

## LETTER TO THE EDITOR

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### **Arterial and end-tidal carbon-di-oxide tensions are indifferent under spinal and general anaesthesia in upper abdominal laparoscopic surgeries: result needs cautious acceptance**

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Dear Editor

Upper abdominal laparoscopic surgeries, especially laparoscopic cholecystectomy under regional anaesthesia (RA) have been a research area of interest in recent times. Although a good number of studies have been conducted, and even meta-analysis has shown regional anaesthesia as feasible option<sup>1</sup>, the issue has remained as a Pandora box which requires further evaluation<sup>2</sup>. In this line, the article published in your esteemed journal on the comparison of arterial carbon-di-oxide tension (PaCO<sub>2</sub>) and end-tidal carbon-di-oxide tensions (EtCO<sub>2</sub>) under general anaesthesia (GA) and spinal arachnoid block (SAB) is read with great interest<sup>3</sup>. The authors have compared a few very important parameters and done a commendable job. The hypothesis and the result both will help the scientific community in better decision making. However, a few facts and methodology needs to be considered before coming to a conclusion.

Firstly, both the PaCO<sub>2</sub> and EtCO<sub>2</sub> depend on the alveolar ventilation. In simple terms, they depend on the minute ventilation (MV) which is on the other hand product of respiratory rate (RR) and tidal volume (Vt). In a patient under GA, the respiratory drive to increased carbon-di-oxide tension is suppressed and the authors rightly acknowledge that. What is more important in the study method is that the GA patients received muscle relaxants as well, and the MV was controlled to targeted EtCO<sub>2</sub>. Although this is a standard method of conducting GA, the target used by the authors are not universally accepted target range and is likely to vary from person to person and hospital to hospital. Therefore, comparing a non-standard, targeted and

controlled EtCO<sub>2</sub> with spontaneously ventilated EtCO<sub>2</sub> is likely to give a result which may not be universally acceptable.

Secondly, the sampling technique of EtCO<sub>2</sub> in both the group is different. Whereas a sampling from a circuit with an endotracheal tube in place and connected near the tube is likely to give a more precise value; a sampling from a face mask, even if tightly placed, is likely to less precise values. Even the Oxygen flow rate can influence the measured EtCO<sub>2</sub> level measured from face mask<sup>4</sup>. Therefore, if the authors provide the value of Oxygen flow used, readers and researchers will be helped in reproducing and validating the findings.

Thirdly, the authors found that the EtCO<sub>2</sub> decline was faster in SAB group as compared to GA is also not devoid of methodological bias. This is also because the rate of decline in the GA will depend on the how frequently the RR or Vt is adjusted by the anaesthesiologist. Moreover, if the anaesthesiologist was part of the study, the potential bias related to his management can also not be denied.

Fourthly, the SAB group of patients received a good number of drugs which has known the effect on sedation, amnesia, and analgesia. Ketamine can even affect the haemodynamics. The drug like Midazolam 2 mg, Tramadol 100 mg and/or Ketamine 25 mg in combination is a good cocktail to produce a significant effect of cardio-respiratory function, patients perception and tolerance. Moreover, haemodynamics, cardiac output, and production of carbon-di-oxide are interrelated. As EtCO<sub>2</sub> and PaCO<sub>2</sub> have a nearly linear relationship, all the aspects pertinent to EtCO<sub>2</sub> are also applicable for PaCO<sub>2</sub> levels. Requirement of high level of block often warrants high amount of local anaesthetics or sedatives and other drugs, which is also against the clear feasibility and acceptance of the RA in such cases<sup>5</sup>.

Fifthly, the intra-operative complication data mentioned in the table III of the authors' manuscript<sup>3</sup>, needs special attention. When analyzed by Fisher's

**Table-I**

*Comparison of intra-operative complications and their relative risks. (GA- general anaesthesia, SAB- Subarachnoid block, RR – relative risk, CI – confidence interval, n – number; N- total number)*

Intraoperative complications	Group GA n (%) [N=40]	Group SAB n (%) [N=40]	RR (95% CI)	Two-tailed p-value
Discomfort	0	19 (47.5)	Infinity	<0.0001
Shoulder tip/Neck pain	0	11 (27.5)	Infinity	0.0004
Hypertension	7 (17.5)	6 (15.0)	0.85 (0.31 – 2.32)	1.000
Nausea/vomiting	0	5 (12.5)	Infinity	0.0547
Hypotension	1 (2.5)	5 (12.5)	5.0 (0.61 – 40.92)	0.2007
Delirium	0	4 (10.0)	Infinity	0.1156
Bradycardia	0	3 (7.5)	Infinity	0.2405
Shivering	0	2 (5.0)	Infinity	0.4937
Arrhythmias	0	2 (5.0)	Infinity	0.4937

exact test using INSTAT software (Graphpad Prism Software Inc.; La Jolla, CA, United States), it was found that the complications in the SAB group were very high and statistically significant (Table 1 of this manuscript). Moreover, it will be better for the scientific community if the authors present the definition of hypotension used in the study, their management and drugs required. Because all these actually affect the decision making to adopt the SAB as the anaesthetic technique even if the patient is American Society of Anesthesiologists – physical status (ASA-PS) I.

Lastly, the authors have mentioned that they have excluded cases which lasted for more than one hour. However, the data mentioned in table I of the authors' manuscript, shows the duration of surgery as 0.957+0.62 and 0.947 + 0.44 hours, which is contradictory. Moreover, predicting the precise time duration of one hour for a planned procedure is also not always practically feasible. This makes the practical applicability of the study limited.

There is no doubt that the authors have done a great job and this prospective randomized study has added thought in favor of adopting SAB for upper abdominal laparoscopic surgeries. However, the Pandora box still

remains open and further good powered, multicenter trial will be required before we adopt the SAB for the said procedure even in ASA-PS I patients.

Conflicts of Interest: None

Competing Interest: None

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