17th World Congress in Fetal Medicine

Relationship between intercellular adhesion molecule-1 and morbidly adherent placenta

Korkmazer E, Nizam R, Arslan E, Akkurt MO, Güçlü T
Bursa Yüksek İhtisas Research and Trainin Hospital, Bursa, Turkey

Objective

Morbidly Adherent Placenta (MAP) is an important clinical condition that includes placenta accreta, increta and percreta. The entire pathogenesis of MAP is not fully elucidated. In cases of MAP, placental trophoblasts invade the decidua, the myometrium and even beyond. MAP can cause life-threatening bleeding at delivery. Cell adhesion molecules are involved in the regulation of many events, such as orientation of cells to specific tissues, recognition of cells among each other, remodeling, and inflammation. Inter Cellular Adhesion Molecule – 1 (ICAM-1) is a member of the immunoglobulin superfamily of proteins expressed in several cell types. Placental macrophages are responsible for implantation, trophoblast function, placental angiogenesis and placental construction. ICAM-1 plays an important role in fulfilling all these functions. It also has a regulatory function, especially in placental angiogenesis. Therefore, we investigated the effect of ICAM-1 expression in MAP cases that had shown placental invasion anomalies.

Methods

Our study was conducted between May 2016 and October 2017 in Bursa Yüksek İhtisas Education and Research Hospital, Obstetrics and Gynecology Clinic. We included 112 placentas of patients with diagnosis of MAP and 307 placentas without adherent placenta. Patients with history of a previous uterine surgery (except cesarean section), placenta praevia in previous pregnancies, gestational diabetes, smokers, narcotic users, and intrauterine growth restricted fetuses were excluded. The study was approved by the local ethics committee. Women who were seen in the outpatient clinic were evaluated by transabdominal ultrasonography after physical and vaginal examination. If a MAP was suspected a transvaginal ultrasound was performed using the criteria by Cali et al. to define MAP. All women who met all of the criteria were considered as MAP and included in the study group. Ultrasound criteria were: - a placenta covering the anterior uterine surface and the cervical internal os entirely - loss/irregularity of the echolucent area between the uterus and the placenta ('clearspace'), - thinning or interruption of the hyperechoic interface between the uterine serosa and the bladder wall - irregular intraplacental vascularization - hypervascularity of the uterine serosa Women with a previous cesarean section (CS) without MAP appearance were included in the control group. The control group was delivered by elective CS at 38-39, the study group by planned CS with hysterectomy at 36-37 gestational weeks, respectively. All MAP diagnoses were verified intraoperatively. Immediately after CS the placentas were stored in containers containing 10% formaldehyde (neutral-buffered). Rectangular sections measuring 15x10mm were taken from the decidual surface of the placentas. The tissue samples were buried in paraffin blocks, stored in cold compartments and hematoxylin-eosin staining and ICAM-1 as an immune-histochemical staining after antigen retrieval treatment were applied to all sections of 4 micron thickness that had been obtained from the prepared paraffin blocks for all groups (ICAM-1 Antibody MS-1101-P ThermoScientific/LabVision). Prepared slides were examined with Nikon Eclipse Ni Education and Research Microscope that had NIS Elements v4. 30 Nikon Eclipse Ni Imagine Software Programme and pictures were taken. The pathologist evaluating the preparations was blinded regarding the patient group from which the specimens were taken. The placentas were assessed as positive or negative staining for ICAM-1 (Figure-1). SPSS 15. 0 was used for statistical analysis. Descriptive statistics were given as mean and standard deviation for ordinal variables. Statistical analysis of the ordinal variables was performed by Mann Whitney U test. The ratios of the groups were compared using the Chi square test. A probability value of $p<0.05$ was considered statistically significant.

Results

The demographics (age, gravida, parity, abortion, number of live children, body mass index) did not show statistically significant differences. A statistically significant difference was only found for gestational weeks at the time of delivery.

(Table 1) When the placentas were examined, 92 (82. 1%) of 112 placentas in the patient group and 95 (30. 9%) of 307 placentas in the control group were positive for ICAM-1 immuno-histochemical staining, respectively, constituting a statistically significant difference (p<0. 05). (Figure-1).

Conclusion

MAP is a clinical condition of increasing importance. Therefore, detection and prevention are very important. In our study, we observed that the adhesion molecule ICAM-1 was detected significantly more often in MAP. Although the etiology of MAP is a multifactorial condition that is not fully understood, we found that the adhesion molecule ICAM-1 may also be involved in placental invasion. There are basically two important components in the development of solid tumors. The first is the cellular mass produced by the tumoral cells themselves and the second is the connective and vascular tissue developing to support this cellular mass. This support is particularly produced by paracrine and endocrine secretions produced by the tumoral mass. The invasion ability of the tumor is an important step for its malignancy potential. In addition, angiogenesis is also a major factor to meet the high metabolic needs of a developing tumor mass. MAP demonstrates behavioral patterns similar to tumoral masses in these respects. In physiological conditions, tissue invasion and angiogenesis are controlled by biological feedback mechanisms. In tumoral tissues, this feedback mechanism has been shown to be defective. It is known that invasion is defective also in MAP cases. ICAM-1 is an important adhesion molecule that plays role in cell activation, tight binding and trophoblast migration in placental tissue. Overexpression of ICAM-1 has been implicated in invasion and progression in many types of cancer, such as lung cancer and hepatocellular carcinoma. Furthermore, in preeclampsia, which is a trophoblast invasion disorder, the role of ICAM-1 expression has been demonstrated. ICAM-1 which combine can trigger the calcium concussion, activate protein, and take a part in disintegration of the cells local adhesion, contraction of cells and the reconstruction of cytoskeleton, so as to promote the transfer of invasive cells. Gaffuri et al. shown that expression of ICAM-1 was low in normal placental tissue in a study [27]. In our study, similarly, the placental examination of control group revealed a low rate of ICAM-1 expression (27%). This is the first study on the role of adhesion molecules in MAP cases in the literature. We showed that ICAM-1 expression was significantly higher in MAP cases. Although this does not elucidate the entire pathogenesis of MAP cases, it appears to be a step in understanding the pathogenesis.