



Uterine artery Doppler in singleton pregnancies obtained by IVF/ICSI with fresh or frozen embryo transfers

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Objective

Medically assisted reproduction encompasses a heterogeneous group of procedures now frequently associated with embryonic cryopreservation. Pregnancy obtained by frozen embryo transfer (FET) present a reduced risk of preterm birth and low birth weight as compared to those achieved by fresh embryo transfer. The aim of this study is to evaluate uterine artery pulsatility index (UTPI) during pregnancies conceived by in vitro fertilization (IVF)/ intracytoplasmic sperm injection (ICSI) techniques using either fresh and cryopreserved embryos.

Methods

Prospective study of 448 cases performing ultrasound assessment at San Raffaele Hospital. IVF/ICSI group (n=219) was composed of fresh embryo transfers (fresh group, n= 119) or frozen embryo transfers (frozen group, n = 100). A control group (n= 229) was randomly chosen among women who conceived spontaneously. Twins and egg donations were excluded. All pregnant women underwent first-trimester combined test (1stscan: 11-14 weeks), second-trimester ultrasound (2ndscan: 18-24 weeks) and at least one third-trimester ultrasound (3rdscan: 25-36 weeks). Uterine artery Doppler was studied in each time point according to FMF criteria in order to obtain the mean uterine artery PI (UAPI) that were converted to delta UAPI (mean expected UAPI- mean UAPI) and to multiples of median (MoM). Data are presented with median and interquartile ranges. Continuous variables were analyzed by the Mann-Whitney U-test. The MoM UAPI values of IVF/ICSI pregnancies were compared with those of the naturally conceived group and between fresh and frozen groups by univariate mixed linear analysis.

Results

No difference was showed in delta UAPI and MoM UAPI between IVF/ICSI group and control group through pregnancy; however, delta PI was significantly lower in the frozen group than in the fresh group in all time points [1st scan: fresh group: -0.11 (-0.67-0.27), frozen group: 0.12 (-0.41-0.60), p= 0.013; 2ndscan: fresh group: 0.01 (-0.45-0.23), frozen group 0.27 (0.13-0.45), p < 0.0001; 3rdscan: fresh group: -0.01 (-0.16-0.09), frozen group 0.08 (0.02-0.22), p=0.01]. Considering the trend of MoM UAPI during pregnancy, there was a decrease in all groups [coefficient (95 CI), controls: -0.0169 (-0.173--0.0165), fresh: -0.0167 (-0.0171--0.0163), frozen: -0.0168 (-0.0172 --0.0163)] and there was a significant difference in the slope of the regression line of UAPI MoM against gestational weeks between control group and frozen group (p= 0.017) and also between fresh group and frozen group (p=0.002).

Conclusion

Mean UAPI across gestation is lower in pregnancies with FET as compared to those with fresh embryo transfer, whereas it is not different in the overall IVF/ICSI group and controls. Moreover, the physiological UAPI decrease is greater in IVF/ICSI with FET as compared to fresh embryo transfer. Pregnancies obtained by IVF/ICSI and FET present a more physiological placentation probably due to a natural uterine environment. These findings could explain their lower risk of prematurity and low birth weight as compared to fresh embryo transfer after controlled ovarian stimulation.