

TITLE: THE EFFECT OF HIGH DOSE SODIUM THIOPIENTAL ON BRAIN STEM AUDITORY AND MEDIAN NERVE SOMATOSENSORY EVOKED RESPONSES

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Introduction: To assess the potential usefulness of evoked response monitoring during high dose barbiturate anesthesia, the authors recorded brainstem auditory evoked responses (BAER's) and median nerve somatosensory evoked responses (MnsSSEP's) during the infusion of sodium thiopental (STP) in doses ($75\text{mg}\cdot\text{kg}^{-1}$) up to and in excess of those required to produce an isoelectric EEG.

Methods: Human Studies Committee approval was obtained. Six informed and consenting patients (age 28.8; range 22-43 yrs) undergoing staged resection of giant, unilateral thalamic or basal ganglia arteriovenous malformations were studied. Premedication consisted of oral diazepam supplemented with small doses of intravenous diazepam and morphine during placement of arterial and pulmonary artery (PA) catheters. MnsSSEP's (stimulus ipsilateral to lesion) and BAER's were recorded in duplicate immediately prior to induction using standard stimulus and recording parameters. Thereafter, STP infusion began at $1.25\text{mg}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. Upon loss of consciousness, pancuronium/metocurine was administered and ventilation was controlled by mask (FiO_2 .5) to maintain normocapnia (ETCO_2 , ABG's). PA temperature was maintained (fluid warmers, warming blanket, heater/humidifier) at the preinduction level. MnsSSEP's (5 patients) were generated after 5,10,20,30,40,50 and 60 minutes and BAER's (4 patients) after 15,32,45 and 62 (n=3) minutes of infusion. Nasotracheal intubation was performed after the 45 minute data collection and no other stimulus was permitted.

Results: For both BAER and MnsSSEP wave forms, significant and progressive increases in latency and decreases in amplitude were noted with increasing dose (see Table and Figure). The latencies of later waves showed greater increases. The greatest loss of amplitude was apparent for the MnsSSEP cortical response. The cortical EEG was isoelectric prior to the 30 minute data collection in all patients.

Discussion: There are elective and emergency circumstances in which the use of EEG-suppressive doses of a barbiturate may have protective or therapeutic effects. While the cortical EEG will have no monitoring value in these situations, these data indicate, when suppression is accomplished with STP, that both the BAER and the MnsSSEP can provide information regarding the integrity of their respective pathways. A progressive alteration of wave

form (increased latency, decreased amplitude) occurs with increasing dose (and presumably blood level) and must be taken into account during monitoring in these circumstances. However, in no instance did $75\text{mg}\cdot\text{kg}^{-1}$ of STP administered over 1 hour preclude effective recording of either BAER's or MnsSSEP's.

BAER WAVE	Latency (msec)			Amplitude (μV)
	I	III	V	$V_p - V_n$
Control	1.94±.07	4.29±.16	6.16±.24	.44±.29
15 min	2.03±.09 ⁺	4.44±.13 ⁺	6.53±.23 ⁺	.33±.11
32 min	2.03±.06 ⁺	4.56±.18 ⁺	6.76±.26 ⁺	.29±.12 [*]
45 min	2.03±.05 ⁺	4.62±.19 [*]	6.87±.31 ⁺	.29±.11 ⁺
62 min	2.09±.10 ⁺	4.66±.32 ⁺	6.83±.36 ⁺	.32±.11 ⁺
MnsSSEP	C ₂	N ₁	CCT	N ₁ -P ₁
Control	13.6±1.8	19.0±1.8	5.33±.41	2.10±.85
20 min	13.8±1.7	20.8±2.4 ⁺	7.05±1.1 ⁺	1.42±.87 ⁺
40 min	14.1±1.7 [*]	21.1±2.1 ⁺	7.25±1.1 ⁺	1.04±.72 [*]
60 min	14.3±1.5 ⁺	21.8±2.3 ⁺	7.46±1.2 [*]	0.85±.55 [*]

Table. Latencies and amplitudes (\pm SD) of BAER's and MnsSSEP's during a 62 minute STP infusion ($1.25\text{mg}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$). p=positive, n=negative, C₂=upper cervical spine, N₁ and P₁ as per Figure, CCT=Central Conduction Time (C₂-N₁), + =significantly different (paired t, p<.05) vs control, * significantly different vs control and vs preceding recording.

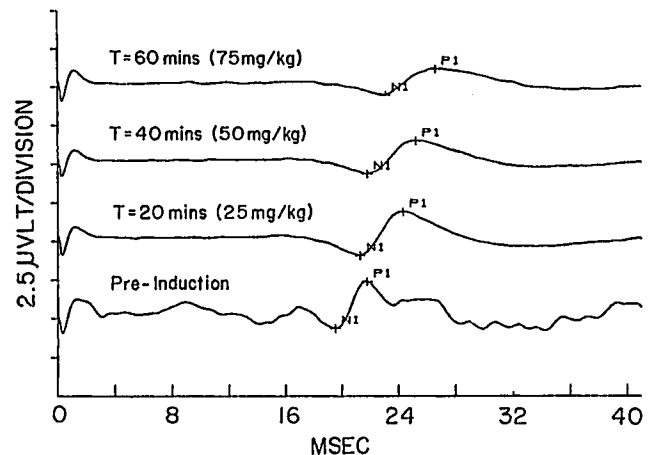


Figure. MnsSSEP cortical response (C₃' or C₄'-FP₂) at intervals during STP infusion ($1.25\text{mg}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$).

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