

The influence of volatile anesthetics on alveolar epithelial permeability measured by noninvasive radionuclide lung scan

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Many volatile anesthetics have long been thought to affect pulmonary functions including lung ventilation (LV) and alveolar epithelial permeability (AEP). The purpose of this study is to examine the influence of volatile anesthetics on LV and AEP by noninvasive radionuclide lung imaging of technetium-99m labeled diethylene triamine pentaacetic acid radioaerosol inhalation lung scan (DTPA lung scan).

Twenty patients undergoing surgery and receiving volatile anesthesia with 1% halothane were enrolled as the study group 1. The other 20 patients undergoing surgery and receiving volatile anesthesia with 1.5% isoflurane were enrolled as the study group 2. At the same time, 20 patients undergoing surgery with intravenous anesthesia drugs were included as a control group. Before surgery, 1 hour after surgery, and 1 week after surgery, we investigated the 3 groups of patients with DTPA lung scan to evaluate LV and AEP by ^{99m}Tc DTPA clearance halftime (T1/2).

No significant change or abnormality of LV before surgery, 1 hour after surgery, or 1 week after surgery was found among the 3 groups of patients. In the control group, the ^{99m}Tc DTPA clearance T1/2 was 63.5 ± 16.4 , 63.1 ± 18.4 , and 62.8 ± 17.0 minutes, before surgery, 1 hour after surgery, and 1 week after surgery, respectively. In group 1, it was 65.9 ± 9.3 , 62.5 ± 9.1 , and 65.8 ± 10.3 minutes, respectively. No significant change in AEP before surgery, 1 hour after surgery, or 1 week after surgery was found. However, in group 2, the ^{99m}Tc DTPA clearance T1/2 was 65.5 ± 13.2 , 44.9 ± 10.5 , and 66.1 ± 14.0 minutes, respectively. A significant transient change in AEP was found 1 hour after surgery, but it recovered 1 week after surgery.

We conclude that volatile anesthesia is safe for LV and AEP, and only isoflurane can induce transient change of AEP.

Key words: volatile anesthetics, lung ventilation, alveolar epithelial permeability