

## A VESTIBULO-PALPEBRAL REFLEX

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According to published reports, impulses from the vestibular apparatus exert a marked influence on the development of the human nervous system during both the pre- and post-natal periods. The vestibular apparatus is completely formed in a fetus of 6-7 months, and at birth it is associated with various effectors, so that when it is stimulated contractions occur in the muscles of the limbs, neck, trunk, and eyes, and there are changes in blood pressure and in the blood supply to the brain [3, 4]. It would therefore be expected that there might be some connection between the vestibular apparatus and the muscles which open the eyelids.

It is known that during the first few days after birth it is very difficult to induce the eyes to open during sleep, particularly in premature infants. Clapping, light shaking, touching the lips or cheeks, and shining light on to the eyes very seldom causes the lids to open. However, it appears that the opening may be readily elicited by appropriate stimulation of the vestibular apparatus.

### METHOD

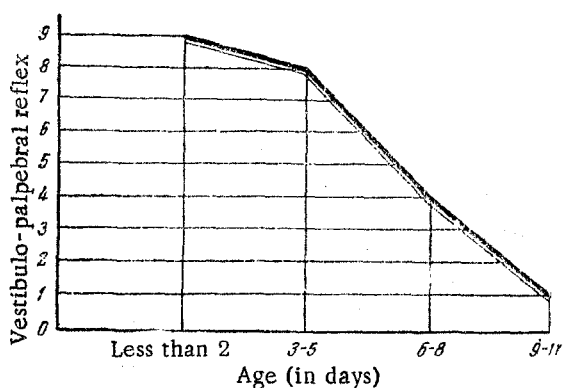
We studied 87 infants born at term, and 8 which were premature. The former were divided into 4 groups aged up to 2 days, from 3-5, 6-8, and from 9-11 days. To stimulate the semicircular canals the child was picked up as it lay on its back and was then rapidly rotated so as to face downwards. When such an influence was applied to the vestibular apparatus, the muscles opening the eyelids contracted.

### RESULTS

In the group aged 2 days or less the reaction occurred in 9 out of the 10 infants, in the group aged from 3-5 days in 8, in the 6-8 day group in 4, and in the group aged 9-11 days, only one child responded. The opening of the lids was not accompanied by any generalized motor reaction, as it is on awaking, but the response was purely local and lasted from 1-5 sec. The eyelid movement differed in the different children; in most the opening was clearly seen, and in some, although the muscles raising the lids contracted, the edges of the lids remained in contact. Cases where rotation of children only a few hours old failed to cause any opening were usually those where the lids were greatly swollen, and evidently could be opened only with great difficulty.

We thus found a reflex which caused the lids to open when the vestibular apparatus was sufficiently stimulated, and we have called it the vestibulo-palpebral reflex.

As we have shown, this reflex may be elicited during the first hours of life, but subsequently, like other phylogenetically ancient reflexes, it disappears, though earlier than, for example, the Palmar reflex, or the Babinski or Moro embrace, or the Rossolimo, etc. reflexes. In premature infants, by the 6th-8th day of life the reflexes are less stable, and by the 9th-12th day they are absent entirely. The diagram shows the gradual disappearance of the reflex in children of the different age groups.



The disappearance of the reflex.

the child wakes up, and the reflex often occurs immediately after the child is picked up, so that it may be due to tactile stimuli. In children less than 11 days old, and in premature infants, the reflex is truly local.

Therefore, appearance of a temporary connection at an early stage, in the development of the individual, between the vestibular apparatus and the muscles of the eyelid, represents yet one more example of a simple reflex which disappears quite early in life. The relationship must be looked on as a vestigial association whose transient manifestation indicates that evolution proceeds not by the complete elimination of such connections but by superimposing upon them new functional relationships [5] which are in keeping with the new conditions of existence.

An ontogenetic mechanism which deserves particularly careful study is that which causes the disappearance of such inherited established connections. The disappearance of such reflexes as the Palmar, Babinski, Moro and other reflexes is normally attributed to the restraining effect of the cerebral cortex. M. I. Astvatsurov [1] has shown that reflexes which are caused to disappear at an early age through the action of the cerebral cortex pass into a latent state. This view is confirmed by the appearance under pathological conditions in adults of the Babinski, Rossolimo, Mendel-Bechteraw, Robinson, and other reflexes.

Results obtained on decorticate animals, and observations on anencephalic and feeble-minded children are evidence of the action of the cerebral cortex in causing the elimination of various simple reflexes. The tonic neck and labyrinthine reflexes are found in their most complete form in decerebrate animals, and are particularly clearly shown in anencephalic children.

A detailed study of animal development, A. A. Volokhov [2] has shown that a number of specialized reflexes disappear during the post-natal period, and that effective elimination of the cortex, either by extirpation or by reducing the partial pressure of oxygen, releases the "previously inhibited specialized reflexes."

These facts further substantiate the view of the part played by the cerebral cortex in suppressing certain reflexes at an early stage. It is not however yet possible to explain the different times at which the separate reflexes are suppressed; some of them are inhibited early, some much later, and the total range covered is of the order of several months. In children born at term, the vestibulo-palpebral reflex described above disappears at the end of the second week, the Palmar reflex at the end of the fifth month, while the Babinski reflex can be elicited for the whole of the first year.

A further study of the vestibulo-palpebral reflex might establish a basis for its use in diagnosing vestibular disturbances at an early age, for determining how premature a birth has been, and possibly for determining individual features of the cortical activity which is manifested at such an early stage by the suppression of the reflex, as described.

## SUMMARY

A study of 87 full-term and 8 premature infants revealed a connection between the vestibular apparatus and the muscles of the eyelids which is here described for the first time. The connection was shown by the opening of the eyes during the stimulation of the semicircular canals. The stimulation was effected by carefully raising

the infant and then suddenly turning it face downwards. The infant did not wake up, and the reflex, which we have called the vestibulo-palpebral reflex was strictly local, and not accompanied by any general motor reaction. It appeared during the very first hours after birth, but later it disappeared, as do other phylogenetically ancient reflexes, and earlier than, for instance, the Palmar or Babinski reflexes.

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