Plasma propofol levels during target controlled infusion dip significantly during volume resuscitation

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Introduction

Work on humans to assess pharmacokinetic (PK) influences of significant haemorrhage and subsequent volume resuscitation have demonstrated that the hypnotic potency of propofol is increased, perhaps related to an increase in unbound propofol.1 A study in swine confirms an increase in propofol potency following resuscitated haemorrhage, without demonstrating changes in propofol PK.2 There is little work looking at the ability of commercially available target controlled infusion (TCI) algorithms to predict plasma propofol levels during fluid resuscitation.

Methods

Following ethics committee approval and patient consent, a patient undergoing routine neurosurgery recruited into a study involving serial arterial plasma propofol measurement throughout Marsh TCI anaesthesia (effect site targeting) was noted to have surgical blood loss of 15ml/kg, and subsequent volume resuscitation with 45ml/kg of fluid. Serial measured propofol levels were compared with levels estimated using the Marsh algorithm.

Results

The graph below (figure 1) demonstrates a depression in measured plasma propofol levels during the maintenance phase of anaesthesia when compared to estimated plasma levels using the Marsh algorithm. Depression of measured propofol levels correlated with periods of fluid resuscitation. The lowest measured plasma propofol concentration of 2.1μg/ml, represents a level one third lower than anticipated, and could potentially lead to awareness at this level. Figure 2 is an example of plasma propofol measured in a different patient in the same study, in which volume resuscitation did not take place.

Discussion

Extra vigilance should be employed when monitoring for clinical or pharmacodynamic measures of depth of anaesthesia when administering propofol TCI during periods of blood loss and fluid resuscitation, as this can lead to significant dips in plasma propofol concentration, which TCI algorithms do not predict.

References & Acknowledgements


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