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Influence of X-ray exposure during hysterosalpingography on the quality of oocytes in IVF

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(Introduction)

Hysterosalpingography (HSG) plays a crucial role in reproductive medicine by evaluating the condition of the fallopian tubes and uterus. However, it is ignored that HSG entails the exposure of the female reproductive organs to X-rays. It is suggested that X-rays, upon absorption by tissues, generate free radicals, thereby having a detrimental influence on the quality of oocytes. The present study aims to investigate the impact of X-ray exposure during HSG on subsequent laboratory parameters in IVF, such as the number of oocytes retrieved, maturation, fertilization, and embryonic development rates.

(Method)

A total of 1458 oocytes were analyzed in this study. Among these, 990 oocytes were retrieved from 70 women (89 cycles) who underwent HSG prior to IVF, while 468 oocytes were obtained from 45 women (57 cycles) without HSG. The X-ray exposure during HSG was measured as reference air kerma (RAK) (mGy). The subjects were categorized based on RAK levels: No-HSG (IVF without HSG), HSG with Low-RAK (RAK < 16.23), and HSG with High-RAK (RAK ≥ 16.23). A comparison of the number of oocytes retrieved, maturation, fertilization, and embryonic development was conducted among the three groups. Furthermore, multivariable analyses were performed to explore the impact of X-ray exposure on laboratory outcomes in IVF.

(Result)

A significant difference was recognized in the fertilization rate among the three groups (No-HSG: 71.6%, Low-RAK: 80.5%, High-RAK: 78.3%). Notably, the rate of good-quality

blastocyst formation in the High-RAK group (46.2%) was significantly higher compared to both the Low-RAK group (35.3%) and the No-HSG group (32.4%). Multivariable analyses demonstrated that X-ray exposure was associated with higher rates of fertilization, blastocyst development, and high-quality blastocyst development after adjusting for patient age, body mass index (BMI), ovarian stimulation protocols, and fertilization methods. No association was observed between X-ray exposure and the number of oocytes retrieved or maturation rate.

(Conclusions)

The present study suggests that X-ray irradiation on female reproductive organs during HSG has the potential to enhance oocyte competencies instead of exerting detrimental effects.