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POSTER SESSION IX

A804

TITLE: INTRAOCULAR PRESSURE (IOP) EFFECT OF SUCCINYLCHOLINE (SDC) IN THE HUMAN EYE WITH EXTRAOCULAR MUSCLES (EOM) DETACHED.

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INTRODUCTION: It is well documented that IOP increases transiently following administration of SDC. This has been attributed to compression of the globe by the contraction of EOM.[1] We tested this hypothesis in 15 patients undergoing elective unilateral enucleation.

METHODS: After receiving IRB approval and written consent, 15 patients were enrolled. A standard anesthetic regimen consisted of induction with 3- 4 mg/kg thiopental and maintenance with 1 - 2 MAC halothane or isoflurane in 60% N_2O. The trachea was intubated under deep anesthesia without muscle relaxants. IOP was measured in both eyes with a Perkins applanation tonometer after severing of all EOM and repeated every 30 seconds following administration of 1.5 mg/kg SDC. End tidal CO_2, oxygen saturation, inspired anesthetic concentration and blood pressure were constant throughout the study period. Data were analyzed using paired and unpaired Student's t test comparing baseline values with each other and with peak values following SDC.

RESULTS: Peak IOP occurred at 60-90 seconds bilaterally following SDC. Measured intraocular pressure and statistical evaluation are summarized in Table 1.

Table 1: Intraocular Pressure Changes

	Pre SDC	Post SDC	P
EOM detached	16.1 ± 1.0	24.7 ± 1.8	0.01
EOM intact	15.1 ± 1.1	25.2 ± 1.6	0.01
P	NS	NS	

All values are Mean ± SEM

DISCUSSION: We have demonstrated a rise in IOP with EOM detached following SDC administration, a finding not previously reported in humans. We observed similar IOP changes in both eyes, regardless of the attachment of EOM. Similar results in the cat were attributed to contraction of the feline nictitating membrane.[2] Previous research in humans has demonstrated relaxation of the ciliary muscle following SDC, deepening of the anterior chamber, and reduction of the axial thickness of the lens.[3] We postulate that in the human eye SDC - induced cycloplegia may cause narrowing of trabecular lamellae resulting in diminution in outflow capability, leading to a sudden rise in IOP. What role, if any, human EOM play in elevating IOP following SDC administration is unclear.

References:
[1] Am J Ophth 40, 501-510 (1955).
[2] J Pharm and Exp Ther 162, 1-9 (1968).
[3] Arch Ophth 86, 643-647 (1971).

A805

TITLE: COMPUTER-AIDED ASSESSMENT OF REFRACTORINESS OF NEUROMUSCULAR TRANSMISSION

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Neuromuscular transmission has a refractory period which is sensitive to anesthetics, depolarizing and nondepolarizing relaxants, magnesium and aminoglycosides[1,2]. However, electrophysiology of refractoriness is traditionally difficult to study because the response (R_2) elicited by the second stimulus rides on the waveform of the first (R_1). With a constantly changing "baseline" the R_2 can not be quantified accurately. We report here 1) a new technique utilizing computer-aided waveform subtraction to obtain an accurate R_2, and 2) the normal human neuromuscular refractoriness.

With institutional approval, 9 volunteering healthy male anesthesiologists (36-51 yo) were studied while awake, at rest, and unmedicated. The left ulnar nerve was supramaximally stimulated and the compound electromyographic response (ncEMG) of the first interosseous muscle of the hand was measured. In part I, a computer program was written to remember a set of 512 datum points sampled during a 16-ms window of ncEMG activity. The response to the single stimulus (R_1) was aligned with the response to double stimuli (R_{1+2}), and subtracted from it point-by-point to obtain the R_2. In part II, double stimuli of the following interstimulus intervals were applied at 30-sec. intervals: 0, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.4, 3.8, 4.2, 4.6, 5, 6, 7, 8, 9, 10 ms. We determined in each subject the interstimulus intervals corresponding to the following end points (RPs, "refractory periods"): RPo (maxRPo), RP.25, RP.5 (medRP), RP.75, RP_1 (minRP_1) when R_2 was still zero but emerging, or 25%, 50%, 75% or just reached 100% of R_1 in amplitude.

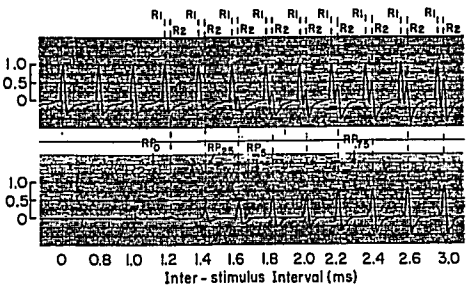
Fig. 1 shows that the technique of computer-aided waveform subtraction produces an R_2 whose amplitude and waveform can be clearly displayed by itself. The R_2 shows consistent waveform and logical progression of amplitude with increasing interstimulus interval (lower panel). Conventional R_{1+2} tracings (upper panel) give inaccurate R_2's. Table I shows the normal human refractoriness.

We conclude that a computer-aided waveform subtraction technique is practicable, and required, for accurate electromyographic determination of neuromuscular refractoriness.

Table I: Normal Human Refractoriness (mean ± SD, ms, n=9)

RPo	RP.25	RP.5	RP.75	RP.9
1.1±0.0	1.2±0.2	1.9±0.3	2.7±0.5	4.0±0.8

References: 1. Anesthesiology 1963, 31:69-77
2. Anesthesiology 1988, 69:A504



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