

Letter to the Editor

Trigemino-cardiac reflex: Some thought to the definition

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Dear Editor,

We read with great interest one of the rare prospective studies related to the Trigemino-cardiac Reflex (TCR) by Etezadi *et al.* in the September issue of the *Surgical Neurology International*.^[6] Given the fact that most TCR evidence is based upon case reports and case series,^[9] the importance of such studies become more evident. The TCR has long suffered from a lack of proper evidence for a couple of reasons:

First, the nomenclature has been partly misleading, as trigeminal stimulation has been only linked to cardiac and cardiovascular changes,^[10,13,14] as these are most evident during operation. It should be noted that TCR is originally coined to describe concrete autonomic changes upon stimulation of the trigeminal nerve. These changes include “sudden onset of parasympathetic dysrhythmia, sympathetic hypotension, apnea, or gastric hypermotility during stimulation of any of the sensory branches of the trigeminal nerve”.^[13] None of the clinical assessments of TCR, to the best of our knowledge, have hitherto concerned the big picture.^[3]

Second, the reflex is elicited by the maneuvers around any of the branches of cranial nerve V or allegedly upon stimulation of Gasserian ganglion or trigeminal brainstem centers.^[11,13] A direct cause and effect assessment of the trigger point of the reflex, however, is ethically not possible in humans unless in proper animal models,^[9] but a generally accepted and clinically driven model, which is properly and sufficiently studied, is lacking.^[1]

Third, the original definition of the reflex did only describe the central part of the reflex^[14] and not triggering of the reflex during stimulation of peripheral

part, Gasserian ganglion or brainstem trigeminal centers and nuclei,^[4,10] a fact that was only discovered recently. Proper definition of the reflex is currently an ongoing debate driven by the continuous new knowledge on this reflex.^[4]

Fourth, the 20% cut-off of the TCR^[14] seems to decrease the true incidence of the reflex,^[4] but is the best instrument to exclude common cardiovascular disturbances that are seen during operations and are not related to the reflex. According to Bohluli *et al.*, who for the first time, systematically studied the occurrence of TCR in maxillofacial procedures through clinical trials, a mean decrease of 6.5% and 9.7% compared with baseline was recorded for Le-Fort I osteotomy, respectively, in pulse rate and mean arterial blood pressure.^[2] Also in bilateral sagittal split ramus osteotomy, the locally blocked side was associated with mean decreases of 4.6% and 6.8% during splitting and manipulation, respectively, compared with baseline while these values were 17.6% and 21.5% in the control ramus.^[3] It seemed that the 20% cut-off is only resulting in the exclusion of the actual cases of occurrence of TCR. Since the magnitude of the reflex seemed to be a factor of aggression of the surgical maneuver – needs verification – the reflex could always

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be expected and its rate is much higher than what is described throughout the literature.

Fifth, not every bradycardia is TCR.^[12,14] Besides the strict definition, there is a need of a clear “cause-/effect-relationship. If such clear definitions are used in every case, comparisons of the works related to TCR would be possible and consecutively systematic reviews would be help to create new knowledge.^[9]

Last, it is thought that the reflex involves coactivation of the sympathetic and parasympathetic reflex.^[8] This belief stems mainly in oculocardiac reflex (OCR), which is part of the peripheral TCR,^[10] research that has been far more extensive compared to TCR. The incidence of OCR during eye surgery is reportedly significant especially during strabismus surgery.^[5] In patients with suppressed vagal tone, ventricular ectopic beats can occur along with reduced bradycardia, which could lead to an increased risk of arrhythmias.^[7]

Based on these findings and observations, the definition of TCR is an ongoing work that is substantially influenced by the continuous and increasingly new knowledge on this reflex.^[4] With these new suggestions, as published recently,^[4] another interesting approach to study the occurrence of TCR will be to record the mean arterial blood pressure and pulse rate drop compared with the baseline, which is immediately before the stimulation and to report the relative magnitude of the reflex for each procedure. Needless to say, the 20% decrease will still be helpful to report the “more clinically concerning” event of the reflex.

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