INTRODUCTION

Mechanical ventilation (MV) may trigger some pulmonary inflammatory response in absence of pre-existing lung disease. Conventional ventilation may also enhance systemic inflammatory response after major surgical procedure.

METHODS

Animals: 34 client-owned ASA I-Il horses (9.8±5.4 years, 510±88 kg) undergoing elective soft tissue or orthopaedic surgery.

Anesthesia: Premedication with acepromazine (0.1 mg·kg⁻¹ IM) followed by xylazine (0.6 mg·kg⁻¹ IV) 10 minutes prior to induction with ketamine (2.2 mg·kg⁻¹ IV) and midazolam (0.06 mg·kg⁻¹ IV). Partial intravenous anaesthesia was used for maintenance of anaesthesia: isoflurane in 70% O₂ and 30% air; ketamine and midazolam CRIs (1 and 0.02 mg·kg⁻¹·h⁻¹, respectively, discontinued 20 min prior to recovery).

Surgical procedure started 25 min after induction and lasted a minimum of 45 min. Antibiotics and NSAIDs were given on the morning of the surgery.

Mechanical Ventilation: Intermittent positive pressure ventilation was started 10 min after induction, using a volume-target, time-cycled ventilator (Drager AVE ventilator, Drager Medical) used in continuous mandatory ventilation mode. Horses were randomly allocated to 4 groups:

- Low pressure-volume: PIP 15 cmH₂O, V₅ 10 mL·kg⁻¹·min⁻¹, in DORSAL (15D, n=5) or LATERAL (15L, n=11) recumbency.
- High pressure-volume: PIP 30 cmH₂O, V₅>10 mL·kg⁻¹·min⁻¹, in DORSAL (30D, n=9), or LATERAL (30L, n=3) recumbency.

I/E ratio was set between 1.2 and 1.3. Respiratory rate 8 ± 3 breath per min (Min: 4 - Max: 15) to achieve the PIP and V₅.

RESULTS

- Plasma concentrations of ELT and MPO significantly decreased at T1. Plasma concentration of TNF-α significantly deceased at both T1 and T2. These changes were not linked to PIP, recumbency or their 2-by-2 Interactions. Plasma concentration of IL-6 was not significantly different either at T1 or T2 (fig 1-3).
- V₅ significantly varied with PIP and recumbency; RR and PaCO₂ significantly varied with PIP; minute volume significantly varied with recumbency (table I).
- No correlation with anti-inflammatory drug and antibiotic therapies was found.

AIM

To investigate SYSTEMIC changes in equine pro-inflammatory mediators (IL-6, TNF-α, ELT, MPO) after 60 min of conventional mechanical ventilation in anaesthetized horses undergoing surgery.

Measurements:

- Periperal arterial blood gas analysis every 20 min (AVL Compact 3 blood gas analyser).
- Horses were excluded if PaCO₂ was <30 or >60 mmHg, and if PaO₂ > 80 mmHg.
- Peripherical venous blood samples (EDTA, jugular vein) immediately before the start of MV (T0, n=34), after 60 min (T1, n=34) and 120 min (T2, n=12) were immediately centrifuged and the plasma was stored within 30 min at -20°C. IL-6, TNF-α, ELT and MPO measured with equine specific ELISA.

Statistical analysis:

- A linear mixed model with a 1st-order autoregressive structure was used on normalized data (significance: p<0.05)

Figure 1: Plasma concentrations of equine IL-6, TNF-α, ELT and MPO at T0, T1 and T2 in 35L (n=13), T0 (n=12) and T2 (n=12).

CONCLUSIONS

None of the protocols tested in this study were associated with a systemic increase of equine pro-inflammatory mediators (IL-6, TNF-α, ELT, MPO) after 120 minutes of mechanical ventilation.

The use of drugs with anti-inflammatory properties may have contributed to the overall decreased systemic inflammatory mediator concentration, despite MV and surgery.

Pulmonary inflammation, undetectable systemically, cannot be excluded, as suggested recently.

References: