The effect of diazepam in the prevention of succinylcholine-induced hyperkalemia

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Topic. Does pretreatment with diazepam prevent succinylcholine-induced hyperkalemia? Several authors have researched this question, with mixed results. It has recently been discovered that diazepam requires 20-30 minutes to penetrate the phospholipid membrane of skeletal muscle cells.

No studies were found in the literature that allowed up to 30 minutes between diazepam and succinylcholine injections.

This study allowed 30 minutes to elapse between injections of the two drugs, using rabbits as subjects.

Significance of study. Hyperkalemia following succinylcholine administration can lead to cardiac arrest. Currently, the drug must be avoided in certain patient populations known to be at risk for developing succinylcholine-induced hyperkalemia. If diazepam, a well known, commonly used drug, is found to be effective in preventing this potential disaster, anesthetists and their patients will be able to benefit from the effects of succinylcholine without having to substitute with a less desirable muscle relaxant.

Research methodology. The validity of the study's design has been demonstrated by previous authors. Twelve rabbits were divided into two groups of 6. Each rabbit was anesthetized with halothane. Tracheostomy, arterial and venous

Figure 1
Serum potassium levels: Comparison between control and diazepam-treated groups

![Graph showing serum potassium levels comparison between control and diazepam-treated groups](image-url)
lines, and EMG recording were established. Ventilation was controlled. Arterial blood gas and serum electrolytes were allowed to stabilize at normal values. Each animal received succinylcholine, 0.25 mg/kg IV. Serum potassium samples were drawn at 1, 2, 5, 10, and 30 minute intervals following the succinylcholine. The experimental group differed from the control group only by the administration of diazepam, 0.1 mg/kg, 30 minutes prior to the succinylcholine. Vital signs and neuromuscular block characteristics were analyzed. Data was analyzed by the use of the Wilcoxon Signed T and the Mann-Whitney U tests. Level of significance was set at p<0.05.

Conclusions from data. No differences were found between the control and experimental groups with regard to sex, weight, vital signs, or neuromuscular block characteristics.

Both groups showed a significant rise in serum potassium, which peaked at 10 minutes post-succinylcholine (Figure 1.) The diazepam group, however, exhibited a decrease in baseline serum potassium during the elapsed 30 minutes prior to succinylcholine administration. Due to this decrease, the diazepam-treated rabbits did not experience hyperkalemia.

This study concluded that diazepam prevents succinylcholine-induced hyperkalemia in New Zealand white rabbits. Further studies are indicated to establish dose-response in human subjects.

REFERENCES


AUTHOR

Henry W. (Bill) Giles, Jr., CRNA, MS, received his nurse anesthesia education from the UCLA School of Nurse Anesthesia, Los Angeles. He holds a BS in Nursing from the University of Maryland, Baltimore. At the time this research was undertaken, he was pursuing a Master of Science degree at UCI A in Los Angeles with a thesis topic of "The Effect of Diazepam in the Prevention of Succinylcholine-Induced Hyperkalemia." He is Chief Nurse Anesthetist at Bon Secours Hospital, Baltimore, Maryland.