

Women Patients Require More Propofol for General Anesthesia than Men

Prichep L. Drover D., *Anesthesiology* 2001; 95:A481.

Introduction

Many variables can affect anesthetic requirements during anesthesia and surgery. Common covariates are age and weight. Articles have been published suggesting that gender may produce a differential requirement for anesthesia, with women requiring more anesthesia than men.(1,2)

Methods

After IRB approval and informed consent, 224 patients were enrolled at 6 centers. This data was part of a prospective study of the Physiometrix patient state index (PSI). The PSI is a mathematical multivariate classifier function derived from quantitative EEG (QEEG) features recorded from anterior and posterior scalp locations (3). All patients received a propofol/alfentanil/nitrous oxide anesthetic after pre-medication with midazolam 1-2 mg IV. Anesthesia was induced with 1-2 mg/kg of propofol and ≤ 30 mcg/kg of alfentanil. The maintenance phase of anesthesia was initiated using 140 mcg/kg/min of propofol, 0.5 mcg/kg/min of alfentanil and nitrous oxide at 50%. Patients were randomized into 2 groups. In the first group standard practice guidelines were used to adjust dose; in the second group, the PSI was also used to judge anesthetic requirements. 112 patients were in the group that used the PSI. In the standard practice group, hypertension, tachycardia or somatic signs of inadequate anesthesia during the maintenance phase were managed with increased dosages of alfentanil, propofol or an antihypertensive at the discretion of the anesthesiologist. Hypotension and bradycardia were managed by appropriate dose reductions, adjustments of fluid status, or other needed pharmacologic agents. In the PSI group, the anesthesiologists were instructed to adjust the infusion of propofol to maintain a PSI target range between 25 and 50. Signs of inadequate analgesia were treated with increased doses of alfentanil. Hypotension was treated by decreasing the dose of alfentanil and then adjusting fluid status, or use of other pharmacologic agents as required. Statistical analysis was performed using ANOVA implemented in SAS.

Results

There were 112 patients enrolled in each of the standard practice and PSI guided group. In each group of 112 there was an equal number of 76 women and 36 men. Emergence endpoints, such as time to eye opening, response to verbal command, and extubation were not different between men and women. The mean propofol infusion rate for women was 140 (SD 30) ug/kg/min and 123 (SD 38) ug/kg/min for men: significantly higher for women than men ($p < 0.001$). Duration of surgery was not different between groups ($p > 0.05$).

Conclusions

Women may require more propofol than men to maintain general anesthesia. Previous results (1) using a similar anesthetic found women were able to attain emergence endpoints more quickly under equivalent amounts of anesthetic, these results appear to suggest a similar gender difference. Anesthesiologists may not note the faster emergence time for women from anesthesia since the intra-operative anesthetic dose adjustment to higher concentrations for women subsequently produces a similar emergence time as for men. Use of the PSI may have produced a similar depth of anesthesia for women as men at the expense of increased propofol use. Gender has been found to be a significant covariate for the pharmacokinetics of propofol as women were found to have greater clearance rates and a larger volume of distribution.(4) Increased propofol requirements in women may be a combination of increased pharmacokinetic and pharmacodynamic factors.

References:

1) *Anesthesiology*, 90(5), 1999, 1283-1287; 2) *Anesthesiology*, 89(4), 1998, 869-877; 3) *Memory and Awareness IV*, 2000, 97-107; 4) *Anesthesiology*, 69(3), 1988, 348-356

