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Introduction:

Effective control of endotracheal tube (ETT) cuff pressure (CP) is vital to airway management in intubated patients. CP must be kept within a therapeutic range to ensure adequate cuff seal and delivery of mechanical ventilation, while preventing against complications such as ischemia, aspiration, and stenosis [1,2]. The purpose of this study was to test the CP management device PBACC (Puritan Bennett Automatic Cuff Controller, Medtronic, Boulder, USA) and evaluate maintenance of cuff seal in an animal model during mechanical ventilation.

Methods:

Eight animals with tracheal sizes suitable for 5.0 to 8.0 mm inner diameter ETTs were intubated. The cuff was inflated to a pressure of 25-30 cmH₂O, as recommended in instructions for use. Contrast media was applied above the cuff. CP was maintained using the PBACC and compared to a reference pressure transducer. Animals were in supine position for 60 minutes, followed by lateral position for 60 minutes. Supine position was assumed again for 30 minutes, followed by opposite lateral position for 60 minutes. Fluoroscopy was obtained five minutes after position change and at the end of each position period. Images were examined for dye in the trachea below the cuff.

Results:

There were no statistical differences between the PBACC pressures and the reference. No cuff leaks were detected on fluoroscopy.

Conclusion:

CP may change due to change in position, slow cuff leaks and other causes, making routine monitoring of CP necessary to maintain correct pressure. Automated cuff management devices have been suggested to remedy this situation. The PBACC maintained CP during all position changes resulting in no breach of cuff seal. These results may indicate that the PBACC device is suitable for continuous CP management. Longer-term clinical studies are needed to demonstrate its clinical utility.

References:

M. Sole, D. Penoyer, X. Su and e. al., "Assessment of endotracheal cuff pressures by continuous monitoring; a pilot study.," American Journal of Critical Care, vol. 18, no. 2, pp.133-143, 2009.

Table:

	5 mm tube	6 mm tube	7 mm tube	8 mm tube
Animal Number	1 2	3 4	5 6	7 8
Mean PBACC pressure (cm H ₂ O)	24.9 25.1	24.9 25.1	25.0 25.4	25.1 25.2
STD	0.62 0.86	0.80 0.56	0.68 0.74	0.68 0.67
Mean Reference Pressure (cm H ₂ O)	24.9 27.3	26.7 26.2	27.5 27.6	26.8 27.6
STD	0.89 1.14	1.13 1.78	1.22 1.19	1.69 1.11
Mean Difference (cm H ₂ O)	0.0 -2.2	-1.8 -1.1	-2.5 -2.2	-1.6 -2.4
STD	0.73 0.96	0.99 1.68	1.10 1.03	1.53 0.83

Cuff pressures versus reference pressures