

PublisherInfo

PublisherName : BioMed Central
PublisherLocation : London
PublisherImprintName : BioMed Central

Effects of acute systemic dehydration promoted by intravenous furosemide on respiratory mucus in dogs

ArticleInfo

ArticleID : 1369
ArticleDOI : 10.1186/cc1328
ArticleCitationID : P264
ArticleSequenceNumber : 257
ArticleCategory : Meeting abstract
ArticleFirstPage : 1
ArticleLastPage : 2
ArticleHistory :
 RegistrationDate : 2001-1-15
 Received : 2001-1-15
 OnlineDate : 2001-3-2
ArticleCopyright : Biomed central limited1997
ArticleGrants :
ArticleContext : 1305455S1S1

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Introduction

Heat and moisture exchangers (HME) can be used as artificial noses in intubated patients undergoing invasive mechanical ventilation. Intravenous furosemide (F) is widely used in the ICU for volume control. Furosemide could act on respiratory mucus either directly by inhibiting $\text{NaK}(\text{Cl})_2$ cotransporter or indirectly by promoting intravascular volume depletion. The aim of this study was to determine the effects of acute systemic dehydration promoted by IV furosemide on respiratory mucus properties, transportability and tracheal transepithelial potential difference in dogs.

Methods

Thirty six male mongrel dogs, 11 to 15 Kg, were anesthetized and submitted to mechanical ventilation for 3 h with a HME (PALL BB100F). The animals were randomized to control group ($n = 12$) with no intervention; furosemide group (40mg IV) ($n = 12$) and furosemide + volume replacement group ($n = 12$). Tracheal mucus was collected by suctioning immediately after general anesthesia (Time 0), and after 1 (Time 1) and 2h (Time 2) of intervention. Transepithelial potential difference (PD) used as an index of epithelial function was measured at tracheal level. Mucus properties were analyzed by means of 1) *in vitro* mucus transport by cilia (MCT) on frog palate; 2) cough clearance (CC) by a cough simulator; 3) contact angle (CA) by measuring the angle between a mucus drop and a surface; 4) mucus rheology by a magnetic microrheometer.

Results

PD decreased in modulus immediately after F administration, however this effect was partially blunted by fluid replacement. MCT ($P < 0.001$) and CC ($P < 0.001$) increased significantly over time, and CA ($P = 0.01$) and $\text{Log } G^* 1 \text{ radian/s}$ ($P = 0.002$) decreased in all three groups.

Conclusion

Our results suggest that physiological compensatory mechanisms of the airways in association with the use of a HME reduce the impact of acute systemic dehydration on mucus physical properties and transportability by cilia and cough.

Supported by FAPESP and Fundação Faculdade de Medicina

References

1. Trout L, et al.: *Am J Physiol* 1998, **274**: 258-263.
2. Winters SL, Yeates DB: *J Appl Physiol* 1997, **83**: 1360-1369.
3. Basbaum C, et al.: *Am Rev Respir Dis* 1988, **137**: 479-485.