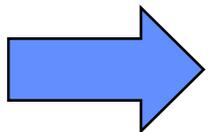


# Neuromuscular Blockade and Neuromonitoring

Laura Hemmer, MD

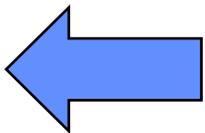
Antoun Koht, MD

Tod Sloan, MD, PhD, MBA

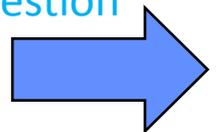


Surgeries for which one would consider omitting an intermediate or longer-acting neuromuscular blockade at the time of induction and intubation include:

- A) Craniotomy for aneurysm clipping with electroencephalogram (EEG), somatosensory evoked potentials (SSEPs), and transcranial motor evoked potentials (tcMEPs) planned for neuromonitoring
- B) Thyroidectomy with planned recurrent laryngeal nerve monitoring
- C) Multi-level thoracolumbar posterior spinal fusion without “pre-flip” baseline neuromonitoring signals planned.
- D) Cervical posterior spinal fusion with “preflip” baseline SSEP and tcMEP neuromonitoring signals requested.
- E) Microvascular decompression for hemifacial spasm with neuromonitoring including lateral spread response.
- F) Both B and D are correct.
- G) Both B, D, and E are correct.



Next question



Choice A: No.



[Try again](#)

Although, with tcMEPs planned, avoidance of neuromuscular blockade would be important as surgery progresses, a single dose of intermediate acting muscle relaxant to facilitate endotracheal intubation is generally acceptable (and may be beneficial to prevent bucking during head pinning and positioning). By the time lines are placed and the patient is positioned and sterilely prepped, it is likely muscle relaxant will have worn off enough to obtain adequate baseline signals. As surgery progresses and the patient more fully recovers from the muscle relaxant it will be important to re-assess baseline signals and stimulation parameters (often the MEP stimulation intensity needs to be further decreased at this point).

Choice C) No.



[Try again](#)

Although, monitoring modalities dependent on incomplete muscle blockade (tcMEPs and EMG) would likely be utilized for this surgery and avoidance of neuromuscular blockade would be important as surgery progresses, a single dose of intermediate acting muscle relaxant to facilitate endotracheal intubation would generally be considered acceptable. By the time multiple lines are placed for intravenous access and monitoring and the patient is positioned prone it is likely the initial dose of muscle relaxant will have worn off enough to obtain adequate baseline signals.

Choice B) Yes.

Generally any longer-acting muscle relaxant would be avoided for this surgery since, without much time needed for positioning, line placement, and surgical exposure, neuromonitoring will usually commence quickly.

However, there are also other correct answers...



keep thinking - try again

Choice D) Yes.

Generally any longer-acting muscle relaxant would be avoided for this surgery since neuromonitoring signals (including tcMEPs) will be needed essentially just after commencement of the general anesthetic.

However, there are also other correct answers...



keep thinking - try again

Choice E) Yes.

Lateral spread is dependant on avoidance of muscle relaxation. In some cases and with faster surgeons, there may not be enough time for the relaxant to worn off enough by the time the patient is positioned and surgical access is obtained.

However, there are also other correct answers...



keep thinking - try again

Choice F) Yes.

B and D are correct, but there is another more correct answer...



keep thinking - try again

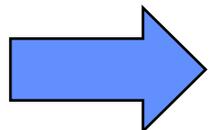
## Choice G) Yes.

Longer acting muscle relaxants would generally be avoided at the time of intubation since monitoring will be needed shortly after induction of general anesthesia. Depending on the patient and airway concerns, alternatives to consider would include depolarizing muscle relaxant, awake fiberoptic intubation, and asleep fiberoptic intubation without muscle relaxant. Another option could be use of non-muscle relaxant drug regimens to achieve relaxation to facilitate direct laryngoscopy, such as propofol and remifentanil.<sup>1</sup>

1. Erhan E, Ugar G, Gunusen I, et al. *Can J Anesth* 2003;50(2):108-115.

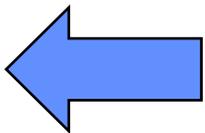


[go back and click on individual answers for more explanations](#)



# What is lateral spread?

- A) A SSEP-type of signal (e.g. conducted via the sensory pathway)
- B) An EEG-type signal
- C) An EMG-type signal



Choice A) No.

Although lateral spread is a response to stimulation of a nerve like the SSEP, the recording is from a muscle for this cranial nerve with both sensory and motor components.



[Try again](#)

Choice B) No.

Lateral spread is a response from muscle whereas the EEG is the observation of spontaneous superficial cerebral cortex pyramidal cells.



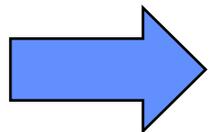
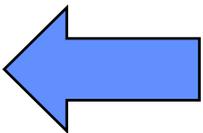
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Choice C) Yes.

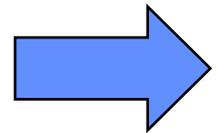
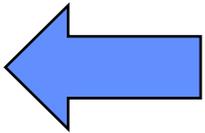


Lateral spread response occurs when stimulation of one branch of cranial nerve (CN) VII leads to activation of other branches of CN VII. This can be viewed as a type of EMG activity. As such, this neuromonitoring modality is basically not affected by intravenous or inhalation anesthetics, but it is very sensitive to the presence of muscle relaxant.

This is an abnormal response since normally stimulation in one branch would not cause a response in another branch. It is likely the result of irritation of the nerve.

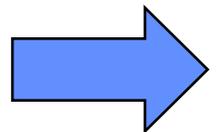
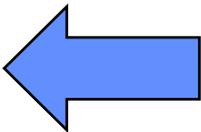
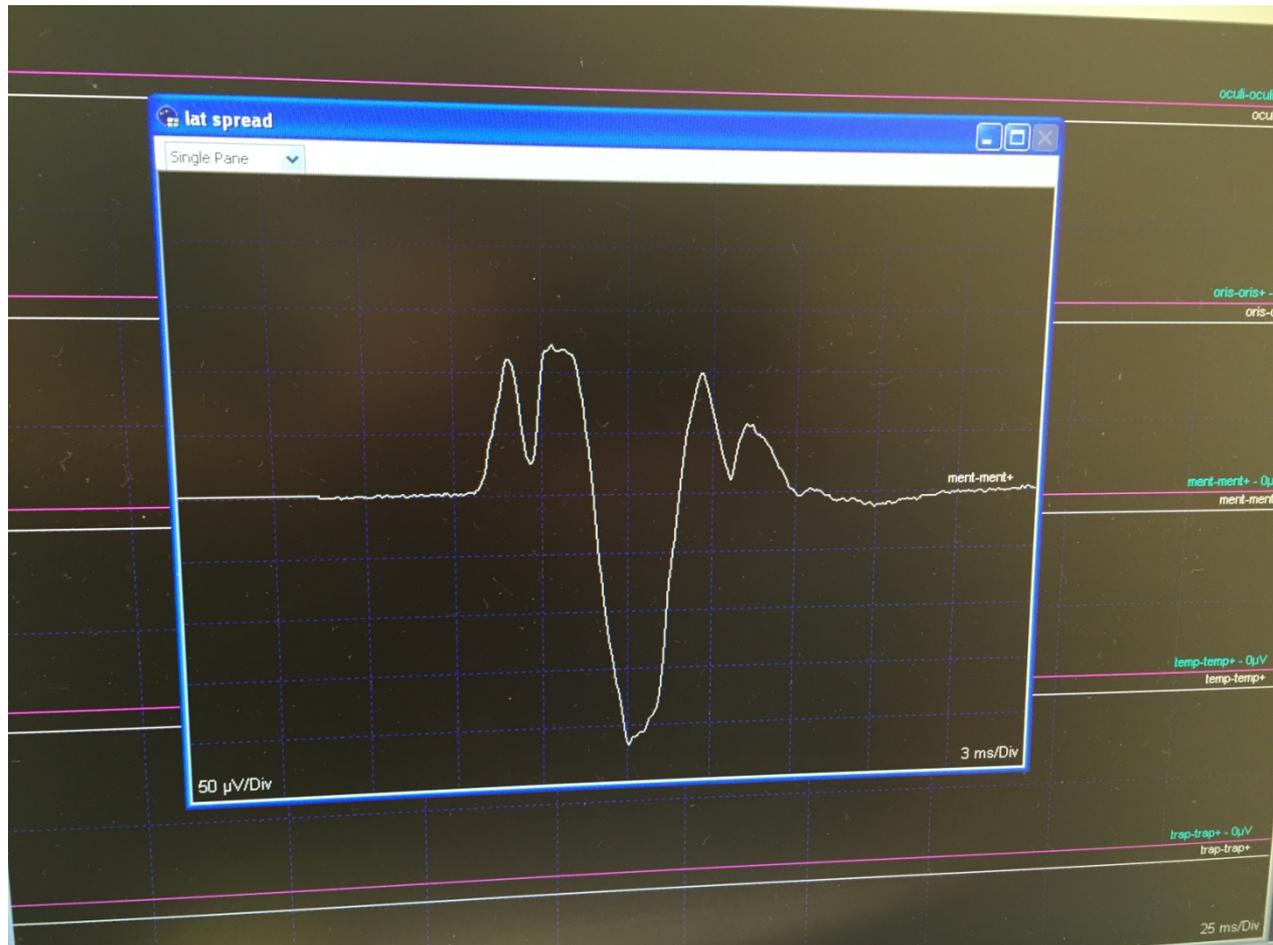


In microvascular decompression surgery for hemifacial spasm, lateral spread response disappearance may help predict success in alleviating the hemifacial spasm.<sup>1-3</sup> Thus, since its initial presence must be verified early in surgery, non-depolarizing muscle blockade is usually avoided for intubation and throughout surgery. The long term predictive value of the lateral spread response has been questioned, however.<sup>3-4</sup>



1. Minahan RE, Mandir AS. *J Clin Neurophysiol* 2011; 28:551-565.
2. Neves DO, Lefaucheur JP, de Andrade DC, et al. *J Neurol Neurosurg Psychiatry* 2009; 80:1375-80.
3. Thirumala PD, Shah AC, Nikonow TN, et al. *J Clin Neurophysiol* 2011; 28:56-66.
4. Joo WI, Lee KJ, Park HK, et al. *J Clin Neurosci* 2008; 15:1335-1339.

# Lateral Spread Response Prior to Microvascular Decompression



# Lateral Spread Response Disappearance Post Microvascular Decompression

