

EDITORIAL

CERVICO OCCULAR REFLEX IN CERVICAL VERTIGO

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Vertigo is an illusion of rotatory motion either of the surrounding or the subject himself though usually complained by the word dizzy, which usually means disorientation. Most of the vertigo (90 %) are otological in origin with phases of remission usually associated with hearing impairment or tinnitus. Central vertigo is progressive and associated with various cranial nerve palsia, ataxia, blurred or double vision, blindness, difficulty with speech and swallowing, numbness of face or extremities and/or their weakness, clumsiness or confusion. While in dizziness there is feeling of unsteadiness, falling tendency, faintness, transient blackout and in majority improves by rest or lying down. Dizziness is seen in one in three elderly patients and one in five people of working age.^{1,2} It may be just a fear also termed as fear of frequent falling (3 F Syndrome) more common in elderly post-menopausal women. It may be of psychiatric origin due to personality disorders, anxiety or phobias.

Cervical vertigo results from paravertebral stretch receptors in the neck. Vertebral artery arises from the posterior supero aspect of the first branch of the subclavian artery and it passes through the foramina in the transverse canal of all cervical vertebrae except 7th and joins at the lateral pontine border to form the basilar artery.

Vertebral artery is crossed by lymphatic duct left or thoracic duct right, inferior thyroid artery. Transverse process of the seventh cervical vertebrae lies posterior to it, above it

is medial to rectus capitis lateralis, and covered by semispinalis capitis in the suboccipital triangle, hence involvement of muscles and ligaments, may also result in vascular compression.

Conditions like pain, injury, anxiety or ergonomics may produce hyper lordosis in lower cervical spine and kyphosis in upper cervical spine, resulting in over activity of the extensor group of the muscles and under activity of flexor group of muscles of neck. Neck trauma even minor, neck manipulation or spontaneous cervical spondylosis may result in transient ischaemia by reduced flow via vertebral artery, basilar artery and finally posterior inferior cerebellar artery supplying the dorsolateral medulla, inferior cerebellar peduncle, and posterior inferior cerebellum of ipsilateral side.

Though cervical spondylosis is the predominant etiological factor, associated emotions like atherosclerosis, embolism, or vascular occlusion, hyper viscosity syndrome and hyper coagulation disorder can precipitate or aggravate the vertigo.

Stenosis of the proximal segment subclavian artery prior to origin of vertebral artery (subclavian steal syndrome) will result in ischaemia of brainstem resulting in vertigo, bruit may be heard in axilla and blood pressure is different between the two arms.

There is no need to emphasize that proprioception has its own place in balance. In cervical region short muscles of neck which are rich in spindle muscle specifically rectus

capitis lateralis and semispinalis capitis. Proprioception is also maintained by the pacini receptors and golgi tendon organ of periarticular tissue of cervical vertebrae. Cervical proprioception generates two types of reflexes, viz. postural neck reflex and cervico ocular reflex. The cervico ocular reflex is mediated by medial and descending vestibular nuclei but, in human cervico ocular reflex is subdued by vestibulo ocular reflex, which is inadvertently due to head movement. In animal the cervico ocular reflex has been studied following the loss of vestibular function. The cervico ocular reflex is enhanced with shortening of latencies, enhancement of slow phase velocities indicating the precedence of vestibulo ocular reflex. Certainly, the cervico ocular reflex alone has got submissive role and usually does not generate a severe vertigo which may amount for medical emergency. It usually presents as light headedness, mild malaise, and symptoms of sympathetic irritation and may be associated with tinnitus and down beating nystagmus.

The cervico ocular reflex is generated in the neck and reaches the vestibular nuclei by proprioceptive afferents. The cervico ocular reflex works in conjunction with vestibular and visual cues. It produces posterior correction but these responses change direction with change in head position which is compensated by cervico ocular reflex from afferents of neck muscles. For example, when the head is turned to right on fixed body, brain differentiates the movement of head by vestibular and visual cues but body remaining in the same position is differentiated by proprioceptive system. The cervico ocular reflex works in conjunction with vestibulo ocular reflex (VOR) and the optokinetic reflex (OR) in order to prevent visual slip over the retina during head movement.³ Hence cervico ocular reflex induces eyes movement in response to afferent proprioceptive signals from the neck which shows significantly lower equilibrium scores in

the patients with vertigo than in controls and much more lower scales in particular position to provoke unsteadiness.¹⁰ It has been observed that vestibulo ocular reflex and optokinetic reflex gains decrease with the age but cervico ocular reflex gain increases with age and there is significant coviation between them i.e. when vestibulo ocular reflex increases cervico ocular reflex decreases. Hence active cervico ocular reflex (ACOR) can be used for staging vestibular dysfunction.

Cervical vertigo is associated with neck tenderness and limitation of movement which is attributed to inflammatory mediator of sensitive muscle spindle and myofascial trigger points. This may result in mismatch between vestibular and proprioceptive system input hence resulting in cervical vertigo. If it is due to trauma then associated sympathetic or vascular (carotid bodies) may be simultaneously involved.

If vestibular or visual vertigo is based on vestibular stimuli or visual stimuli and diagnosed by their specific tests, cervical vertigo testing should be based on somato sensory cervical dysfunction and on anatomical dysfunction tests viz. Posturography, CT, V MRI and Trans cranial Doppler ultrasonography of vertebral artery (which may be involved at V2 level by compression as atherosclerosis is rare of this segment of vertebral artery). can be used Various studies have shown vertigo by experimental studies. Static cranio corpography (recorded Romberg Test), which is a method of recording oscillations of head and shoulders can show characteristic patterns in patients with vertigo caused by increased muscle tension in the neck. Soto Varela A, etal has observed movement of head with static shoulder in 67% cases of cervical vertigo compared to 31% of healthy subjects and 36 % front back flexion and in 34 % oscillation in all directions.⁸

Another test is dynamic posturography in which vibratory stimulus is applied to calf muscles as input and body sway is recorded as

out put. Three parameters, swiftness, stiffness and damping are studied. The patients of cervical vertigo show differences, hence may be a future tool for differentiating vertigo.⁹

The cervical vertigo is usually characterized by ataxia, insteadness, floating at place of walking and not by rotational or linear vertigo. Neurootological, vestibular and psychosomatic disorder must first be excluded before the dizziness or unsteadiness in cervical pain

syndrome can be attributed as cervical vertigo.⁷ In cases of cervical vertigo there is spasm and inflammation of cervical muscle spindles which may be due to psychosomatic changes by vestibular or visual dysfunction resulting in vertigo. Hence, a diagnosis of cervical vertigo should be cautiously made after excluding post traumatic otolith vertigo, benign paroxysmal positional vertigo and central vestibular dysfunction.

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