

Author's Reply

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We appreciate the interesting and thoughtful comments made by Dr. Yang¹ on our study.² We agree with Dr. Yang that safety in sedation is an important issue with regard to gastrointestinal endoscopy, especially in elderly patients. Dr. Yang expressed concerns about two points in the double-balloon enteroscopy (DBE) procedure, specifically regarding sedation-related complications and the sedation protocol.

We did not define sedation-related complications, such as the need for intubation/noninvasive ventilation or early termination of the examination, as described in another study.³ However, in our study, there were no cancelled procedures and no patients required intubation and/or ventilation while undergoing DBE, and only one elderly patient (0.5%) was reported to have transient hypoxia requiring intraprocedural oxygen therapy. The 0.5% sedation-related complication rate among patients aged 65 years or older in our study was lower than the 2.3% rate reported in a previous study that investigated the safety of DBE in patients aged 75 years or older.⁴ However, this difference seems to be related to discrepancy in the age cut-off. Most complications are reported to improve with medical treatment. Thus, the sedation-related complication rate in DBE is low and acceptable.

With regard to the second point (i.e., the sedation protocol), it is common to use conscious sedation or general anesthesia, based on other studies.^{4,6} In a review article, the authors noted that many endoscopists in the United States prefer propofol-based sedation as the primary seda-

tion modality, but general anesthesia for DBE is typically not required.⁷ In our study, all DBE procedures were performed under conscious sedation with midazolam and/or pethidine. During DBE, the pre-sedation assessment and pre- and post-procedural monitoring were not much different from those in conventional endoscopy. There was also no difference between the elderly and younger groups with regard to the sedation protocol. In the pre-procedural assessment, patient status was evaluated by the American Society of Anesthesiologists (ASA) physical status classification system. Although high-risk patients with an ASA classification of \geq IV weren't included in our study, if the airway assessment was unfavorable for patients with this classification, an anesthesia consultation was obtained. All patients were monitored every 5–10 minutes during the DBE procedure according to the level of sedation by the Modified Observer's Assessment of Alertness/Sedation Scale.⁸ However, the mean midazolam dose needed to achieve sufficient sedation was significantly lower in the elderly group than in the younger group (2.61 vs. 3.85 mg; $P < 0.001$) in our study. Based on a previous study that suggested that low complication rates in the elderly may be due to the modest doses of sedatives used for them,³ this theory can be applied to our study.

Thus, there is no specific sedation protocol associated with the DBE procedure. However, a more careful sedation procedure and close monitoring, especially in elderly patients with co-morbidities, may improve DBE safety. A well-designed sedation protocol that is applicable in the DBE procedure should be developed for the Korean population.

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