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TITLE: MASSETER SPASM, RHABDOMYOLYSIS AND MALIGNANT HYPERPYREXIA(MH)

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Introduction. The onset of MH is often heralded by masseter muscle spasm following succinylcholine. Even if anesthesia is stopped and surgery cancelled after this event and overt MH does not occur, marked elevation of CPK and myoglobinuria may occur, leaving the question of whether the patient is at risk to MH. It is therefore of obvious importance to know how often masseter spasm after succinylcholine indicates MH susceptibility.

Methods. A single muscle biopsy was obtained from either the quadriceps, vastus lateralis or rectus muscle from each of 8 patients who sustained episodes of MH and from 13 who had masseter spasm after succinylcholine.

The control population were patients undergoing elective surgery and patients undergoing diagnostic muscle biopsy for disorders other than MH (N=28).

Whenever possible, biopsy was obtained from the left vastus lateralis. If this muscle was not available, quadriceps or rectus muscle was biopsied. Rectus was biopsied in 2 MH patients and 2 controls, quadriceps in 4 MH, and 4 controls, in the rest vastus was used.

The muscle was clamped in vivo and at least 4 strips from each specimen weighing 50-150 mg, were tested for the contracture response to incremental doses of caffeine (0.25-16 mM) and to halothane (0.75, 1.5 and 2%). The muscle was incubated in Krebs Ringer's solution at 37°C bubbled continuously with 95% O_2-5% CO_2.

Results. A. Definition of MH Susceptibility by Muscle Biopsy. The muscle of all patients who had themselves experienced MH (metabolic acidosis, hyperthermia, and muscle rigidity) developed contracture of 0.5 g or greater to 1 or 2% halothane (range 0.5-4 g). None of the 28 control patients exhibited contracture to halothane of greater than 0.3 g. MH patients characteristically developed >.15 g tension upon exposure to 1 mM or 2 mM caffeine. In control patients, contracture developed with concentration of caffeine of 4 mM or more.

Based on these findings MH susceptibility was diagnosed if muscle specimens developed a contracture of greater than 0.5 g in the presence of less than 2% halothane, or a contracture of greater than 0.15 g in the presence of 1 mM caffeine or greater than 0.3 g in the presence of 2 mM caffeine.

B. Muscle Rigidity Patients. Thirteen patients were biopsied who displayed masseter muscle rigidity after succinylcholine.

Nine patients were MH positive on muscle biopsy, 4 were not (Table). In 1 of these 4, halothane and succinylcholine by drip were continued for 20 minutes after the episode of masseter spasm, without stigmata of MH developing. However, CPK elevation and muscle weakness were present for 2 days post-op. In 3 of the 9 positive patients generalized muscle rigidity and/or hyperthermia followed the appearance of masseter spasm. In only one was there a family history of MH.

Resting CPK as well as maximum rise of CPK after masseter spasm episode did not differ between MH negatives and MH positive patients.

The EMG was abnormal in 1 patient whose biopsy was negative, and 1 positive who also had central core disease.

In 3 of 4 MH negatives and 4 of the 9 MH positives, non-specific histologic abnormalities were found. One MH positive had central core disease.

Three patients who developed MH intraoperatively, proven by muscle biopsy, received succinylcholine during anesthesia without masseter spasm.

Conclusions. Patients who develop MH do not always respond to succinylcholine with masseter muscle rigidity.

However, approximately 70% of patients exhibiting masseter muscle rigidity are at risk of developing MH. Thus anesthesia should be stopped and surgery cancelled if masseter spasm occurs after succinylcholine. Muscle biopsy is indicated to diagnose MH susceptibility in these patients. In some patients masseter spasm is not associated with MH susceptibility, but is associated with muscle destruction and sometimes abnormalities of muscle structure. Therefore, it is likely that a myopathy exists in these patients whose characteristics are yet to be defined.

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TABLE I: Characteristics of patients with succinylcholine induced masseter spasm

	Pt.	Result of Contracture Tests	Age	Sex	Anesthetic	Resting CPK u/l (Nl value)	p Episode CPK u/l	EMG
1.	SI	MH neg	9	M	Halo.	81(50)	ND	ND
2.	RF	MH neg	12	M	Halo.	66(50)	8500	Nl
3.	BH	MH neg	25	F	Halo.	Nl	2,060	Nl
4.	JS	MH neg	5	F	Halo.	(50)	>7,000	Myopathic
5.	DMB	MH pos	14	F	Cyclo	Nl	>3,000	ND
6.	SC	MH pos	14	F	Halo.	Nl	548	Abn.
7.	TJ	MH pos	8	M	Halo.	182(50)	>1600	ND
8.	RT	MH pos	8	M	Halo.	57(50)	10,150	Nl
9.	EM	MH pos	22	F	Enflurane	ND	>900	ND
10.	CS	MH pos	11	F	Halo.	92(50)	7510	ND
11.	CB	MH pos	30	F	Halo.	7(20)	ND	ND
12.	SK	MH pos	7½	M	Halo.	57(50)	3380	Nl
13.	KL	MH pos	4	F	Halo.	Nl	20,000	Nl

Nl= Normal ND= Not done