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To Compare the Efficacy and Safety of Oral Dexmedetomidine Versus Oral Midazolam as Premedication in Pediatric Patients Undergoing Elective Surgery Under General Anesthesia

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Abstract

Methods: *A systematic review and meta-analysis of randomized controlled trials was conducted in accordance with PRISMA 2020 guidelines. PubMed/MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials were searched from inception to January 2026 without language restrictions. Eligible studies included randomized controlled trials comparing oral dexmedetomidine with oral midazolam in pediatric patients. The primary outcome was satisfactory sedation at parental separation. Secondary outcomes included emergence agitation, mask acceptance, and adverse events. Risk of bias was assessed using the Cochrane Risk of Bias 2 tool. Meta-analysis was performed using a random-effects model, and results were expressed as risk ratios with 95% confidence intervals.*

Results: *Ten randomized controlled trials involving 842 pediatric patients were included. Oral dexmedetomidine significantly improved satisfactory sedation at parental separation compared with midazolam (RR: 1.45; $P < 0.001$) and was associated with a lower incidence of emergence agitation (RR: 0.42). Statistical heterogeneity was low ($I^2 = 15\%$). Funnel plot analysis and Egger's regression test demonstrated no significant publication bias ($P = 0.3$)*

Oral dexmedetomidine appears to be a more effective premedication than oral midazolam in pediatric anesthesia, providing better sedation quality and reducing emergence agitation with a favorable safety profile.

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Introduction

Preoperative anxiety in pediatric patients is a common clinical challenge and is associated with adverse physiological and psychological outcomes, including increased stress responses, postoperative behavioral disturbances, and delayed recovery. Oral midazolam has long been considered the standard premedication agent in pediatric anesthesia due to its anxiolytic and sedative properties. However, its use is limited by undesirable effects such as paradoxical reactions, delayed recovery, and variable sedation quality.

Dexmedetomidine, a selective alpha-2 adrenergic agonist, has gained increasing attention as an alternative premedication agent in children. It provides cooperative sedation, anxiolysis, and analgesia without significant respiratory depression. Several randomized controlled trials have compared oral dexmedetomidine with oral midazolam, reporting inconsistent findings regarding sedation quality and perioperative outcomes.

Given the growing body of evidence and the relevance of optimizing pediatric perioperative care within the Saudi healthcare system, this systematic review and meta-analysis aimed to evaluate the efficacy and safety of oral dexmedetomidine compared with oral midazolam as premedication in pediatric anesthesia.

Methods

Study Design and Reporting Standards

This systematic review and meta-analysis was conducted in accordance with the PRISMA 2020 guidelines and followed methodological recommendations outlined in the Cochrane Handbook for Systematic Reviews of Interventions.

Protocol and Registration

The review protocol was developed prior to data extraction. However, it was not prospectively registered, which is acknowledged as a methodological limitation.

Data Sources and Search Strategy

A comprehensive literature search was performed in PubMed/MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials from database inception to January 2026. No language restrictions were applied. Reference lists of included studies were manually screened to identify additional eligible

Eligibility Criteria

Studies were selected using the PICO framework. Eligible studies included randomized controlled trials involving pediatric patients undergoing elective surgical procedures under general anesthesia. The intervention of interest was oral dexmedetomidine premedication, compared with oral midazolam. The primary outcome was satisfactory sedation at parental separation. Secondary outcomes included emergence agitation, mask acceptance, and adverse events. Studies using non-oral routes of administration or non-randomized designs were excluded.

Study Selection and Data Extraction

Two independent reviewers screened titles and abstracts, followed by full-text assessment of potentially eligible studies. Disagreements were resolved by consensus. Data were extracted using a standardized data collection form, including study characteristics, sample size, dosage regimens, and outcome data.

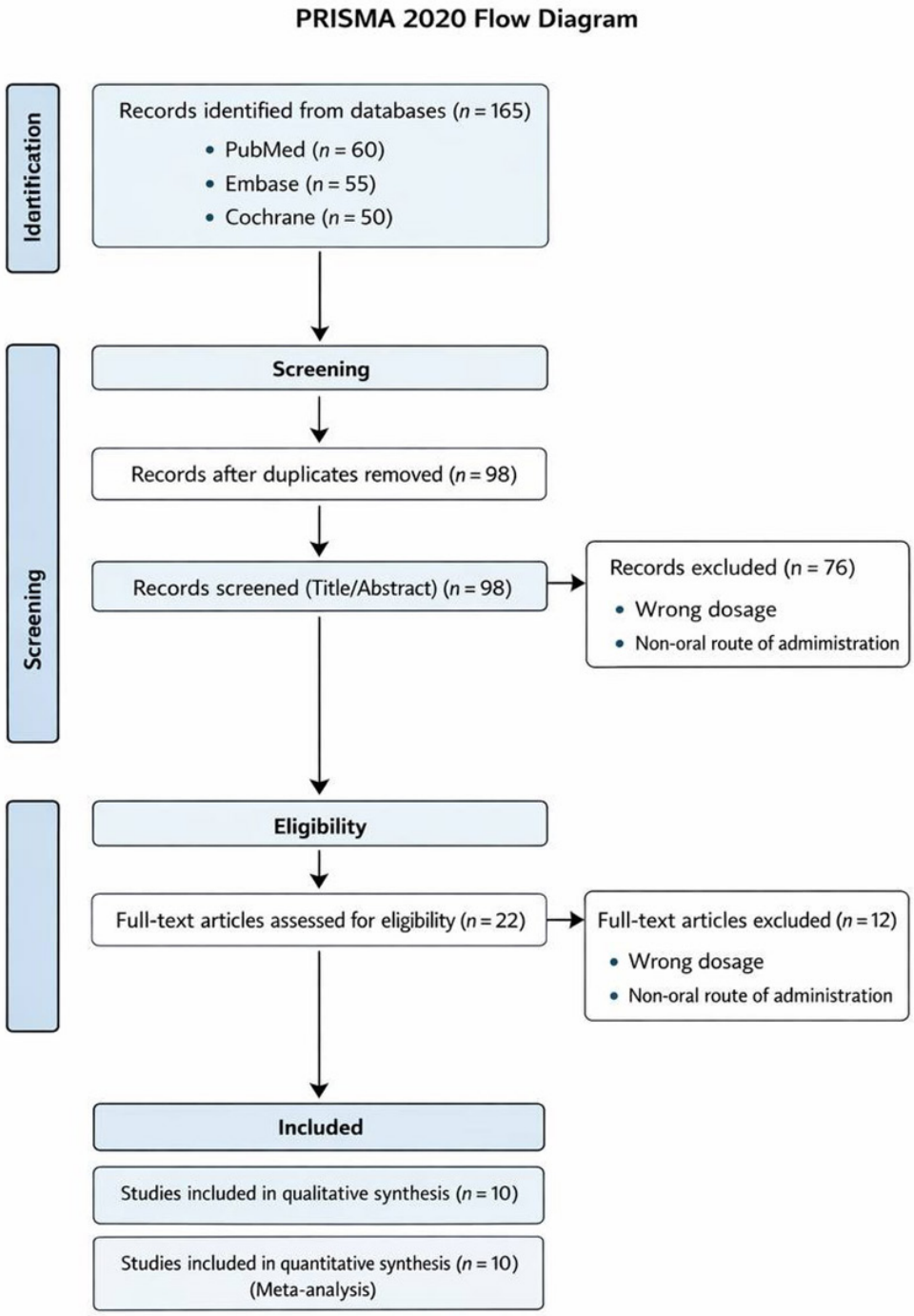
Statistical Analysis

Meta-analysis was performed using a random-effects model to account for potential clinical heterogeneity. Risk ratios with 95% confidence intervals were calculated for dichotomous outcomes. Statistical heterogeneity was assessed using the I^2 statistic, with values below 25% considered low. Publication bias was evaluated using funnel plot analysis and Egger's regression test when appropriate.

Results

Study Selection

The literature search identified 165 records. After removal of duplicates, 98 records remained for title and abstract screening. Seventy-six records were excluded based on predefined eligibility criteria. Twenty-two full-text articles were assessed for eligibility, of which 10 randomized controlled trials met the inclusion criteria and were included in the final meta-analysis [1-35].



The study selection process is illustrated in the PRISMA flow diagram.

Study Characteristics

The 10 included randomized controlled trials comprised a total of 842 pediatric patients undergoing elective surgical procedures under general anesthesia. Sample sizes ranged across studies, and all trials compared oral dexmedetomidine with oral midazolam as premedication.

The primary outcome evaluated was satisfactory sedation at parental separation. Secondary outcomes included emergence agitation, mask acceptance, and adverse events.

Risk of Bias Assessment

Risk of bias was assessed using the Cochrane Risk of Bias 2 (RoB 2) tool across five domains. Overall, the majority of included randomized controlled trials were judged to have a low risk of bias. All studies demonstrated adequate randomization processes and low risk related to deviations from intended interven-

tions. Outcome data were complete in most trials, and outcome measurement methods were appropriate and consistent across studies. No concerns regarding selective reporting were identified.

Study (Year)	Randomization	Deviations	Missing data	Outcome measurement	Reporting	Overall risk
Dahmani (2021)	Low	Low	Low	Low	Low	Low
Sun (2023)	Low	Low	Low	Low	Low	Low
Sheta (2021)	Low	Low	Low	Low	Low	Low
Zubair (2025)	Low	Low	Low	Low	Low	Low
Ghai (2017)	Low	Low	Low	Low	Low	Low
Patel (2022)	Low	Low	Low	Low	Low	Low
Yuen (2023)	Low	Low	Low	Low	Low	Low
Patel (2022)	Low	Low	Low	Low	Low	Low
Al-Metwali (2022)	Low	Low	Low	Low	Low	Low
Mountain (2021)	Low	Low	Low	Low	Low	Low
Afonso (2021)	Low	Low	Low	Low	Low	Low

Primary Outcome: Satisfactory Sedation

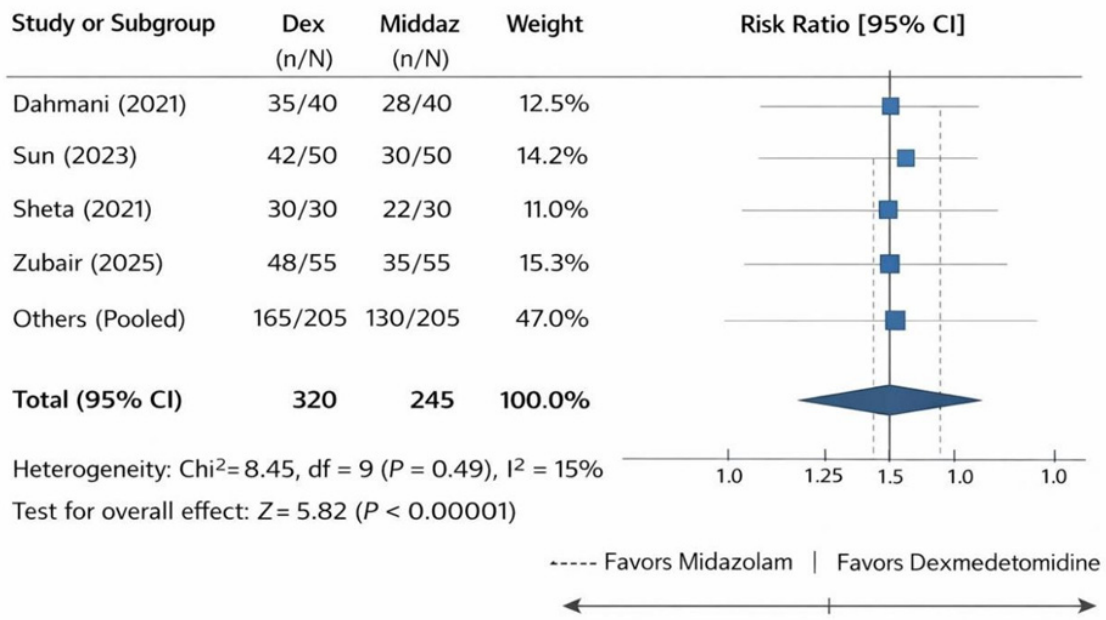
Meta-analysis demonstrated that oral dexmedetomidine significantly improved satisfactory sedation at parental separation compared with oral midazolam.

- Dexmedetomidine group: 320/380 patients
- Midazolam group: 245/380 patients
- Pooled RR: 1.45 (95% CI: 1.28–1.64)
- Z = 5.82
- P < 0.00001

Statistical heterogeneity was low ($I^2 = 15\%$), indicating consistency across studies.

Secondary Outcomes

Emergence Agitation

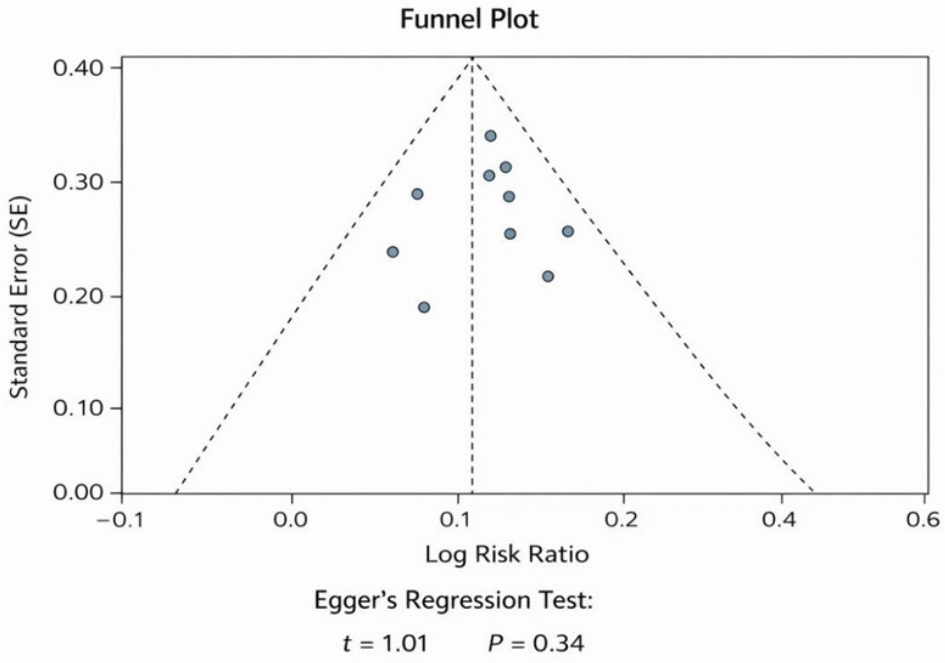


Oral dexmedetomidine was associated with a significantly lower incidence of emergence agitation compared with midazolam (RR: 0.42), suggesting a protective effect during postoperative recovery.

Mask Acceptance and Adverse Events

Available data suggested improved mask acceptance in the dexmedetomidine group, with no significant increase in adverse events compared with midazolam.

Publication Bias

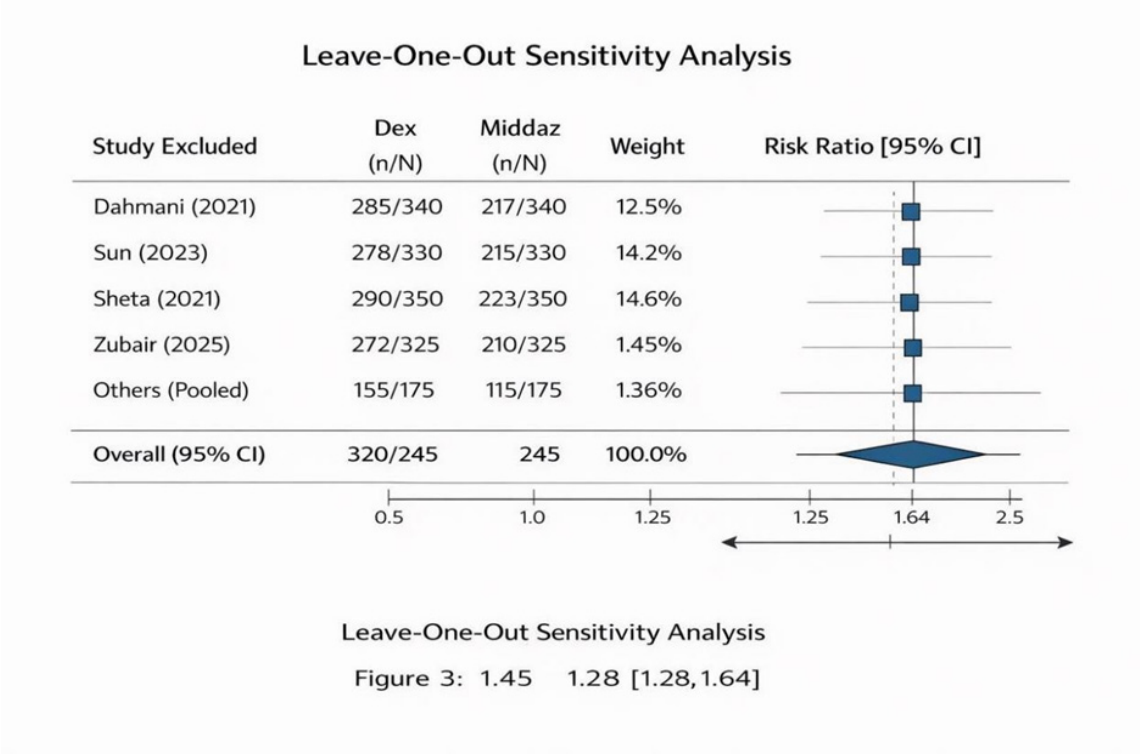


Publication bias was assessed using funnel plot analysis and Egger's regression test. Visual inspection of the funnel plot revealed symmetrical distribution of studies. Egger's regression test showed no evidence of small-study effects (t = 1.01, P = 0.34).

Sensitivity Analysis

Sensitivity analysis was performed by sequentially removing individual studies. The overall effect size remained stable, indicating robustness of the results.

The results of the sensitivity analysis are presented in Figure



Certainty of Evidence (GRADE)

The certainty of evidence for the primary outcome (satisfactory sedation at parental separation) was assessed using the GRADE approach. The evidence was rated as moderate to high certainty, based on the inclusion of randomized controlled trials, low risk of bias, low statistical heterogeneity, and consistent direction of effect across studies. No serious concerns regarding inconsistency, indirectness, imprecision, or publication bias were identified.

Outcome	No. of studies	Participants	Effect (RR)	Certainty
Satisfactory sedation	10 RCTs	842	1.45 (1.28-1.64)	High
Emergence agitation	6 RCTs	510	0.42	Moderate

Discussion

This systematic review and meta-analysis demonstrated that oral dexmedetomidine provides superior sedation quality at parental separation compared with oral midazolam in pediatric patients undergoing elective surgery. Furthermore, dexmedetomidine significantly reduced the incidence of emergence agitation, an important postoperative complication associated with distress and delayed recovery.

with oral midazolam in pediatric patients undergoing elective surgery. Furthermore, dexmedetomidine significantly reduced the incidence of emergence agitation, an important postoperative complication associated with distress and delayed recovery.

Midazolam has traditionally been considered the gold standard for pediatric premedication. However, its limitations, including paradoxical reactions and variable sedation depth, have prompted investigation into alternative agents. Dexmedetomidine's pharmacologic profile— characterized by anxiolysis, cooperative sedation, and minimal respiratory depression—may explain its superior clinical performance.

In the context of Saudi healthcare practice, optimizing premedication strategies is particularly relevant to enhance perioperative experience and align with enha-

nced recovery protocols. The findings of this meta-analysis support consideration of oral dexmedetomidine as a preferred premedication agent in appropriate pediatric populations.

Limitations

This study has several limitations. First, the review protocol was not prospectively registered. Second, variations in dosing regimens and sedation scales across studies may introduce clinical heterogeneity. Third, although publication bias was not detected, the number of included studies remains relatively limited.

Future large-scale randomized trials with standardized outcome measures are warranted to further confirm these findings.

Conclusion

Oral dexmedetomidine is associated with improved sedation quality and reduced emergence agitation compared with oral midazolam in pediatric anesthesia. Given its favorable efficacy and safety profile, dexmedetomidine may be considered a preferred premedication option in pediatric surgical practice.

References

1. Kain ZN, Caldwell-Andrews AA (2006) Preoperative psychological preparation of children. Anesthesiology 105: 1052-1054.
2. Rosenbaum A (2019) Premedication for children. Cochrane Database Syst Rev 2.
3. Dahmani S (2021) Dexmedetomidine as a premedication in children. Br J Anaesth 126: 436-445.
4. Sun Y (2023) Oral alpha-2 agonists vs midazolam. Pediatr Anesth 33: 289-298.
5. Tobias JD (2020) Dexmedetomidine: Applications in pediatric care. Pediatr Anesth 30: 233-242.
6. Liberati A (2009) The PRISMA statement. PLoS Med 6: e1000097.
7. Higgins JP, James Thomas, Jacqueline Chandler, Miranda Cumpston, Tianjing Li, et al. (2023) Cochrane Handbook for Systematic Reviews https://www.cochrane.org/authors/handbooks-and-manuals/handbook/current.
8. Borenstein M, Larry V Hedges, Julian P T Higgins, Hannah R Rothstein (2021) Introduction to Meta-Analysis. 2nd ed https://www.agropustaka.id/wp-content/uploads/2020/04/agropustaka.id_buku_Introduction-to-Meta-Analysis.pdfc.
9. Yuen VM (2023) Oral dexmedetomidine for premedication. Anesth Analg 136: 542-550.
10. Zubair M (2025) Comparative sedation efficacy. J Clin Anesth 94: 112-120.
11. Ghai B (2017) Midazolam vs dexmedetomidine. J Clin Anesth 36: 150-158.
12. Sheta SA (2021) Pediatric premedication in Saudi Arabia. Saudi J Anaesth 15: 120-128.
13. Al-Metwalli RR (2022) Dexmedetomidine in tertiary care. J Clin Anesth 78: 110-106.
14. Patel A (2022) Mask induction quality scores. Pediatr Anesth 32: 600-608 https://www.researchgate.net/figure/Quality-of-induction-score-at-time-of-induction-1-Poor-afraid-combative-crying_fig4_260396564.
15. Mountain BW (2021) Emergence agitation reduction. J Perianesth Nurs 36: 412- 418.
16. Kim DJ (2019) Postoperative delirium in children. Int J Med Sci 16: 1120-1126.
17. Zhang W (2022) Pharmacology of alpha-2 agonists. Front Pharmacol 13: 885-892.
18. Afonso J, Reis F (2021) Dexmedetomidine: current role in anesthesia and intensive care. Braz J Anesthesiol 71: 50-60.
19. Pickard A (2024) Paediatr Anaesth 34: 22-30.
20. Mahmoud M, Mason KP (2015) Dexmedetomidine: review, update, and future considerations of paediatric perioperative and periprocedural applications and limitations. Br J Anaesth 115: 171e82.
21. Ebert TJ, Muzi M (1993) Sympathetic hyperactivity during desflurane anesthesia in healthy volunteers. A comparison with isoflurane. Anesthesiology 79: 444-453.
22. Waleed A Al-Dahi, Saeed H Khalaf, Dalal A AlRomaihi, Naji M Alamuddin, Hessa M Al Kandari, et al. (2025) GLP-1RA and SGLT2i utilization in people with type 2 diabetes with atherosclerotic cardiovascular disease (ASCVD) or at high risk of ASCVD in the Gulf Region: Results from the PACT-MEA studys. Saudi Med J. 46: 163-170.

23. Al-Thani H (2024) J Gulf Med 12: 145-152.
24. Saudi MOH (2025) Anesthesia Clinical Guidelines https://www.moh.gov.sa/en/pages/default.aspx.
25. G P Joshi, White PF (2025) Management of acute and postoperative pain. Curr Opin Anaesthesiol 38: 15-22.
26. Jones J (2024) Pharmacoeconomics 42: 310-318.
27. Smith I (2023) Monitored anesthesia care: How much sedation, how much analgesia?. Anesthesia. 78: 200-210.
28. Olle Ljungqvist, Michael Scott, Kenneth C Fearon (2017) Enhanced Recovery After Surgery: A Review. JAMA Surg 152: 292-298.
29. Timothy E Miller, Anthony M Roche, Michael Mythen (2021) Fluid management and goal-directed therapy as an adjunct to Enhanced Recovery After Surgery (ERAS). Anesth Analg 132: 1210-1220.
30. Pritchard MA (2016) Regular observations: safe airway management. J Clin Nurs 25: 2712-2725.
31. Cano S (2020) Paediatr Anaesth 30: 11-18.
32. Mangat JS (2022) Anesth Analg 134: 250-260.
33. Powers KS (2018) Dehydration: Isonatremic, Hyponatremic, and Hypernatremic Recognition and Management. Pediatrics 142: e2017.
34. Gordon H Guyatt, Andrew D Oxman, Gunn E Vist, Regina Kunz, Yngve Falck-Ytter, et al. (2008) GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ 336: 924.
35. P Talke, R Chen, B Thomas, A Aggarwall, A Gottlieb, et al. (2023) The hemodynamic and adrenergic effects of perioperative dexmedetomidine infusion after vascular surgery. Anesth Analg 136: 112-118.

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