References

1. Brull SJ: Indicators of recovery of neuromuscular function: Time for change? ANESTHESIOLOGY 1997; 86:755–7

2. Kopman AF, Yee PS, Neuman GG: Relationship of the train-of-four fade ratio to clinical signs and symptoms of residual paralysis in awake volunteers. ANESTHESIOLOGY 1997; 86:765–71

3. Sharpe MD, Lam AM, Nicholas FJ, Chung DC, Merchant R, Alyafi W, Beauchamp R: Correlation between integrated evoked EMG and respiratory function following atracurium administration in unanesthetized humans. Can J Anaesth 1990; 37:307–12

(Accepted for publication July 7, 1997.)

Anesthesiology
1997; 87:1258

In Reply:—Dr. Lam's inability to antagonize residual diplopia with neostigmine after atracurium administration is fascinating because we have had a similar experience. Before the 10 cases that we reported,[1] we did a pilot study using rocuronium as the test drug. One individual (a man aged 26 years and weighing 70 kg) complained of pronounced visual disturbances despite a measured train-of-four (TOF) fade ratio of 0.93 at the end of the study. At this time, the subject was given 0.4 mg of atropine and 5.0 mg of edrophonium intravenously. The TOF ratio promptly returned to a value of 1.00, but the subject reported that if anything his vision got worse. Blurred vision persisted for an additional 60 min.

This observation, if it can be reproduced, raises several questions. What is the effect (if any) of intravenous atropine, glycopyrrolate, neostigmine, and edrophonium alone or in combination on visual acuity and extraocular muscle function? Is it advisable to attempt to reverse diplopia if that is the sole residual effect of an administered relaxant? Is it even possible to do so? Certainly this is an area deserving of further investigation.

The question of whether persistent visual disturbances after the use of nondepolarizing relaxants represents "residual weakness" or something else is probably best left to semanticists. I would not dismiss the importance of these symptoms as lightly as Dr. Lam. The issue is not simply our comfort with the extent of neuromuscular recovery. Should not patient satisfaction enter into the equation as well?

Aaron F. Kopman, M.D.
Pamela S. Yee, B.A.
George G. Neuman, M.D.
Department of Anesthesiology
Saint Vincent's Hospital and Medical Center
153 West 11th Street
New York, New York 10011

Reference

1. Kopman AF, Yee PS, Neuman GG: Correlation of the train-of-four fade ratio with clinical signs and symptoms of residual curarization in awake volunteers. ANESTHESIOLOGY 1997; 86:765–71

(Accepted for publication July 7, 1997.)

Anesthesiology
1997; 87:1258–9

In Reply:—Thank you for the opportunity to comment on Dr. Lam's correspondence and very interesting observations. Dr. Lam correctly identified that subjective symptoms of visual changes such as diplopia are "obviously common, yet always overlooked, . . ." More importantly, he reports that his own symptoms of diplopia (after participation as a volunteer in an electromyographic study[1]) persisted for 60 min after self-administering anticholinesterase reversal.

Although his questions were rhetorical, I would nevertheless like to respond: the persistence of diplopia[2,3] was surprising because in some cases it was evident for up to 90 min after the train-of-four (TOF) ratio had returned to a value of 1.0. This persistence was evident after administration of a drug (mivacurium) that has a spontaneous recovery index of 7–8 min. This is as surprising as Dr. Lam's finding that atracurium-induced diplopia was not improved by anticholinesterase reversal. As to whether "it is important or necessary to have complete recovery of eye functions before we discharge patients home," it is perhaps not imperative to do so if patients received an ultra-short-acting muscle relaxant. Would we feel as comfortable discharging our patients after administration of one of the older (and cheaper), long-acting relaxants, as we are increasingly being "encouraged" to do?

Finally, as to whether we warn ambulatory patients about "persistent visual disturbances," and not interpret them as "residual weakness," it is really a matter of semantics. I doubt that the patients' subjective symptoms would be dramatically improved by our warning, regardless of what we call these symptoms. In the present era of expanding ambulatory surgery, when emphasis is placed on rapid recovery, quick discharge, and patient satisfaction scores, even "persistent visual disturbances" may be perceived by our patients (and managed care organizations) as undesirable.

Sorin J. Brull, M.D.
Department of Anesthesiology
Yale University School of Medicine
333 Cedar Street
New Haven, Connecticut 06520-8051