



Corresponding author:

Won-Jung Shin, M.D., Ph.D.
Department of Anesthesiology and Pain
Medicine, Laboratory for Cardiovascular
Dynamics, Asan Medical Center, University of
Ulsan College of Medicine, 88 Olympic-ro 43-
gil, Songpa-gu, Seoul 05505, Korea
Tel: +82-2-3010-5644
Fax: +82-2-3010-6790
Email: wjshin@amc.seoul.kr
ORCID: <https://orcid.org/0000-0002-6790-3859>



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Pediatric sedation and monitored anesthesia care: from chloral hydrate to remimazolam

Won-Jung Shin

Department of Anesthesiology and Pain Medicine, Laboratory for Cardiovascular Dynamics, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Sedation and monitored anesthesia care (MAC), particularly in pediatrics and high-risk cardiac procedures outside the operating room, continue to be challenging. This issue of the *Korean Journal of Anesthesiology* highlights two significant contributions to the fields of pediatric procedural sedation and cardiac anesthesia, both of which underscore evolving practices to enhance patient safety and procedural efficacy.

Historically, chloral hydrate has been a preferred sedative owing to clinician familiarity and its oral administration [1]. Despite its widespread use, studies demonstrating inconsistent sedation, unpleasant experiences, and nausea and vomiting have raised concerns. In fact, chloral hydrate has been withdrawn from markets such as the United States because of concerns over its efficacy and safety; however, it remains a popular choice in countries such as South Korea because of its cost-effectiveness and clinician familiarity.

In the first of these studies, Jang et al. investigated the risk factors associated with chloral hydrate sedation failure in pediatric patients undergoing various diagnostic and interventional procedures outside the operating room [2]. Despite its long-standing use in pediatric sedation, chloral hydrate has been associated with a significant sedation failure rate of 21.8%, as reported in this retrospective analysis of 6,691 sedation events. Factors such as inpatient status, congenital syndromes, oxygen dependency, and procedures lasting > 60 min were identified as contributing to higher failure rates. This study emphasizes the importance of considering patient-specific factors, such as previous sedation history and the nature of the procedure, when selecting sedative agents. These findings suggest that pediatric procedural sedation could benefit from more structured sedation teams and greater adoption of alternative sedatives, such as dexmedetomidine, which may offer a safer and more predictable sedation profile, particularly for non-anesthesiologists performing sedation outside the operating room. Given the high rate of complications associated with failed sedation, ranging from respiratory depression to paradoxical excitation, a shift toward multimodal sedation strategies tailored to individual patient profiles is necessary.

In transcatheter aortic valve replacement (TAVR), which is increasingly used in older patients with aortic valve disease, sedation has gained popularity over general anesthesia given its potential for faster recovery and reduced risks in elderly and frail patients [3]. Dexmedetomidine has been favored because of its sedative and analgesic properties and reduced risk of significant respiratory depression. However, side effects such as bradycardia and hypotension are concerning, particularly in patients with compromised cardiovascular function. In this issue, Kim et al. [4] shift the focus to adult cardiac anesthesia, specifically, recovery outcomes and procedural success with remimazolam versus dexmedetomidine in patients undergoing TAVR under MAC. Through propensity score-

matched analysis, Kim et al. found that remimazolam, a newer benzodiazepine with rapid onset and offset properties, led to faster recovery times without compromising patient safety or procedural outcomes.

The high demand for sedation and MAC is driven by the increasing number of diagnostic and interventional procedures performed outside the operating room, emphasizing patient safety, comfort, and the success of the procedure and diagnosis. A range of sedatives from chloral hydrate to more recently developed agents such as remimazolam are used, the selection of which should be based on the advantages, side effects, and suitability for each specific procedure. These two studies demonstrate significant progress in anesthesia from pediatric procedural sedation to complex cardiac interventions. Both studies underscore the importance of individualized sedation plans, careful patient selection, and the integration of newer agents that offer enhanced safety profiles without compromising procedural efficacy. Staying informed about these advancements will enable anesthesiologists to enhance patient care and optimize outcomes across diverse patient populations.

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Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

References

1. Chen Z, Qin F, Zeng L, Zhang L. Efficacy and safety of rectal chloral hydrate for pediatric procedural sedation: a systematic review and meta-analysis. *Medicine (Baltimore)* 2024; 103: e39403.
2. Jang YE, Park JB, Kang P, Ji SH, Kim EH, Lee JH, et al. Risk factors for chloral hydrate sedation failure in pediatric patients: a retrospective analysis. *Korean J Anesthesiol* 2024; 77: 526-36.
3. Husser O, Fujita B, Hengstenberg C, Frerker C, Beckmann A, Mollmann H, et al. Conscious sedation versus general anesthesia in transcatheter aortic valve replacement: the German Aortic Valve Registry. *JACC Cardiovasc Interv* 2018; 11: 567-78.
4. Kim JH, Nam JS, Seo WW, Joung KW, Chin JH, Kim WJ, et al. Effects of remimazolam versus dexmedetomidine on recovery after transcatheter aortic valve replacement under monitored anesthesia care: a propensity score-matched, non-inferiority study. *Korean J Anesthesiol* 2024; 77: 537-45.