Title : TRAIN OF 4 MEASUREMENT OF POTENTIATION OF CURARE BY LIDOCAINE

Authors : M. G. Zukaitis, M.D. and G. P. Hoech, M.D.

Affiliation: Department of Anesthesiology, Research Medical Center, Kansas City, Missouri 64132

Introduction. Local anesthetics have a measurable blocking effect on neuromuscular transmission which is generally considered to be insignificant at clinical doses. However, when used in conjunction with muscle relaxants, the neuromuscular blocking effects can become quite significant.[1] Train of four (TF) was used to quantify the potentiating effects of lidocaine used in combination with curare.

Method. Healthy, awake, unpremedicated volunteers were used. The Human Rights Committee approved the study and informed consent was obtained. Volunteers were monitored and TF responses were recorded every thirty seconds throughout the experiment. Curare and lidocaine doses were derived from unpublished clinical data from several hundred balanced general anesthetics in which the average intubating doses of curare and lidocaine were .2 mg/kg and 2.5 mg/kg respectively.[2]

Results. Control TF recordings were obtained (Figure 1) followed by the precalculated curare dose. Maximum twitch depression occurred at 5 ± 1 minutes. The mean ratio of fourth twitch to first was .76 ± .03 with curare alone. (Figure 2) Lidocaine (1.25 mg/kg) was injected and TF response became maximally depressed at 4.5 ± .5 minutes. The mean ratio was .56 ± .02. (Figure 3) Another lidocaine bolus (1.25 mg/kg) was injected with maximal depression at 3.5 ± .5 minutes and a mean ratio of .50 ± .02. (Figure 4) Pyridostigmine/Glycopyrrolate reversal at 15 minutes after the initial curare dose led to rapid return of TF responses to control. Following reversal, two further boluses of lidocaine (1.25 mg/kg) led to no measurable decrease in TF ratio.

Discussion. Train of four ratios, useful in assessing the degree of neuromuscular blockade resulting from nondepolarizing relaxants are also helpful in documenting lidocaine potentiation of relaxants.[3] TF ratios decreased by 25% by curare alone can be decreased an additional 25% by lidocaine at clinically safe doses. We have used comparable doses of lidocaine to supplement balanced anesthesia in our daily practice and have been able to decrease our intubating dose of nondepolarizer by 1/3 to 1/2 and yet have excellent conditions for intubation. In addition, these patients are readily reversible in 15 to 20 minutes. Thus we have arrived at a combination of drugs that mimics a short-acting curare.

References.

1. Matsuo, S, et al: Interaction of muscle relaxants and local anesthetics at the neuromuscular junction. Anesthesia and Analgesia 57:580, 1978.
2. Hoech, GP, unpublished data.
3. Ali, H, et al: Monitoring of neuromuscular function, Anesthesiology Vol. 45, 216, 1976.

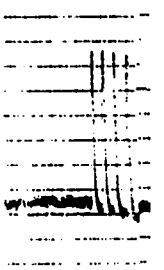

Figure 1

Control

Figure 2

curare
(.2 mg/kg)

Figure 3

curare & lidocaine
(1.25 mg/kg)

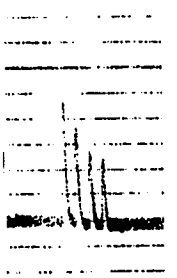

Figure 4

curare & lidocaine
(2.5 mg/kg)