

Abstract

Opioid-Free Anesthesia: Physico Chemical Stability Studies on Multi-Analyte Mixtures Intended for Use in Clinical Anesthesiology

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Objectives

Opioid-free anesthesia is used increasingly often in hospitals around the world. In this type of anesthesia, opioids are replaced by other analgesics, such as ketamine, lidocaine, dexmedetomidine and magnesium sulfate. Many clinicians prepare these agents as dual, triple, or quadruple admixtures within a single syringe. However, data on the stability of the individual substances within these preparations over time and in different storage conditions is very limited. Here, we aim to investigate various admixture of dexmedetomidine, ketamine, lidocaine, and magnesium sulfate with respect to the stability of the individual agents over time at different storage conditions.

Methods

An ultra-high performance reversed phase liquid chromatography method coupled to mass spectrometric detection was developed and validated to determine the stability of lidocaine, ketamine, and dexmedetomidine. Quantification of magnesium was carried out in parallel by potentiometric titration.

Results

Our results demonstrate the stability of dual, triple, or quadruple mixtures of the mentioned substances in 0.9% saline under different storage conditions. Under all conditions, analyzed admixtures remain stable for at least 8 weeks. The quadruple mixture of lidocaine, ketamine, dexmedetomidine, and magnesium sulfate was storable for as long as 148 days without a significant loss of analyte.

Conclusion

A new chromatographic method was successfully developed to analyze the stability of various pharmacological agents commonly used by clinicians in opioid-free anesthesia. The data we obtained indicate that mixing these agents together in a single syringe is safe and reliable and suggest that hospital pharmacies may prepare these solutions in advance of planned surgeries.

Key words: anesthetics, drug stability, medication safety, drug information