

The presence of an endometrioma adversely impacts cortical and peri-follicular blood flow in ipsilateral ovary potentially contributing to poor oocyte quality.

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Objective: Ovaries have a complex vasculature capable of undergoing dynamic structural and functional remodeling to support follicular growth and maturation, ovulation as well as corpus luteum formation and sustenance. Perturbations in the vascular dynamics may therefore have a profound impact on the follicular physiology, oocyte quality and corpus luteum function, particularly among women with endometriomas, who may suffer the consequences of increased reactive oxygen species (ROS) coupled with nitric oxide (NO) insufficiency and poor reproductive outcome. Here, we present a prospective study of ovarian cortical and perifollicular blood flow in ovaries with or without endometriomas among women undergoing ovarian stimulation.

Methods: Women with endometriosis and age matched women without endometriosis undergoing controlled ovarian hyperstimulation for ART were prospectively followed to study ovarian and peri-follicular blood flow using transvaginal ultrasound color doppler (n=36). Qualitative analysis of doppler waveforms as well as quantitative indices including peak systolic (PSV), end diastolic flow (EDV), resistance index (RI) and S/D ratio were documented on stimulation days 1, 6-9 and 10-14 and during oocyte retrieval using transvaginal ultrasound (GE Voluson P8) with standard color and pulse doppler settings. Qualitative and quantitative data were analyzed using appropriate parametric and non-parametric tests.

Results: In both groups, ovarian stimulation resulted in a progressive increase in perifollicular PSV and EDV and decrease in RI and S/D ratio throughout stimulation, peaking on the day of oocyte retrieval. However, the RI and S/D ratios were significantly higher among women with endometrioma in ipsilateral, but not contralateral ovary ($P<0.01$). Furthermore, perifollicular flow in ipsilateral ovaries containing the endometrioma was noted to have a diastolic notch (42.9 and 0% vs 4.5%), absent diastolic flow (21.4 and 0% vs 4.5%) and reversed diastolic flow (21.4 and 0% vs 0%) compared to contralateral versus ovaries of control subjects ($P<0.01$).

Conclusion: Presence of an endometrioma restricts physiological augmentation of blood flow around growing and periovulatory follicles. Resultant decrease in blood flow and consequent hypoxia is a likely key mechanism contributing to dysregulation of follicular and oocyte physiology in women with endometriosis.