

Comparison of a Methadone Continuous Rate Infusion (CRI) with a Fentanyl CRI for Perioperative Analgesia in Dogs with Intervertebral Disc Disease

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Introduction

The full μ agonist opioid methadone has been widely used in dogs for treatment of acute pain. Beside its opioid action, different interesting pain modifying mechanisms like NMDA-receptor antagonism and inhibition of noradrenalin and serotonin re-uptake contribute to its analgesic effects [1, 2]. Its antihyperalgesic mechanisms are of special interest in the treatment and prevention of neuropathic pain states. Pharmacokinetics and pharmacodynamics of methadone applied as a CRI at a dose of $0.1 \text{ mg kg}^{-1} \text{ h}^{-1}$ have recently been investigated in healthy dogs [3]. Therefore, the aim of this study was to evaluate the perioperative analgesic effects of this methadone CRI in comparison to a fentanyl CRI in dogs with complex pain due to intervertebral disc disease. We hypothesized that methadone analgesia would be superior to fentanyl, as a pure opioid analgesic, in these patients.

Material and Methods

- 42 dogs of different breeds and ages presented with intervertebral disc disease for surgical therapy
- Ethically approved, randomized, blinded, clinical study
 - Group M (n= 21): methadone CRI : $0.25 \text{ mg kg}^{-1} \text{ h}^{-1}$ intraoperatively
 $0.1 \text{ mg kg}^{-1} \text{ h}^{-1}$ postoperatively for 3 days
 anaesthetic premedication and rescue boli: $0.25 \text{ mg kg}^{-1} \text{ BW}$ methadone IV
 - Group F (n=21): fentanyl CRI: $5 \text{ } \mu\text{g kg}^{-1} \text{ h}^{-1}$ intraoperatively
 $2 \text{ } \mu\text{g kg}^{-1} \text{ h}^{-1}$ postoperatively for 3 days
 anaesthetic premedication and rescue boli: $2 \text{ } \mu\text{g kg}^{-1} \text{ h}^{-1}$

Postoperative evaluation:

- Time points: at extubation, 1, 2, 3, 4, 18, 24, 42, 48, 66, 72, 90 and 96 hours after extubation
- Sedation scale 0 (no sedation) – 3 (heavy sedation, difficult to arouse), if ≤ 2 → evaluation of:
 - Short Form Glasgow Composite Measure Pain Scale (CMPS-SF) [5]
 - vital parameters: heart rate, respiratory rate, oscillometric arterial blood pressure (ABP), body temperature
 - von Frey filament mechanical thresholds at 3, 5 and 10 cm beside the surgical incision
- Intervention level for rescue analgesia: CMPS-SF ≥ 5 (of maximal 20)
- Data analysis: a priori power analysis, Shapiro-Wilk test and Q-Q-plots, Wilcoxon signed-rank test ($\alpha = 5\%$)



Results

- There were no differences between groups in CMPS-SF, nor in von Frey filament thresholds at any time point
- In both groups, 8/21 dogs needed several rescue analgesia boli, without a group difference
- Mean heart rate ($p= 0.0029$) and body temperature ($p= 0.032$) were lower in group M than in F when compared over the whole time of evaluation, while ABP and respiratory rate did not differ between groups.

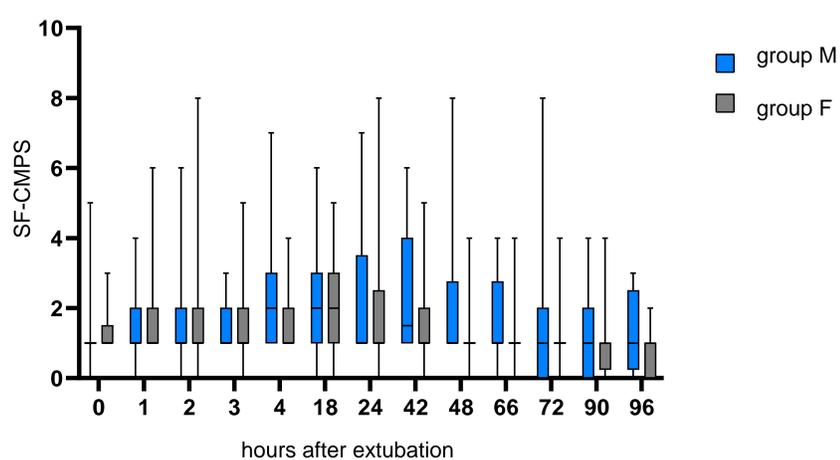


Fig. 1: Short form Glasgow Composite Measure Pain Scale at different time points in dogs treated with a methadone CRI (blue boxplots, n=21) or a fentanyl CRI (grey boxplots, n= 21). Boxplots are spanning the interquartile range, with the horizontal line in the box representing the median and the lower and upper whiskers representing minimum and maximum, respectively.

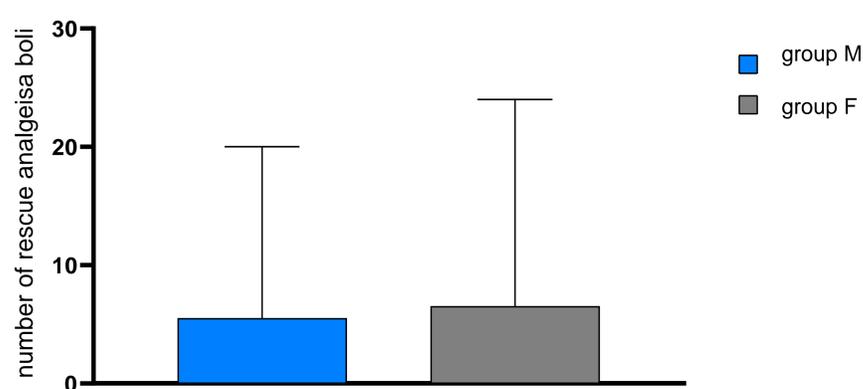


Fig. 2: Median number of rescue analgesia boli necessary per dog during the postoperative phase in 21 dogs receiving a methadone CRI (blue box plot) and 21 dogs receiving a fentanyl CRI (grey box plot). Box plots are spanning the interquartile range with a horizontal line representing the median and the upper whisker representing the Maximum.

Conclusion

In dogs with intervertebral disc herniation, postoperative analgesia of a methadone CRI is not superior to fentanyl at doses assumed as equipotent.

References

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