

Case report

Aberrant regeneration of the third cranial nerve

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Abstract

Background: Aberrant regeneration of the third cranial nerve is most commonly due to its damage by trauma. **Case:** A ten-month old child presented with the history of a fall from a four-storey building. She developed traumatic third nerve palsy and eventually the clinical features of aberrant regeneration of the third cranial nerve. The adduction of the eye improved over time. She was advised for patching for the strabismic amblyopia as well. **Conclusion:** Traumatic third nerve palsy may result in aberrant regeneration of the third cranial nerve. In younger patients, motility of the eye in different gazes may improve over time.

Key-words: aberrant regeneration, third nerve, trauma

Introduction

Aberrant regeneration of the third nerve is most commonly due to third nerve damage by trauma or aneurysm of the posterior communicating artery (Sebag and Sadun, 1983). The full blown features include horizontal gaze-eyelid synkinesis, pseudo-Graefe's sign, limitation of elevation and depression of the eye with retraction of the globe on attempted vertical movements, adduction of the involved eye on attempted elevation or depression, pseudo-Argyll Robertson pupil and absent vertical optokinetic response (Cox et al, 1979; Keane, 1975; Spector and Faria, 1981)

Case report

Ten months old girl child presented with the exotropia of the left eye (Figure 1, 2). She had the history of fall from 4 storey building at the age of the 7 months. She had history of loss of consciousness for 5 days. She was admitted in intensive care unit (ICU) for 16 days. She developed the left sided hemiplegia. On ocular examination, with her right eye, she followed and fixated the light. She refrained

from obstructing the right eye. Eyelids were normal in the right eye.

Prominent signs of aberrant reinnervation of the left third nerve were present. There were changes in the position of the ptotic eyelid on adduction. There was elevation of the ptotic lid on adduction (Figure 3). There was total ptosis on primary gaze in the left eye (Figure 1). There was complete ptosis on abduction of the left eye (Figure 4).

Her extra-ocular motility was full in all gazes in the right eye. It was limited in all gazes in the left eye. There was paresis of all the muscles innervated by the third nerve. There was pseudo-Graefe sign - retraction and elevation of the eyelid on down gaze. The amount of deviation was 110 prism dioptres as per the Krimsky examination. The superior oblique (cranial nerve IV) and lateral rectus (cranial nerve VI) muscles were normal.



Figure 1: Primary position

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Figure 2: Primary position on lid elevation



Figure 3: Dextroversion: Elevation of the left ptotic lid on adduction



Figure 4: Levoersion: Ptosis on abduction of left eye

Cornea was clear in both the eyes. Anterior chamber was of normal depth in both the eyes. Iris was of normal color and pattern in both the eyes. Pupil was round, regular and reacting in right eye. On the left eye, pupil was dilated and not reacting to light. Lens was clear in both the eyes. On dilated fundus examination, disc was pink in color and macula was healthy.

She was diagnosed as aberrant regeneration with post-traumatic third nerve palsy.

Two hours of patching therapy was advised on the right eye, to prevent the strabismic amblyopia in the left eye. She was followed up in 4 month duration. At the end of one year follow up, adduction of left eye improved. The left eye was exotropic and hypotropic. Pupil was sluggishly reacting.

Discussion

Gowers in 1879 first described the aberrant regeneration of the third nerve. Bielschowsky in 1935

postulated that this condition was caused by misdirected regenerating third nerve fibres. Bender and co-workers who produced aberrant regeneration in monkeys and abolished the paresis of upgaze by sectioning the inferior rectus muscle (Bender and Alpert, 1937; Bender and Fulton, 1938). Ocular electromyography has demonstrated the co-contraction of extra-ocular muscles innervated by the oculo-motor nerve with aberrant regeneration (Walsh, 1957).

In this case report, third nerve palsy resulting in 'misdirection' was due to trauma. (Sebag and Sadun, 1983; Keane, 1975).

The full blown signs of aberrant regeneration of the third nerve include: (a) horizontal gaze-eyelid synkinesis elevation of the involved eyelid on adduction of the eye; (b) pseudo-Graefe sign-retraction and elevation of the eyelid on down-gaze; (c) limitation of elevation and depression of the eye with occasional retraction of the globe on attempted vertical movements (d) adduction of the involved eye on attempted elevation or depression;

(e) Pseudo-Argyll Robertson pupil - although pupillary constriction may occur in any direction of gaze requiring third nerve function, it is seen most often with adduction. This resembles Argyll Robertson pupil since it is nonreactive to light but constricts with convergence. These changes are due to re-innervation of the postganglionic fibers serving sphincter function by collaterals from adjacent fibers not originally innervating the sphincter (Chua, 2000).

The abnormal eyelid movements are due to co-contraction of muscles innervated by the third nerve. The regenerating fibers no longer follow their previous paths but innervate different muscles supplied by the third nerve. This mechanism may not apply in every case since anomalous synkinesis can occur transiently after acute third nerve palsy.

Conclusion

Aberrant regeneration of the third nerve may occur after third nerve damage from traumatic head in-



jury. The full blown features of this syndrome may or may not be present. In younger patients motility of the eye in different gazes may improve over time.

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