

Utility of Remimazolam Versus Propofol for Total Intravenous Anesthesia: A Meta-Analysis

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Introduction

- Remimazolam is a gamma-aminobutyric acid A agonist currently approved by the U.S. Food and Drug Administration for procedural sedation.
- Remimazolam undergoes esterase-dependent hydrolysis, resulting in rapid termination of sedative effect; further, it has a reliable antagonist (flumazenil).
- Given the favorable pharmacokinetics of remimazolam for sedation, there is interest in exploring its potential for total intravenous anesthesia (TIVA).

Methods

We systematically searched PubMed on January 16th, 2024 for randomized controlled trials comparing the utility of remimazolam compared to propofol for TIVA using the selection criteria below:

Inclusion Criteria

- P: RCTs of patients undergoing surgery under TIVA *remimazolam AND propofol AND (TIVA or total intravenous anesthesia)*
- I: General anesthesia with Remimazolam infusion
- C: General anesthesia with Propofol infusion
- O: Time to loss of consciousness, time to extubation, intraoperative hypotension, recovery room length of stay

Exclusion Criteria

- Other study designs
- Volatile anesthetic use

The data was analyzed using Review Manager.

Characteristics of Included Papers

	Study	Procedure Type	Total Remimazolam Administered (mg)	Total Propofol Administered (mg)
1	Choi 2022	140 patients undergoing thyroidectomy	84 [65-103]	576 [433-680]
2	Duan 2023	60 patients undergoing hip replacement	Not reported	Not reported
3	Jeon 2023*	132 patients undergoing laparoscopic cholecystectomy or transurethral resection of bladder tumor	90.8 ± 45.9	503 ± 227.2
4	Lan 2024	146 patients undergoing elective urological surgery	78 ± 34	700 ± 275
5	Lee 2023**	58 patients undergoing thyroidectomy	175 [144-208]	800 [603-942]
6	Lee J 2024**	66 patients undergoing breast surgery	129.6 ± 40.2	645.9 ± 178.2
7	Oh 2023**	100 patients undergoing catheter ablation for atrial arrhythmia	199 [170-249]	870 [775-1040]
8	Shimizu 2023**	66 patients undergoing endoscopic sinus surgery	Not reported	Not reported

Values reported as median [interquartile range] or mean ± standard deviation.

*Flumazenil given to patients in remimazolam group whose recovery of spontaneous ventilation was inadequate 10 mins after cessation of remimazolam infusion (39/60 patients).

**All patients in remimazolam arm received flumazenil.

Results

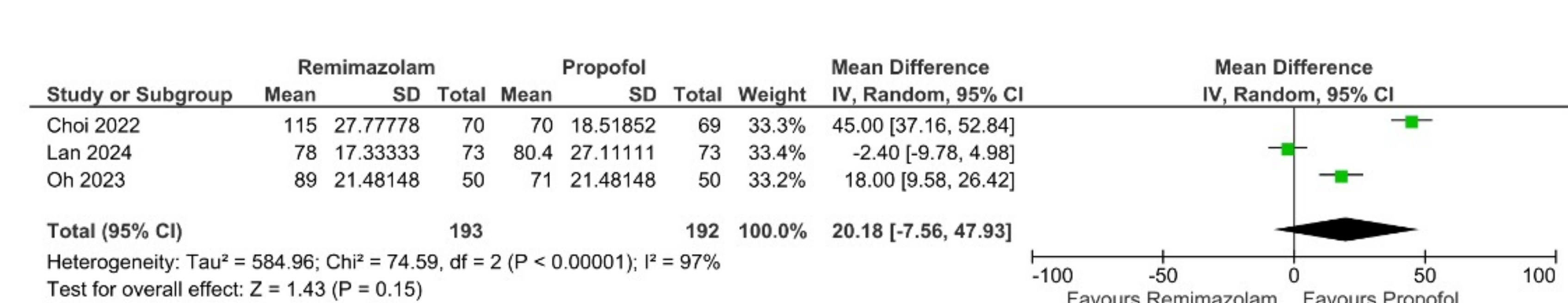


Figure 1: Time to loss of consciousness (seconds)

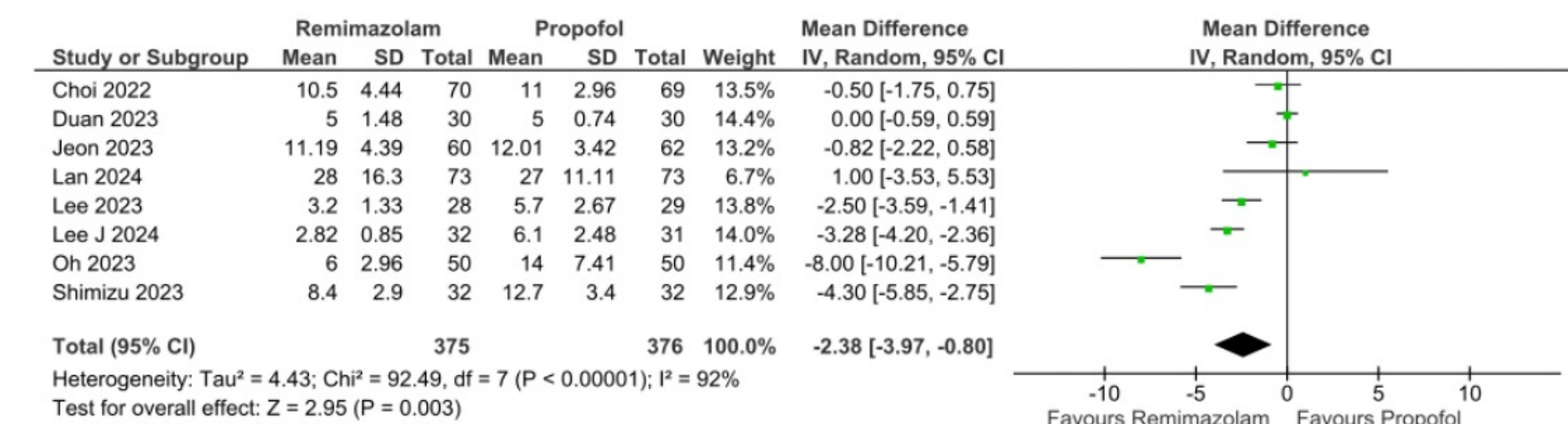


Figure 2: Time to extubation (minutes)/

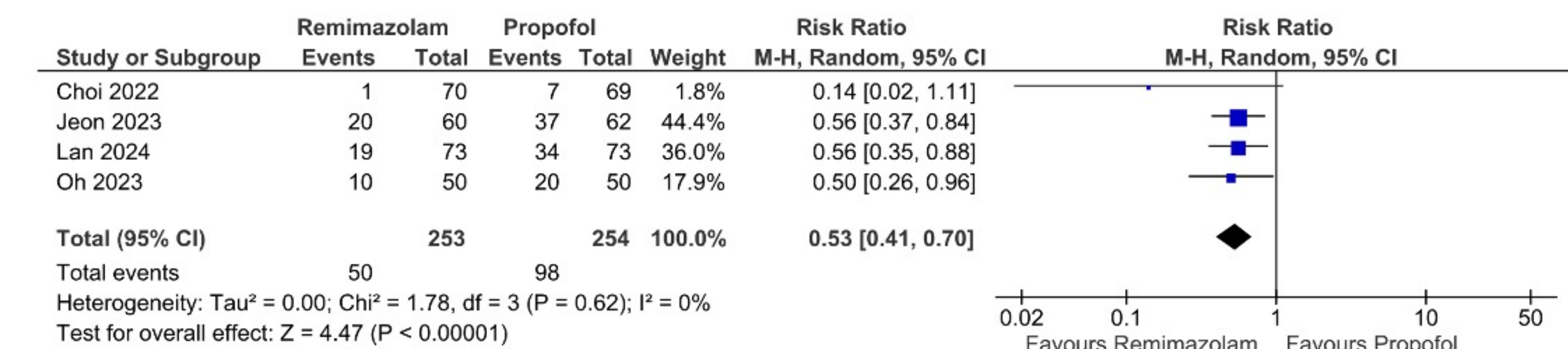


Figure 3: Intraoperative hypotension (events)

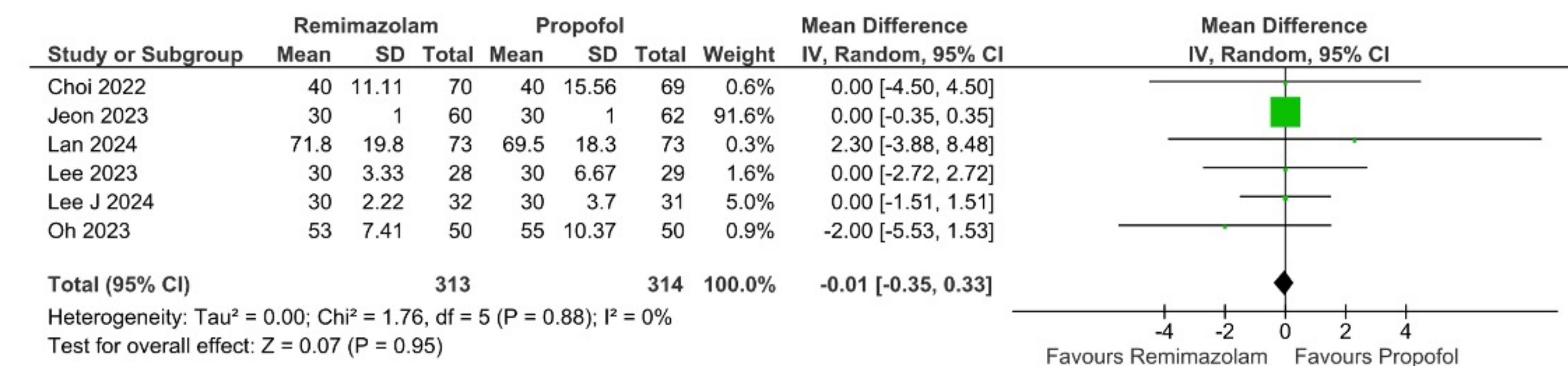


Figure 4: Recovery room length of stay (minutes)

Results

Eight studies met the inclusion criteria.

- All studies utilized an opioid in conjunction with study sedative (remimazolam vs. propofol).
- The pooled analysis showed no difference in the time to initial loss of consciousness with remimazolam versus propofol (MD = 20.18 sec, 95% CI = -7.56, 47.93).
- There was a statistically significant difference between extubation times for patients, such that the remimazolam group was extubated faster than the propofol group (MD = -2.38 min, CI = -3.97, -0.80).
- Patients receiving remimazolam experienced significantly less intraoperative hypotension (risk ratio = 0.53, CI = 0.41, 0.70).
- However, length of stay in the recovery room did not differ (MD = -0.01 minutes, CI = -0.35, 0.33).

Conclusions

- Remimazolam has been used successfully as an induction agent and maintenance agent of general anesthesia.
- It is possible that remimazolam offers a benefit over propofol in improving time to extubation and decreasing the number of intraoperative hypotensive events.
- However, recovery room time remains unchanged limiting its overall utility in the perioperative setting.
- Of note, several studies included the administration of flumazenil to the remimazolam group as part of the study protocol (Jeon 2023, Lee 2023, Lee J 2024, Oh 2023, Shimizu 2023).

References

References available on request, correspondence to Alina.Razak@stonybrookmedicine.edu

