DEVELOPMENT AND VALIDATION OF FLEXIBLE IMAGING FIBER-GUIDED INTRATRACHEAL INTUBATION TECHNIQUE IN RODENTS

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Abstract - Precise intratracheal intubation in small animal models is crucial for respiratory research but presents significant challenges due to anatomical constraints. This study introduces a novel flexible imaging fiber-guided system designed to facilitate safe and accurate intratracheal intubation in rodents. The system integrates a high-resolution fiber-optic camera with a minimally invasive delivery mechanism, allowing real-time visualization of the airway during intubation. In our experiments, 20 rodents (10 mice and 10 rats) were administered either phosphate-buffered saline (PBS) or polyhexamethylene guanidine (PHMG) via the developed intubation system. Subsequent histopathological analysis of lung tissues revealed that all PHMG-administered subjects exhibited significant pulmonary alterations, whereas the PBS group showed no adverse effects. These findings confirm the system's efficacy in delivering substances directly to the lower respiratory tract with high precision. The flexible imaging fiber-guided intubation technique offers a reliable and reproducible method for intratracheal administration in rodent models, enhancing the accuracy of pulmonary research and potential applications in drug delivery and toxicological studies.

Keywords - Flexible Imaging Fiber, Intratracheal Intubation, Rodent Model, Pulmonary Drug Delivery, Toxicological Assessment