomy is the gold standard in the treatment of PA, although it is associated with high and severe maternal morbidity (primarily hemorrhage and trauma to surrounding organs during surgery) [3]. Planned caesarean section in such patients reduces maternal and neonatal morbidity and mortality [14]. Hysterectomy has long been considered the only definitive treatment for PA.

The conservative treatment involves leaving the entire placenta or parts of it in the uterus until it is completely reabsorbed. This treatment is used in women who want to preserve fertility. In such situations, several adjuvant procedures are applied such as: methotrexate treatment and/or placement of preoperative internal iliac artery balloon catheters for occlusion and/or arterial embolization to reduce intraoperative blood loss and transfusion requirements [8].

In conclusion, it can be said that PA and other variants of invasive placentation are complications in pregnancy that tend to increase, especially if risk factors are taken into account. Ultrasound diagnosis of abnormal placenta is the method of choice due to its relatively low cost and easy availability, unlike magnetic resonance imaging. Prenatal diagnosis of this life-threatening condition is of particular importance, as it enables planning of pregnancy termination by organizing a multidisciplinary approach and involving an expert team of obstetricians, pediatric neonatologists, urologists, vascular surgeons, radiologists and anesthesiologists. This approach in highly specialized institutions significantly reduces postpartum complications in both mother and fetus. Hysterectomy after caesarean section is the treatment of first choice, while conservative treatment should be used in strictly selected cases.

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