

This article reviews a new study published in January 2015 in the Journal of Clinical Monitoring and Computing, (Toman et. al.: Comparison of the effects of various airway devices on hemodynamic response and QTc interval in rabbits under general anesthesia)

The study investigated the effect of various airway devices on various cardiovascular parameters in the rabbit. Various parameters were measured during the study, including heart rate, mean arterial pressure (MAP) and ECG traces. Specifically, the QT interval on an ECG trace was measured. The general aim of the study was to see what effect various airway devices had on the cardiovascular system in rabbits.

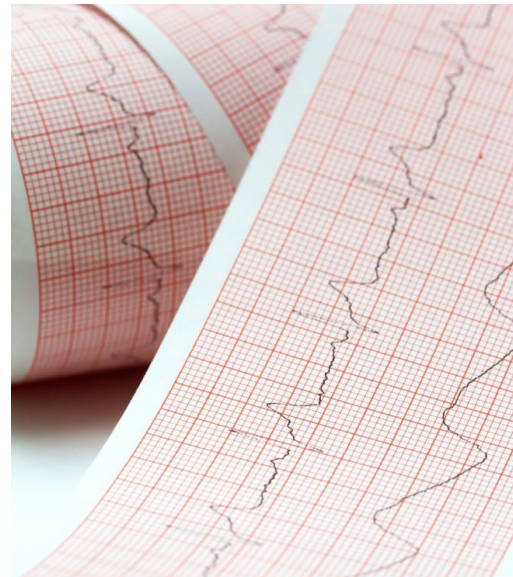


There are various reasons why this is important. As prey animals, rabbits are susceptible to sympathetic nervous system stimulation. The sympathetic nervous system is concerned with 'fight or flight' reflexes. This is of extreme importance to escape capture by predators. The sympathetic nervous system exerts great influence on the cardiovascular system.

Also, rabbits are the most widely used laboratory animal model for the investigation of heart disease in humans. Cardiovascular disease is the number one human cause of premature death, accounting for an estimated 37% of all human disease deaths in 2012 (source – World Health Organisation). Treatments for diseases including atherosclerosis and blood pressure abnormalities are investigated in rabbits, saving lives every day across the world.

Cardiovascular research parameters need to be affected as little as possible by the choice of anaesthetic drugs or devices. A device having more adverse effects on the cardiovascular system is also likely to increase the risk of anaesthetic mortality, in a species already susceptible to anaesthetic death and sympathetic nervous stimulation.

Prolonged QT interval reflects an increased period of cardiac repolarisation. This is known to be associated with increased arrhythmia risk in humans (Day et. al. 1990) and is a prognostic indicator in human heart failure cases associated with diseases like diabetes or ischaemic heart disease.



Results from this study showed that the v-gel devices affected haemodynamic (cardiovascular) parameters less than both endotracheal tubes or human supraglottic airway devices.

Amongst other findings, a reduction in MAP was observed in the v-gel group compared to the endotracheal tube group after 5 minutes of general anaesthesia. The QT interval was significantly increased in the 1st and 5th minute of general anaesthesia in the endotracheal tube group compared with all other groups. In addition, the QT interval was significantly increased in the laryngeal mask airway (a human airway device) group, compared with the v-gel group.

The authors speculate that this is because the anatomically shaped, non inflatable cuff of the v-gel causes less trauma to the pharynx, larynx or trachea and does not therefore produce the degree of sympathetic nervous stimulation seen with other devices.

Not only does this paper demonstrate that the cardiovascular system of the rabbit is affected less by the v-gel than with other airway devices, making anaesthesia safer, it also means that v-gel is a superior device for the investigation and modeling of heart disease in rabbit models of human disease compared with human supraglottic airway devices or endotracheal tubes.

Toman H, Erbas M, Sahin H, Kiraz H.A., Uzun M., Ovali M.A.: Comparison of the effects of various airway devices on hemodynamic response and QTc interval in rabbits under general anesthesia, Journal of clinical monitoring and computing. DOI: 10.1007/s10877-015-9659

Day C.P, McComb J.M, Campbell R.W., QT dispersion: an indication of arrhythmia risk in patients with long QT intervals BR Heart J 1990, 63 342-344