INVASIVE BLOOD PRESSURE IN ANESTHETIZED HORSES: DOES THE ARTERY SITE MATTER?

Monica Midon[1,2], Diego I Yamada[1], Darcio Zangirolami Filho[1], Walter H Feringer Junior[1], Gabriel Conde[1], Erik Hofmeister[2]

[1]School of Agricultural and Veterinarian Sciences, Sao Paulo State University, SP, Brazil
[2]Department of Clinical Sciences, Auburn University, AL

Introduction

Administration of anesthetic drugs combined with recumbency can compromise patient homeostasis, therefore adequate monitorization is essential during general anesthesia. Invasive blood pressure monitorization is highly recommended in horses, particularly when inhalant anesthetics are administered.

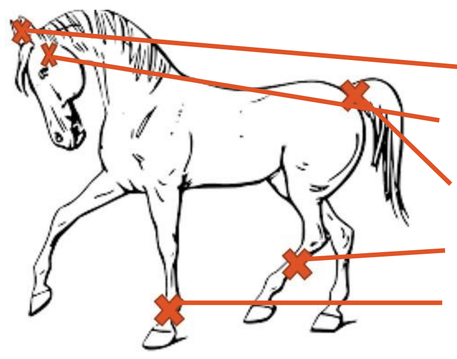
Peripheral arterial pressures differ from aortic pressures: the systolic pressure increases and the diastolic pressure decreases as the distance from the heart increases. Also, comparisons between blood pressure values from auricular artery with major central arteries show “widely” variability in rabbits and pigs. In the same way, several studies have shown a poor agreement between non-invasive blood pressure (NIBP) with invasive blood pressure (IBP) measurements in horses.

Aims

- To evaluate the agreement between blood pressure values measured in the auricular artery, lateral digital artery, and metatarsal artery with the facial artery.
- To assess agreement between blood pressure values measured by oscillometric method on tail with the facial artery.

Material and Methods

- Institution Animal Ethics Committee – 14851/16
- Six healthy horses (424.2 ± 40.73 kg)
- Xylazine / Ketamine + Midazolam
- Isoflurane / IPPV / L lateral = 90 min
- Dobutamine = MAP 70-90 mmHg (IBP from facial)
- HR, ECG, SpO_2, Capnography, ET_{ISO}, Temperature
- Agreement – Repeated-measures Bland-Altman



30 min | 45 min | 60 min | 75 min | 90 min

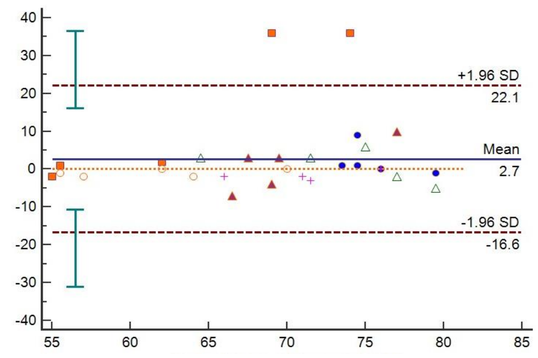
Results

- Low bias but high 95% LOA for IBP comparisons
- High bias and high 95% LOA for NIBP x FA

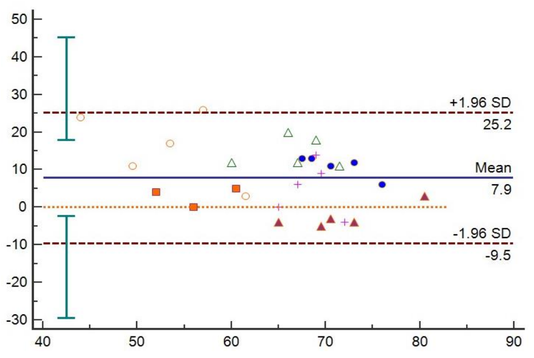
- Physiologic parameters were on normal range
- Failures: 2 NIBP, 1 AA, and 1 LDA

Mean ± SD IBP from FA	
SAP	85.4 ± 10.3 mmHg
MAP	70.6 ± 9.3 mmHg
DAP	58.5 ± 9.5 mmHg

Bland-Altman plot for MAP MA x FA



Bland-Altman plot for MAP NIBP x FA



Conclusion

- There is reasonable agreement for invasive blood pressure values among the arteries evaluated, specially for MAP values, in horses anesthetized in lateral recumbency
- Oscillometric method results in inaccurate blood pressure values in anesthetized horses

References

Barter LS, Epstein SE (2014) Comparision of Doppler, oscillometric, auricular and carotid arterial blood pressure measurements in isoflurane anesthetized New Zealand white rabbits. Veterinary Anesthesia and Analgesia, 41, 393-397.

Bass LME, Yu DY, Cullen LK (2009) Comparision of femoral and auricular arterial blood pressure monitoring in pigs. Veterinary anesthesia and analgesia, 36, 457-63.

Guyton AC (1986) Textbook of Medical Physiology. W. B. Saunders, Philadelphia, PA, USA. pp. 218–229.

Haskins SC (2007) Monitoring anesthetized patients. In: Lumb & Jones’ Veterinary Anesthesia and Analgesia (4th edn). Tranquilli WJ, Thurmon JC, Grimm KA (eds). Blackwell Publishing, USA. pp. 533-560

Hatz LA, Hartnack S, Kümmerle J, et al. (2015) A study of measurement of noninvasive blood pressure with the oscillometric device, Sentinel, in isoflurane-anaesthetized horses. Veterinary Anaesthesia and Analgesia, 42, 369-376.

Hubbell JAE, Muir WW (2009) Monitoring anesthesia. In: Equine Anesthesia Monitoring and Emergency Therapy (2nd edn). Muir WW, Hubbell AJE. (eds) Saunders Elsevier. USA. pp. 149-170.

Tearney CC, Guedes AGP, Brosnan RJ (2016) Equivalence between invasive and oscillometric blood pressures at different anatomic locations in healthy normotensive anaesthetized horses. Equine Veterinary Journal, 48, 357-361.