



Information on recruitment manoeuvres using Tafonius

Taken from the paper by Hopster et al in **Veterinary Anaesthesia and Analgesia 2011**.

This paper looked at the benefits of a simple Recruitment Manoeuvre (RM) that could easily be employed in practice.

The alveolar recruitment manoeuvres consists of increasing the PIP for three consecutive breaths;

- The first breath to 60 cmH₂O, held for 10 seconds
- Second breath to 80 cmH₂O, held for 10 seconds
- Third breath to 60 cmH₂O, held for 10 seconds
- Then back to normal IPPV with no PEEP
- In a full Tafonius this can be done either by using a dedicated Phase file or by manual use of the PEEP control
- In a Junior model this can only be achieved by using the manual PEEP function.

If a PaO₂ of at least 400 mmHg (53.3 kPa) was not reached at the next blood gas measurement, or if it decreased below 400 mmHg (53.3 kPa) at the following measurements, the recruitment manoeuvre was repeated.

The number of recruitment manoeuvres required to reach and maintain PaO₂ values above 400 mmHg (53.3 kPa) was recorded. If it was not possible to reach and maintain a PaO₂ of 400 mmHg (53.3 kPa) after five recruitment manoeuvres, the PEEP-level was increased to 15 cmH₂O and recruitment manoeuvres were repeated.

Results

Statistically significant findings were that horses in group RM had an overall higher PaO₂ (432 ± 101 mmHg) than those in group C (187 ± 112 mmHg) at all time points including during the early recovery period. Recovery time to standing position was significantly shorter in group RM (49.6 ± 20.7 minutes) than group C (70.7 ± 24.9). Other measured parameters did not differ significantly. The median (range) of number of RMs required to maintain PaO₂ above 400 mmHg per anaesthetic was 3 (1–8).

Conclusion

Ventilation using IPPV with constant PEEP and RM improved arterial oxygenation lasting into the early recovery period in conjunction with faster recovery of similar quality. However this ventilation mode was not able to open up the lung completely and to keep it open without repeated recruitment.



Method 2:

Taken from the paper by Hopster et al in **Research in Veterinary Science 2016**.

This paper looked at the incidence and evidence of lung damage in horses receiving PEEP and Recruitment Manoeuvres with an Open Lung Concept (OLC).

- Start with a positive inspiratory pressure (PIP) of 20 cm H₂O and a PEEP of 0
- Then use an incremental PEEP titration with steps of 5 cm H₂O every 10 min up to a PEEP of 20 cm H₂O, whilst maintaining a constant airway pressure difference (ΔP) of 20cmH₂O - After 40 minutes we have a PEEP of 20cm and a PIP of 40cm
- The lung recruitment (RM) consists of a stepwise increase in ΔP by 25, 30, 35 and 40 cm H₂O obtained by increasing peak inspiratory pressure (PIP) to 45, 50, 55 and 60 cmH₂O.
- In a full Tafonius this can easily be done by using a Phase pattern that has a PEEP value of 20 and an inspiratory target pressure of 45, 50, 55 and 60 cm H₂O. Each increment applied every 10 minutes.
- In a Junior machine this is less easy but can be achieved by an adjustment of Tidal volume to achieve the desired PIP values.
- After the RM use a decremental PEEP titration until PIP and PEEP reach pressures of 20 cm H₂O and 0 cm H₂O, respectively.

Conclusion

The applied experimental OLC with high pressures for long time periods resulted only in minor histological changes as alveolar over-distension. However, this over-distention did not result in cytologically or histopathologically evident lung injury. Over-expression of IL-1 β and IL-6 could be early signs of mild inflammation whereas expression of MMP 1 and 9 could be explained by mild overstretching of dependent alveoli.

Notes:

Open lung Concept ventilation is a strategy that is utilized by several modes of mechanical ventilation to combine low tidal volume and applied PEEP to maximize recruitment of alveoli. The low tidal volume aims to minimize alveolar overdistention and the PEEP minimizes cyclic atelectasis.