

Letter to the Editor

Trigemino-cardiac reflex: Some thought to the definition, response

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Sir,

It is an honor that Professor Scaller and his group of researchers were interested in our research and have criticized it so deeply (Sadr-Eshkevari *et al.*, *SNI*, 2014;5:43). Appreciating their interest in this research and in the topic of TCR in surgical practices of all branches, we would like to present this short discussion of the issues raised by them as a response letter to be published in *SNI*, in accordance with the Editor-in-Chief's idea.

First, according to the study of Schaller *et al.*, the TCR has four components (bradycardia, hypotension, apnea, and gastric hypermotility).^[5] We have selected two important hemodynamic variables for defining TCR as the main variable in our study. "Apnea" and "gastric hypermotility" were not considered because of the following reasons.

All patients in our study had undergone general anesthesia using mechanical ventilation. So, it was impossible to check them for occurrence of apnea during the operation. Moreover, the occurrence of "gastric hypermotility" was first described by Kratschmer *et al.* in 1870 during nasal mucosa stimulation of cats and rabbits and this sign has never been proved to exist in a human study.^[1] Thus, we could not believe in the occurrence of this phenomenon in human beings. We even tried to check it by inserting a balloon-like device, for example, "Black-Moore balloon," in the stomach of our cases to detect intragastric pressure changes. However, it was abandoned because of safety concerns for the neurosurgical patients who were under general anesthesia.

Regarding the second and third parts of the letter, if one checks the distribution of our 190 cases in terms of the type of surgical procedures, it will be found that we have

included patients with both central and peripheral types of TCR in this study. It is well-taken that the ethical limitations make it too difficult to conduct human studies in this field.

Fourth, the main drawback of both studies of Bohluli *et al.* was that the deepness of anesthesia has not been controlled with a device like "BIS monitor" during anesthesia. Meanwhile, we tried to avoid repeating this main shortcoming in designing the plan of anesthesia. It is well-known that the level of aggression of surgical maneuver along with the level of pain perceived by the patient has a great impact on the magnitude of any autonomic reflex (vaso-vagal, trigemino-cardiac, etc.). Furthermore, Bohluli *et al.* found that blocking a nerve through its course could decrease the incidence of TCR while imposing noxious stimuli in the territory of the same nerve. This finding supports the general concept which we have tried to convey through the study. In other words, it is inevitable to see a high rate of TCR while the anesthesia is light.^[2,3]

Additionally, we designed our study to answer a main clinical concern during neurosurgical procedures. Thus, we defined a clinically meaningful cut-off point (20% changes) which has been used by many authors before. It is declared that our study was an applied one and not a basic science research study.

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Fifth, as discussed in our communication, we have kept a controlled level of general anesthesia to reduce the impact of other confounding factors that might be the cause of bradycardia. It should be emphasized that searching for a definite cause–effect relationship is best investigated through an animal study, not in human subject.

The only thing all researchers agree upon is that the “TCR” certainly does exist. It is one of the most ancient brain reflexes with its center located deeply in the brain structure. Although we cannot totally abort it, as a clinician, we can reduce the frequency of its occurrence.

Sixth, according to the study of Paton *et al.*, co-activation of both components of autonomic nervous system is observed in the peripheral chemoreceptors, diving, oculocardiac, and somatic nociceptor reflex responses. In addition, all the afore-mentioned reflexes may have a protective role in difficult natural situation in mammals by enhancing the cardiac output.^[4] Although in an anesthetized patient whose autonomic nervous system has been already partially blocked by anesthetic drugs, the scenario may be different.

We cannot predict the behavior of hemodynamic system when encountering TCR. Thus, it is suggested that

occurrence of such reflexes can best be strictly prevented by preparing sufficient deepness of anesthesia rather than comparing the level of painful stimulus with the level of hemodynamic changes during surgical procedures. Consequently, we would like to disagree with Professor Schaller’s suggestion to design a study in such a way in the future.

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