Dose sparing of opioids and anaesthetics with pre-operative dexmedetomidine

Sir,

I have read with great interest the recent article “Attenuation of pressor response and dose sparing of opioids and anaesthetics with pre-operative dexmedetomidine” in this journal of international repute, and I would like to address some concerns. [1]

This study stresses that dexmedetomidine decreases the dose of opioid and isoflurane required to achieve adequate analgesia and anaesthesia.

White in his editorial mentioning the work of Ura states that 1.3 minimum alveolar concentrations (MAC) (SD 0.34) isoflurane blocks adrenergic responses to skin incision and it decreases with concomitant use of fentanyl.[2] In the study by Lee, the median time for end-tidal concentration of isoflurane to reach 80% of inspiratory concentration was 19 min with an interquartile range of 12 min.[3]

Carbon dioxide (CO₂) production and alveolar ventilation are major determinants of arterial CO₂ if there is no CO₂ rebreathing.[4] As alveolar concentration of CO₂ is determined by production of CO₂ and fresh gas flow (FGF), it can be assumed that if CO₂ production is constant then alveolar CO₂ is determined by FGF to alveoli in optimal conditions.[4] In patients with normal ventilation perfusion ratio, end-tidal carbon-di-oxide (ETCO₂) monitoring can be an estimate of arterial CO₂.[5]

As alveolar ventilation is a major determinant governing uptake of potent inhaled anesthetics,[6] considering the above-mentioned facts, every patient should have been ventilated to a predetermined ETCO₂ with predetermined FGF to remove minute ventilation as the confounding factor in the study by Bajwa et al.[1]

Considering the above facts, in the study by Bajwa et al., a predefined period (to allow equilibration time prior to skin incision) with a fixed protocol-based adjustment of inhalational agent, fresh gas flow, and ventilation pattern to maintain a predefined end-tidal CO₂ level was necessary to attain a steady level of depth of anaesthesia, so that meaningful conclusion could be drawn regarding fentanyl or isoflurane sparing effect of dexmedetomidine in the absence of end-tidal isoflurane and bispectral index monitoring facility.

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Author’s reply

Sir,

It is always nice to receive the constructive criticism of one’s research work that can open new avenues for further improvement in medical sciences. It is also matter of honor that the concerns have been expressed by the readers.[1]
Letters to Editor

To begin with, it should be clear to the concerned readers that this study was mainly focused on attenuation of stress response to laryngoscopy and intubation and not just merely to a decreased response to skin incision as has been cited in all the references in their communication.[2] In the various references, they have mentioned the MAC values of isoflurane required for prevention of response to skin incision and a wait for equilibration of end-tidal and alveolar levels for achieving such a response. How will you wait for equilibration with face-mask ventilation after induction of anaesthesia to achieve attenuation of stress response to laryngoscopy and intubation? The readers are solely concerned with intraoperative events rather than the most important part of anaesthesiology practice, that is, laryngoscopy and intubation to secure airway.

In one of the mentioned articles, the MAC values of isoflurane were decreased by the use of concomitant fentanyl 1.5 µg/kg.[3] Further, it has also been stated in the study that doubling the dose of opiates has a ceiling effect with no further decrement effect on the concentration of inhalational anaesthetics. It is very clearly mentioned in the present study in the Material and methods section that the maximum concentration used for isoflurane was 1% which was 33% lesser than the maximum concentration used by the quoted study.[3] Also, no quoted study in the letter has attended the issues of stress response to laryngoscopy and intubation, which was the main nucleus of our study. The concerned readers should be aware of the potential actions of dexmedetomidine when used through various routes or even as premedicant or pre-operatively as was used in the present study. The central actions of dexmedetomidine are largely responsible for decreasing the dose of anaesthetics and analgesics which can help in the titration as well as achieving the desired clinical effects (attenuation of stress response in the present study) at a lower dose of anaesthetics and analgesics thus avoiding side effects due to higher dosages.[1,4] The model of comparison of the quoted studies does not match exactly with the present study.

It is invariably implied that all type of surgeries using inhalational anaesthetics in modern day anaesthesiology practice uses circle absorber system unless and until specified. Monitoring of end-tidal CO₂ has huge significance during maintenance phase of anaesthesia after intubation. In the present study, continuous monitoring of EtCO₂ was done but no significant findings were observed as compared to pulse oximetry that showed significant variations pre-operatively. Therefore, it was not considered necessary to occupy a larger space in the journal by an insignificant clinical finding. The concerned readers should have given a better example than the study of Elam et al. which was published more than 56 years ago in 1956 and is not relevant in the present day anaesthesiology practice.[5] Besides the stress response, all other findings and outcomes were secondary results and hence cannot be considered important to give priority over the primary aim of the study. Every study may have a number of confounding variables which may mask some of the reliability of the statistical results and significance. However, in the present study, the mentioned confounding variables are merely physiological postulates and they are relevant only to a smaller extent to the methodology of our study as we intended to study the effect on stress response primarily and not the response to skin incision alone. It could have been significantly helpful for future references and improvement had the concerned readers compared our study with other studies of similar models and methodology.

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