Altered gene expression of remodelling proteins after IVF/ICSI explain increased pregnancy complications

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Introduction: In IVF/ICSI pregnancies, placental adaptation that favors fatal development may be disrupted due to the unnatural pathways induced by in vitro interventions. This may be reason why the incidence of placental complications such as abnormally adhesive placenta and preeclampsia/ placental ablation are increased in these patients.

Matrix metalloproteinases (MMPs) are proteolytic enzymes that break up extracellular matrix (ECM) to remodel the tissues via angiogenic and apoptotic pathways. So called the tissue inhibitors of metalloproteinases (TIMPs) inhibit MMP actions and both of them are in balance during healthy tissue functions. Disturbed balance between MMP and TIMPs in favor of increased degradative activity during implantation, placentation and remodelling of the growing placenta may cause gestational problems which are more common in the pregnancies conceived via IVF/ICSI. The ADAMTS (A Disintegrin and Metalloproteinase with Thrombospondin motifs) enzymes are similar extracellular enzymes like MMPs. They cleave or modify the ECM, similar to their relatives. Increased expression is associated with uncontrolled tissue proliferation and behaviours of metastatic invasion in cancer and inflammatory diseases. ADAMTS 1, being the first identified member of this family, has an additional anti-angiogenic effect.

The aim of this study was to measure gene expression levels of MMP2, MMP9, TIMP 1 and ADAMTS 1 in placentas of IVF/ ICSI conceptions and compare them to the gene expression levels of placentas obtained from control patients who had conceived spontaneously.

Material Methods: A total of eighteen tissue samples of placenta from IVF/ICSI (n=9) and spontaneous (n=9) pregnancies were obtained. We measured the gene expression levels of ADAMTS1, MMP2, MMP9 and TIMP1 by real-time polymerase chain reaction. Expression levels were analysed using the delta threshold cycle method.

Results: The levels of ADAMTS1, MMP2, MMP9 were increased in placentas obtained from IVF/ICSI pregnancies compared to controls ($p<0.05$ for all). TIMP1 values were not different.

Conclusions: Gene expression of MMP2, MMP9 and ADAMTS 1 were increased in the placentas of the pregnancies conceived via IVF/ICSI compared to those conceived spontaneously. Disturbed placental architecture as a result of the increased destructive actions of MMP and ADAMTS may be one of the reasons why IVF/ICSI pregnancies are more prone to gestational complications.

Speaker Biography

Özlem Gün Eryilmaz has completed her PhD at the age of 24 years from Hacettepe University and Ob&Gyn Education and Research Hospital, Turkey. She has been working as a gynecologist for 22 years and for the last 8 years she has been interested in IVF and endometriosis. Her publications are mostly over these topics. Since 2013, she has been working as an associate professor in a government hospital in Ankara.

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