How much esmolol was administered?

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To the Editor,

In their recent article, Lopez-Alvarez *et al.* compared an esmolol infusion vs ketamine-remifentanyl combination for their effects on postoperative analgesia.¹ I read the article with great interest, but I am confused about the esmolol dosing regimen that is reported. In the methods section, the dose of esmolol was reported as $0.5 \text{ mg}\cdot\text{kg}^{-1}$ *iv* bolus, followed by a continuous infusion titrated from $5\text{--}15 \text{ }\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ to maintain the patient's mean arterial pressure and heart rate within 20% of respective baseline values. Reviewing Table 1 of the article, the mean total esmolol dose administered was $5.2 \text{ mg}\cdot\text{kg}^{-1}$, whereas the mean duration of anesthesia was 64 min. Mathematically, $4.7 \text{ mg}\cdot\text{kg}^{-1}$ of the mean total dose had to be given as an infusion (since the bolus dose was $0.5 \text{ mg}\cdot\text{kg}^{-1}$ *iv* in all patients). Therefore, even had the patient received the maximum stated dose of esmolol (i.e., $15 \text{ }\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$) for the entire duration of anesthesia, this would have resulted in a mean total dose of esmolol of only $0.96 \text{ mg}\cdot\text{kg}^{-1}$. Adding the bolus dose would then bring the total dose to $1.46 \text{ mg}\cdot\text{kg}^{-1}$. Accordingly, there appears to be a considerable discrepancy between the esmolol dosing according to the methods ($1.46 \text{ mg}\cdot\text{kg}^{-1}$, calculated for mean anesthetic duration assuming the maximum infusion rate) and the results ($5.2 \text{ mg}\cdot\text{kg}^{-1}$). I would be curious to hear from the authors as to whether they used a much bigger dose range of esmolol or whether they miscalculated the total esmolol dose reported in Table 1 of their article.

Conflicts of interest None declared.

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Reply

We sincerely thank Dr. Ozcan for his interest in our article and welcome the opportunity to clarify the esmolol dosing regimen that we reported.¹ We had originally planned to use a bolus dose of esmolol $0.5 \text{ mg}\cdot\text{kg}^{-1}$ *iv* to be followed by a continuous infusion titrated according to patient requirements, at a rate from $5\text{--}15 \text{ }\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, to maintain mean arterial pressure and heart rate within 20% of the patients' respective baseline values. However, soon after initiation of the study, we found that the dosing regimen initially planned made it impossible to achieve and maintain the desired hemodynamic goals. This was explained in the discussion section of our article, as we had to administer a much higher dose of esmolol [mean (standard deviation) dose of 382 (255) mg, equivalent to $5.2 \text{ mg}\cdot\text{kg}^{-1}$]. This dose was similar to that reported by Chia *et al.*, who administered a mean esmolol dose of 375.4 (143.4) mg, which showed an opioid-sparing effect of this drug.² The opioid-sparing effect of esmolol has been described previously within this dose range in two other studies.^{3,4} In contrast, Collard *et al.* used lower doses of esmolol (approximately 94 mg). In their study, both esmolol and remifentanyl were titrated to maintain a heart rate within $\pm 20\%$ of each subject's baseline value. In our view, this methodological distinction probably accounts for the different doses of esmolol and remifentanyl in the

Collard *et al.* study compared with ours (1.3 vs 5.2 mg·kg⁻¹; and 7.6 vs 21 µg·kg⁻¹, respectively).^{4,5} We sincerely hope that this explanation resolves any confusion regarding the doses of esmolol administered in our study, as reflected in Table 1 of the article.

Conflicts of interest None declared.

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