Influence of Menstrual Cycle Phase on Propofol Pharmacokinetics

Background: Several studies[1-4] reported menstrual cycle influenced pharmacodynamics of propofol. Unfortunately, plasma concentration of propofol was not measured in these studies. The aim of the study was to investigate the influence of the phase of menstrual cycle (the follicular and luteal phase) on propofol pharmacokinetics in premenopausal female patients.

Method and Materials: Female patients who were ASA physical status I or II, aged 20-49 years, scheduled to undergo surgery under general anesthesia were enrolled. After oxygenation, the patients received propofol 2 mg/kg for 3 min. Arterial blood samples were taken to measure propofol collected at 15, 30, 45, 60, 75, 90, 105, 120, 140, 160, 180, 195, 210, 225, 240, 260, 280, 300 s, and 5, 5.5, 6, 7, 8, 10, 12, 15, 20, 25, 30, 40, 55, 70, 90, 150, 180, 240 min after the start of the infusion of propofol until the operation was finished. Anesthesia was maintained using sevoflurane and remifentanil.

Pharmacokinetic model was developed. The best model structure was determined using conventional 2 or 3 compartment model with a lag time and transit model. The menstrual cycle phase was assessed as potential covariates for the pharmacokinetic parameters. NONMEM 7.3 (ICON plc, Dublin, Ireland) and PLT tools (PLT Soft, San Francisco, CA) were used for the model development.

Result: Eleven patients in the follicular phase and nine patients in the luteal phase were included. The ranges of age, weight and BMI were 20-45 years, 43-74 kg, and 18-27 kg/m^2. The best model structure was 3 compartment model with a lag time and two transit compartments. The menstrual cycle phase was a significant covariate for the final model.

Conclusion: The pharmacokinetics of propofol was described by a three-compartmental model with a lag time and two transit compartments. Menstrual cycle phase was found not to be a significant covariate.

References

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