

Methylene Blue For Post-Cardiopulmonary Bypass Vasoplegic Syndrome

The Editor,

We have read the interesting study “Methylene Blue for Postcardiopulmonary Bypass Vasoplegic Syndrome: A Cohort Study.”^[1] We appreciate the authors for conducting one of the largest observational studies of methylene blue administration for vasoplegic syndrome in cardiac surgery patients. However, we would like to add a few points to the study.

First, in the author’s study methylene blue was administered in a dose of 1–2 mg/kg bolus over 10 min and the median time until a maximum hemodynamic response was 2 h after drug administration. Out of 88 patients who received methylene blue, only 39 (44.3%) showed a positive hemodynamic response to the drug. We believe that if the bolus of methylene blue was followed by a continuous infusion of the drug, it would have produced even better results. Evora *et al.* have reviewed 20 years of vasoplegic syndrome treatment in heart surgery and found that the most used dosage of methylene blue is 2 mg/kg as an intravenous bolus, followed by the same dose in continuous infusion because its plasma concentration sharply decreases in the first 40 min.^[2,3]

Second, while comparing the variables associated with methylene blue response, the authors did not take into account the dose of protamine given to neutralize heparin in the study population. It is very likely that the vasoplegic syndrome in these patients was due to the high dose of protamine which then responded to a single bolus dose of methylene blue. Viaro *et al.* studied that the intrinsic mechanism of protamine vasodilation was nitric oxide/cyclic guanosine monophosphate-dependent and endothelium-mediated. They suggested methylene blue as a novel approach to prevent and treat hemodynamic complications caused by the use of protamine after cardiopulmonary bypass (CPB).^[4]

Third, the authors did not measure serum lactate levels in response to methylene blue treatment. The authors have mentioned in the limitations of their study that the target means arterial pressure at their Intensive Care Unit was 70–80 mmHg, which could be variable at different centers. We believe that measuring serum lactate levels in response to methylene blue would also be a good indicator of its hemodynamic effects. In a study by Leyh *et al.*, 54 patients with norepinephrine-refractory vasoplegia after CPB were treated with methylene blue (2 mg/kg) administered intravenously over 20 min. They found a significant decrease in arterial serum lactate concentration

within 24 h after starting methylene blue infusion, underlining the restoration of normal peripheral blood flow after methylene blue infusion.^[5] Maslow *et al.*, in their randomized control trial, studied the hemodynamic effects of methylene blue when administered at the onset of CPB. In their study, 30 patients taking angiotensin-converting enzyme inhibitors within 24 h before elective heart surgery were randomized to receive either methylene blue or saline during CPB. They found that lactate levels were significantly reduced in the methylene blue group at all time periods during CPB after administration of the drug.^[6]

We acknowledge and appreciate the authors for their in depth study. At the same time, we propose that if the above recommendations were considered, it would have yielded more holistic results.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

**Neha Pangasa, Rohan Magoon,
Vandana Bhardwaj, Amita Sharma,
Ameya Karonjkar, Poonam Malhotra Kapoor**

*Department of Cardiac Anaesthesia, CTC,
AIIMS, New Delhi, India*

*Address for correspondence: Dr. Neha Pangasa,
Department of Cardiac Anaesthesia, CTC,
All India Institute of Medical Sciences,
Ansari Nagar, New Delhi - 110 029, India.
E-mail: nehapangasa@gmail.com*


References

1. Mazzeffi M, Hammer B, Chen E, Caridi-Scheible M, Ramsay J, Paciullo C. Methylene blue for postcardiopulmonary bypass vasoplegic syndrome: A cohort study. *Ann Card Anaesth* 2017;20:178-81.
2. Evora PR, Alves Junior L, Ferreira CA, Menardi AC, Bassetto S, Rodrigues AJ, *et al.* Twenty years of vasoplegic syndrome treatment in heart surgery. Methylene blue revised. *Rev Bras Cir Cardiovasc* 2015;30:84-92.
3. Evora PR, Ribeiro PJ, Vicente WV, Reis CL, Rodrigues AJ, Menardi AC, *et al.* Methylene blue for vasoplegic syndrome treatment in heart surgery: Fifteen years of questions, answers, doubts and certainties. *Rev Bras Cir Cardiovasc* 2009;24:279-88.
4. Viaro F, Dalio MB, Evora PR. Catastrophic cardiovascular adverse reactions to protamine are nitric oxide/cyclic guanosine monophosphate dependent and endothelium mediated: Should methylene blue be the treatment of choice? *Chest* 2002;122:1061-6.
5. Leyh RG, Kofidis T, Strüber M, Fischer S, Knobloch K, Wachsmann B,

et al. Methylene blue: The drug of choice for catecholamine-refractory vasoplegia after cardiopulmonary bypass? *J Thorac Cardiovasc Surg* 2003;125:1426-31.

6. Maslow AD, Stearns G, Butala P, Schwartz CS, Gough J, Singh AK. The hemodynamic effects of methylene blue when administered at the onset of cardiopulmonary bypass. *Anesth Analg* 2006;103:2-8.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code: 	Website: www.annals.in
	DOI: 10.4103/aca.ACA_78_17

How to cite this article: Pangasa N, Magoon R, Bhardwaj V, Sharma A, Karonjkar A, Kapoor PM. Methylene blue for post-cardiopulmonary bypass vasoplegic syndrome. *Ann Card Anaesth* 2017;20:381-2.

© 2017 Annals of Cardiac Anaesthesia | Published by Wolters Kluwer - Medknow