

## ASSOCIATED MOVEMENTS IN ANESTHESIA: THE WINKING-JAW PHENOMENON

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DURING induction of anesthesia, the eye reflexes disappear in the following order: (1) ciliary, second stage; (2) palpebral, beginning of third stage; (3) conjunctival, first plane; (4) corneal, second plane; (5) reaction to light, third plane. Thus the eye reflexes provide a true progression of anesthesia so long as slow induction has been accomplished.

We have observed that stimulation of the cornea causes a simultaneous movement of the lower jaw when anesthesia has been induced by the slow intravenous administration of barbiturates. The jaw becomes displaced contralaterally and in the horizontal plane (winking-jaw phenomenon). This movement varies in amplitude, speed, and duration.<sup>3</sup>

The characteristics of this phenomenon are: (1) It disappears when anesthesia deepens beyond the first plane of the third stage. It is chronologically inseparable from the corneal reflex, and when present, stimulation of the cornea provokes a simultaneous appearance of the phenomenon. (2) It is subject to fatigue following repeated stimulation. (It may thus escape detection.) (3) It is usually bilateral (nearly always with a dominant side). (4) Normality of muscular tone is optimal for the phenomenon. Excessive muscular contraction or curarization interferes with its appearance. (5) The stronger the closure of the eyelids in response to corneal stimulation, the more prominent the winking-jaw phenomenon.

Von Solder and Tromner<sup>1, 2</sup> first observed the phenomenon in patients with organic lesions of the encephalon. Its physiopathogenesis has been studied by Wartemberg<sup>3</sup> who has suggested that the palpebral-mandibular movement is not a reflex but a phenomenon known in neurology as an associated movement or a synkinesis.\* Wartemberg refers to the fact that the pterygoid and the orbicularis pal-

pebrarum muscles are in proximity to each other and have parallel courses. A functional relationship between them does not appear unlikely since these two muscles primitively function synergistically. Following supernuclear lesions with the fifth cranial nerves, the orbicular and homolateral external pterygoid muscles may again function together. When patients with such disfunction vigorously close their eyelids, the winking-jaw phenomenon may be provoked. In comatose patients the secondary movement is present even in the absence of corneal reflexes since it occurs in Bell's palsy and complete facial nerve paralysis. The phenomenon should be classified as facio-trigeminal, palpebro-mandibular, or orbiculo-ptyerygoid synkinesis involving an associated movement between muscles innervated by the facial nerve and those by the trigeminal (homolateral external pterygoid).

### METHODS

The anesthetic technique employed for investigation of the winking-jaw phenomenon in 1,017 patients, all clinically free of neurologic disease, was as follows: Premedication; an opium alkaloid or synthetic derivative (meperidine or methadone) plus atropine or scopolamine, used in association with pentobarbital in some cases, was administered in two hours preoperatively. Anesthesia was induced with 5 per cent or 2½ per cent thiopental or kemithal (10 per cent) plus succinylcholine. Anesthesia was maintained with divided doses of meperidine and nitrous-oxide and oxygen for inhalation.

The winking-jaw phenomenon was sought in all cases during induction of anesthesia. When absent the search was repeated during awakening. In some cases the winking-jaw phenomenon was sought the day preceding operation and in rare instances a few days after operation.

### RESULTS

Of the 1,017 patients examined, 374 (36.4 per cent) demonstrated the winking-jaw phenomenon. It was present in 41.5 per cent of

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\* Associated movements represent a primitive factor; the vestige of phylogenetically extinct movements which may be recognized in traces in normal persons or occur as the sequelae of encephalic lesions.

the males and 31.3 per cent of the females. The lowest incidence was found in infancy and in the elderly.

The intensity of the response varied, with the major proportion being strongly positive. The phenomenon was noted bilaterally most often (35 cases, right side; 65 cases, left side; 274 bilateral).

In the series of patients examined preoperatively the winking-jaw phenomenon was present in 5 per cent.

#### DISCUSSION

Statistics based on examination of normal, awake subjects revealed 4 per cent or less positive for the winking-jaw phenomenon<sup>2, 5</sup> while in anesthetized patients the incidence was 36.7 per cent. It is obvious that the functional changes in the central nervous system induced by the anesthesia are capable of duplicating physio-pathologic situations which are the basis of associated movements represented by the winking-jaw phenomenon.

The winking-jaw phenomenon was observed in some cases for hours after operation. Whenever it existed before the operation it was always more easily detectable and appeared more obvious for a few days. This in our opinion indicates that anesthesia leaves a disturbance in the central nervous system, the duration of which varies from patient to patient. It also suggests that some central nervous functions require a longer time to return to normal in comparison with other functions. The observation that less than one third of our patients had the winking-jaw phenomenon demonstrates that anesthesia alone is not adequate to provoke the response, but that other factors must intervene to induce associated movement.

At present we have no data on these other factors. Anesthesia appears to be a precipitating cause, while age and pathological states of acute and chronic nature may also be predisposing factors. A more thorough study is required.

It is not clear as to what importance the winking-jaw phenomenon has. It is, however, additional evidence of the effect anesthesia may have upon the central nervous system in

a different direction than usually considered. More information is needed on the difficult problem of assaying response to anesthesia.

#### SUMMARY

The winking-jaw phenomenon is an associated movement characterized by a contralateral horizontal displacement of the jaw following corneal stimulation during light anesthesia. We have examined 1,017 patients under light thiopental nitrous-oxide anesthesia and have found this phenomenon present in 37.6 per cent. It was most often strongly positive and could usually be obtained bilaterally. The importance of this phenomenon in relation to anesthesiology is discussed.

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