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Comparison of volume-controlled and pressure-controlled ventilation in horses undergoing vitrectomy

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Mechanical ventilation is essential when neuromuscular blocking agents are used. This study compares the cardiopulmonary effects of pressure-controlled (PCV) and volume-controlled ventilation (VCV) during vitrectomy in horses.
Sixty horses were enrolled in the study. Horses were premedicated (acepromazine 0.05 mg kg^{-1} IM, xylazine 0.8 mg kg^{-1} IV) and anaesthetized (ketamine 2.5 mg kg^{-1} IV, diazepam 0.05 mg kg^{-1}IV). Anaesthesia was maintained with isoflurane in 100% oxygen and xylazine infusion (0.6 mg kg^{-1} $hour^{-1}$). After positioning in lateral recumbency, placing of an esophageal pressure probe was attempted. Atracurium boli (0.1 mg kg^{-1} IV) were administered to facilitate ocular immobilisation. The horses were randomly assigned to PCV (inspiratory pressure: 22.5 cmH_2O) or VCV (VT: 12.5 ml kg^{-1}) with a ^{f}R of 6 (breaths $minute^{-1}$) adjusted in cases of hypo- or hypercapnia. Data collected included HR, MAP, PaO_2, $PaCO_2$, VT, esophageal pressure and airway pressures (GE Healthcare CARESCAPE; Horse-lite spirometer). Transpulmonary pressure, dynamic total and lung compliance and VE were calculated. Data were analyzed using descriptive statistics and two-way ANOVA ($p < 0.05$). No statistically significant differences were found between the groups.

Parameter*	**VCV**	**PCV**
MAP [mmHg]	86.6 ± 5.9	93 ± 7.6
VE [ml]	35910 ± 205	35178 ± 485.2
PaO_2 [mmHg]	409.6 ± 28.4	358.1 ± 33.8
$PaCO_2$ [mmHg]	46 ± 0.9	47.2 ± 0.5
Transpulmonary pressure [cmH_2O]	8.5 ± 3.8	9.8 ± 3
Dynamic total compliance [ml cmH_2O^{-1} kg body $weight^{-1}$]	0.6 ± 0.01 (*n*: 25)	0.6 ± 0.02 (*n*: 24)
Dynamic lung compliance [ml cmH_2O kg^{-1} body $weight^{-1}$]	1.2 ± 0.5 (*n*: 12)	1.1 ± 0.4 (*n*: 11)

* Sum of means for each time point divided by number of time points

With overall excellent pulmonary function in this population, no differences in ventilation modes appeared. For vitrectomies in lateral recumbency both PCV and VCV are equally suitable.