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Article

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Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11383477/v1

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Additional Declarations: No competing interests reported.

Effect of COMBO Endoscopy of Oropharyngeal Airways versus Conventional Nasal Cannula on Hypoxaemia in Obese Patients Undergoing Gastrointestinal Endoscopy under Sedation: A Randomised Controlled Trial

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Abstract

Background Compared with the general patient population, obese patients are more susceptible to adverse events such as hypoxaemia and airway obstruction during sedation. Furthermore, during gastrointestinal endoscopy, presence of the endoscope in the airway complicates airway management. This not only poses significant challenges for anaesthesiologists but also directly threatens patient safety. Currently, simple yet effective airway management tools specifically designed for gastroscopy in clinical practice are lacking. This study aimed to evaluate whether the use of Capnography Monitoring Bite Block Oxygenation (COMBO) endoscopy of the oropharyngeal airway could reduce the incidence of hypoxaemia and other respiratory-related adverse events compared to that with traditional nasal cannula oxygen therapy in obese patients undergoing gastrointestinal endoscopy under sedation.

Methods This single-centre, prospective, randomised, single-blinded trial (1:1) included 226 adult patients with a BMI of 30–40 $kg \cdot m^{-2}$ and an ASA physical status of I–II who were scheduled for gastrointestinal endoscopy under deep sedation with propofol–sufentanil. Participants were randomly assigned to receive either COMBO (M group) or a nasal sampling cannula (N group). Both groups received oxygen at 5–6 $L \cdot min^{-1}$ with standard monitoring. The primary outcome was hypoxaemia ($75\% \leq SpO_2 < 90\%$ for ≤ 60 s). Secondary outcomes included severe hypoxaemia; airway interventions and intensity; respiratory and haemodynamic variables; anaesthetic use; procedure and recovery times; adverse events; and patient satisfaction.

Results COMBO significantly reduced the incidence of hypoxaemia compared with nasal cannula (11.11% vs. 42.86%; RR, 0.26; 95% CI, 0.15–0.46; $P < 0.001$; NNTB, 3; 95% CI, 2–6). The airway intervention rate and intensity were also lower in the device group ($P = 0.002$ and $P < 0.001$, respectively).

Among groups M and N, group×time interactions were significant for IPI, RR, SpO_2, and $PETCO_2$ (all $P_{group \times time} < 0.001$), were borderline significant for MAP ($P_{group} = 0.044$), and were nonsignificant for HR ($P_{group \times time} = 0.178$). Moreover, the main effects of group were significant for all the variables (all $P_{group} < 0.001$).

Conclusions In obese adults undergoing gastrointestinal endoscopy with sedation, the COMBO airway provides a favourable risk–benefit profile by effectively reducing the incidence of hypoxaemia and airway events and improving cardiorespiratory stability. Clinical trial registration number: **NCT06590922**

Keywords: Obesity; Gastrointestinal endoscopy; Endoscopy of oropharyngeal airways; Hypoxaemia; Airway management.

Key points

- **Question:** Obese patients undergoing sedated gastrointestinal endoscopy are at high risk of hypoxaemia and difficult airway management due to endoscopic interference. This study investigated whether the novel COMBO airway device could improve respiratory safety compared with conventional nasal cannula oxygenation in this vulnerable patient group.
- **Findings:** In this prospective randomised trial of 226 obese patients, COMBO oxygenation significantly reduced the incidence of hypoxaemia, lowered airway intervention requirements, and improved perioperative cardiorespiratory stability, with obvious group-time interactive effects on key respiratory and haemodynamic indicators.
- **Meaning:** The COMBO airway device is a simple and effective clinical tool that enhances respiratory safety and stabilises vital signs during sedated gastrointestinal endoscopy in obese patients, providing a promising optimisation strategy for clinical airway management.

Gastrointestinal endoscopy is considered the most effective method for reducing the incidence of gastrointestinal tumours, as it can significantly lower morbidity rates and effectively control disease onset and progression[1]. Specifically, regarding colorectal cancer, the WCRF/AICR Third Expert Report (2018) and an umbrella review revealed adiposity as a causal factor[2-4]. Given the growing burden of obesity and the expanding role of GI endoscopy, mitigating procedure-related respiratory risks has become an important clinical priority[5, 6].

During sedated GI endoscopy, obesity and obstructive sleep apnoea (OSA) substantially increase the risk of hypoxaemia and airway events[7-9]. Mechanistically, the combination of supine positioning and sedation or anaesthesia reduces functional residual capacity (FRC) by approximately 20–30% in obese patients, increases upper-airway collapsibility, and exacerbates ventilation–perfusion (V/Q) mismatch, thereby accelerating desaturation and delaying reoxygenation[10, 11]. The incidence of such events varies depending on the definition of hypoxaemia[12], the type of procedure, and the sedation regimen applied. To address these physiological vulnerabilities, a growing body of evidence has evaluated optimized oxygenation and airway management strategies in obese patients undergoing GI endoscopy[13, 14].

An endoscopy-specific oropharyngeal airway that combines a bite block, oxygen channel, and posterior-oropharyngeal capnography has been shown to improve oxygenation and patient satisfaction in elderly outpatients without increasing complications[15-17]. The COMBO protocol exemplifies this integrated paradigm. On the one hand, its oropharyngeal airway component effectively alleviates tongue-base obstruction (tongue fall) while preserving sufficient space for endoscopic manoeuvrability. On the other hand, the mainstream sampling system positioned over the bite block directly captures end-tidal carbon dioxide at the supraglottic level, thereby improving $PETCO_2$ monitoring precision and overall monitoring accuracy.

We hypothesized that in adults with obesity undergoing upper GI endoscopy with sedation, the use of

COMBO Endoscopy of Oropharyngeal Airways can reduce the incidence of hypoxaemia and severe hypoxaemia, increase respiratory stability (involving parameters such as SpO_2, $PETCO_2$, and the integrated pulmonary index [IPI])[18], and decrease the need for airway interventions without increasing the incidence of device-related complications.

Currently, there is a scarcity of simple yet effective airway management tools specifically designed for gastrointestinal endoscopy in clinical practice, and clinical research on COMBO—a novel, endoscopy-specific airway management device—is virtually nonexistent. Therefore, this study provides new insights and favourable guidance for airway management in obese patients undergoing gastrointestinal endoscopy under sedation and subsequent treatment.

Methods

Study design

A single-centre, prospective, randomised, single-blinded clinical trial was conducted at the Endoscopy Centre in collaboration with the Department of Anesthesiology, Qianfoshan Hospital, Shandong First Medical University. The protocol was approved by the institutional ethics committee (YXLL-KY-2024-082) and registered at ClinicalTrials.gov (NCT06590922; first registered on 19/09/2024); moreover, all of the enrolled patients provided written informed consent. All methods were performed in accordance with the relevant guidelines and regulations and the ethical principles of the Declaration of Helsinki.

Participants

The inclusion criteria for adults were as follows: aged 18–65 years; body mass index (BMI) of 30–40 $kg \cdot m^{-2}$; American Society of Anesthesiologists (ASA) class I–II; and scheduled for elective painless gastrointestinal endoscopy.

The following exclusion criteria were utilized: severe cardiac, pulmonary, hepatic, or renal dysfunction; upper respiratory infection; pregnancy or lactation; allergy to study medications; resting peripheral oxygen saturation (SpO_2) <95%; recent substance abuse; and any condition deemed unsuitable.

Randomization and masking

Patients were randomised (1:1 ratio) to either the COMBO (Capnography Monitoring Bite Block Oxygenation) (Group M) or the conventional mouthpiece with a dual-nasal sampling cannula (Group N) using a computer-generated randomization sequence in SAS. Allocation concealment was ensured with opaque sealed envelopes. The participants and statisticians were blinded to the group allocation; however, the anaesthesiologists and endoscopists could not be blinded because of the appearance of the devices. Anaesthesiologists performed the procedures and recorded the data, which were subsequently analysed by statisticians using completed case report forms (CRFs).

Study intervention

Group M included patients who received COMBO Endoscopy of Oropharyngeal Airways (Shanghai ALIFUN Medical Technology Co., Ltd.; sizes L/M/S) with oxygen delivery via the bite-block channel and posterior-oropharyngeal sidestream $EtCO_2$ (Microstream®) and monitoring using a Capnostream® 20p capnography monitor (Oridion Medical 1987 Ltd., Jerusalem, Israel).

Group N included patients who received a conventional mouthpiece with a nasal sampling cannula.

The oxygen flow for both groups ranged from 5–6 $L \cdot min^{-1}$. Device photographs are shown in Supplementary Figures 1 and 2.

Preoperative and baseline information

All the subjects were instructed to fast for 6 h and to avoid clear fluids for 2 h before the procedure. Upon

arrival, intravenous (IV) access was established, and 5 mL of 2% lidocaine gel was used for oropharyngeal topical anaesthesia. Baseline demographic and clinical variables, including age, sex, ASA class, BMI, resting SpO_2, Mallampati score, and obstructive sleep apnoea (OSA), were recorded.

Anaesthesia and sedation management

Continuous monitoring included noninvasive blood pressure (NIBP), heart rate (HR), SpO_2, respiratory rate (RR), $EtCO_2$, and the Integrated Pulmonary Index (IPI).

Observations were made at the following time points: T0 (preinduction), T1 (1 min after induction), T2 (5 min), T3 (end of the procedure), and T4 (after recovery).

Preoxygenation was administered for 1 min via bite block (Group M) or nasal cannula (Group N). Sufentanil (7 μg IV) was administered at the start of preoxygenation, followed by the administration of 3 $mg \cdot kg^{-1}$ IV of propofol 1 min later. After loss of the eyelash reflex, the oropharyngeal airway was inserted into Group M, followed by endoscope insertion; in contrast, Group N underwent direct endoscopy. The maintenance therapy consisted of 5 $mg \cdot kg^{-1} \cdot h^{-1}$ infusion of propofol with 40–50 mg of boluses as needed for movement.

If the heart rate (HR) is <50 beats/min, an intravenous injection of 0.5 mg of atropine will be given; if the mean arterial pressure (MAP) falls below 60 mmHg, norepinephrine should be administered as 4–12 μg intravenous boluses, with the initial dose adjusted according to the severity of hypotension.

If failure occurred, airway rescue followed a prespecified step-up algorithm: increase oxygen flow → jaw thrust → two-hand mask ventilation → nasopharyngeal airway (NPA) → endotracheal intubation. Evidence supports the use of NPA to mitigate desaturation in obese outpatients[34]. Airway intervention needs and the highest intervention level (scores of 1–6) were recorded. After completion, the anaesthetics were discontinued, and the patients were transferred upon observation of a modified observer's assessment of alertness/sedation (MOAA/S) score of 3–4. Discharge required a postanaesthesia discharge scoring system (PADSS) score ≥ 9 and an accompanying adult.

Primary and secondary outcomes

The primary outcome included intraoperative hypoxaemia ($75\% \leq SpO_2 < 90\%$ for ≤ 60 s).

Secondary outcomes included subclinical respiratory depression (SpO_2: 90–95%); severe hypoxaemia ($SpO_2 < 75\%$ or 75–90% for > 60 s); incidence and degree of airway intervention; haemodynamic or airway complications (MAP fluctuation > 30% or MAP < 60 mmHg, HR < 50 bpm, coughing or laryngospasm); anaesthetic and procedural parameters (including propofol induction dose, total propofol dose, endoscopy duration, and recovery time); satisfaction scores (visual analogue scale [VAS] score of 0–10 for endoscopists and patients); and perioperative trajectories of HR, MAP, RR, SpO_2, $EtCO_2$, and IPI at T1–T4.

Sample size and statistical analysis

In the pilot study, a random number table was used to randomly select 20 patients from the digestive endoscopy centre and allocate them equally to the experimental group (novel oropharyngeal airway group) or the control group (conventional endoscopic bite block group), with 10 patients in each group. The incidence rates of hypoxia ($75\% \leq SpO_2 < 90\%$, duration ≤ 60 s) in the two groups were 8% and 26%, respectively. With a two-sided test level of $\alpha=0.05$ and a test power of 0.9, the sample size calculation indicated that 93 subjects were needed per group. Accounting for a 20% dropout rate, 113 subjects per group will be needed, resulting in a total sample size of 226 subjects. The inclusion of 226 patients is expected to provide more than 90% power for difference detection.

Results From September to November 2024, a total of 1535 patients requiring gastrointestinal endoscopy were assessed at the centre. Of these, 278 patients were deemed eligible, and 226 were randomised to groups. Six patients withdrew consent after randomization. Ultimately, 220 patients were included in the final

analysis, with 108 in the M group and 112 in the N group (Fig. 1).

The baseline demographic and clinical characteristics were comparable between the groups (Table 1).

Primary outcome

The proportions of patients who experienced hypoxaemia during the procedure were 42.86% in the N group and 11.11% in the M group (RR, 0.26; 95% CI, 0.15–0.46; $P < 0.001$; NNTB, 3; 95% CI, 2–6) (Table 2). A significant difference in airway intervention intensity was also observed between the groups, with patients in the N group requiring more intensive airway support ($P < 0.001$) (Fig. 2). In multivariable logistic regression adjusted for baseline covariates (sex, modified Mallampati score, OSA, age, BMI, and baseline SpO_2), assignment to Group M remained associated with markedly lower odds of hypoxaemia (adjusted OR, 0.16; 95% CI, 0.08–0.33) (Fig. 3). The results revealed that Group M had a significantly lower incidence of hypoxaemia and airway intervention procedures.

Secondary outcomes

The incidence of cough or laryngospasm and the need for airway intervention were not significantly different between the M group and the N group (P = 0.025 and P = 0.002, respectively). No significant differences in the incidence of other adverse events were observed between the groups (Table 2).

There were also no significant differences between groups in terms of anaesthetic or procedural parameters, including the propofol induction dose, total propofol dose, procedure duration, or recovery time. The Hodges–Lehmann median differences (M minus N) were -5 mg, -20 mg, 0 min, and 0 min, respectively (Supplementary Table 1). Although the groups had comparable medians (median difference = 0), nonparametric tests indicated a small difference in favour of the M group (endoscopist satisfaction: $P = 0.001$; patient satisfaction: $P = 0.011$) (Supplementary Table 2).

Among the M and N groups, significant group × time interactions were identified for several physiological variables, which were highly significant for IPI, RR, SpO_2, and $PETCO_2$ (all $P < 0.001$); borderline significant for MAP ($P = 0.044$); and nonsignificant for HR ($P = 0.178$). The main effects of group were significant for all the variables (all $P < 0.001$) (Fig. 4).

Post hoc between-group comparisons at prespecified time points (Hodges–Lehmann median differences, M–N) revealed no baseline differences across any variable (all $P > 0.05$). At T1, compared with the N group, the M group had significantly greater RR (+5 breaths min^{-1}), $PETCO_2$ (+13 mmHg), IPI (+3), SpO_2 (+2%), MAP (+6 mmHg), and HR (+7 beats min^{-1}) values (all $P < 0.001$). At T2, the differences persisted but were attenuated, with differences in RR (+2), $PETCO_2$ (+11), IPI (+1), and SpO_2 (+1) remaining significant (all $P < 0.001$), whereas MAP ($P = 0.110$) and HR ($P = 0.337$) did not differ between groups. At T3, only the $PETCO_2$ remained significantly elevated in the M group (+4; $P < 0.001$), whereas the RR (+1; $P = 0.061$), IPI (0; $P = 0.209$), SpO_2 (0; $P = 0.990$), MAP (+2; $P = 0.455$), and HR (+3; $P = 0.205$) values did not significantly differ. At T4, a small but statistically significant difference in the $PETCO_2$ persisted (+1; $P = 0.001$), whereas the RR, SpO_2, IPI, MAP, and HR were comparable between the groups (all $P \geq 0.250$) (Supplementary Table 3).

Discussion

In obese patients undergoing gastrointestinal endoscopy with sedation, the use of the COMBO Endoscopy of Oropharyngeal Airways approach can significantly reduce the incidence of intraoperative hypoxaemia and the need for emergency airway interventions. It also facilitates early maintenance of respiratory stability and sustained haemodynamic stability throughout the procedure without prolonging recovery time.

Multivariate analysis revealed that device assignment was the only independent predictor of reduced hypoxaemia (adjusted OR: 0.16), thereby underscoring its potential protective role.

Mechanistically, these effects likely resulted from improved upper-airway patency and enhanced respiratory monitoring enabled by the integrated device design. The observed reduction in rescue burden and the left-shifted intervention-intensity distribution (Fig. 2) indicate earlier recognition and timely relief of upper-airway obstruction during endoscope insertion or during episodes of negative pharyngeal pressure. Time-resolved physiological analyses (Fig. 3) further revealed that under comparable anaesthetic exposure, Group M maintained higher respiratory rates and SpO_2 levels, more stable $EtCO_2$ profiles, and higher IPI values; these findings are consistent with preserved ventilation and efficient gas exchange. Compared with nasal sampling, bite-block-integrated posterior-oropharyngeal capnography likely improves monitoring accuracy, thereby allowing for earlier detection of respiratory compromise and enabling faster intervention[19-21]. The mean arterial pressure and heart rate in group M remained relatively stable throughout the procedure, which is potentially attributable to the reduced stimulation of the pharyngeal wall by the integrated oropharyngeal airway[22]. These advantages may help to mitigate obesity-related airway narrowing and collapsibility[23]. In the adjusted analysis (Fig. 4), device assignment remained the only independent predictor of reduced hypoxaemia, thus reinforcing its protective role beyond baseline risk factors such as sex, modified Mallampati score, OSA, age, BMI, and baseline SpO_2.

Randomised and prospective studies further demonstrated that capnography enables earlier detection of hypoventilation and is associated with fewer desaturation and rescue events[15, 24, 25, 26]. Since the Combo device samples exhaled gases directly from the pharynx for $PETCO_2$ monitoring, it improves not only measurement accuracy but also enables earlier detection of hypoxaemia, facilitating timely intervention. This contributes to an effective reduction in both the incidence and severity of hypoxaemia.

Despite these strengths, several limitations of the study should be acknowledged. This single-centre trial primarily enrolled patients with class I obesity; therefore, its generalizability to individuals with a BMI $\geq 40\ kg \cdot m^{-2}$, severe obstructive sleep apnoea (OSA), or those undergoing prolonged therapeutic procedures remains uncertain. In addition, the blinding of anaesthesiologists was not feasible, and severe hypoxaemia infrequently occurred, thereby potentially limiting the precision of the estimates for this endpoint. Therefore, adequately powered noninferiority and factorial trials are warranted across diverse resource settings. Future research should prioritize multicentre factorial RCTs, incorporate high-resolution physiologic phenotyping, and use appropriate ordinal or zero-inflated models to explore potential group-by-BMI/OSA interactions while evaluating process efficiency and cost outcomes.

In conclusion, for obese adults undergoing painless upper gastrointestinal endoscopy, the use of COMBO Endoscopy of Oropharyngeal Airways significantly reduces the incidence of hypoxaemia and the need for airway rescue while improving respiratory stability without prolonging recovery time. These findings provide robust evidence supporting the incorporation of this approach into standardized, risk-adapted sedation pathways to improve patient safety and procedural efficiency. In the future, multicentre clinical trials across diverse healthcare settings should be conducted to validate the broader applicability and cost-effectiveness of this approach.

Acknowledgements

We thank the nursing staff and technicians at the Endoscopy Centre for their assistance with this study.

Author Contributions

X.L. and Q.Y. contributed equally to this work and wrote the main manuscript text. Y.L. contributed to the methodology and manuscript revision. X.L., Q.Y., Y.M. and C.S. performed the investigation. X.L., Q.Y. and

Y.M. curated and analysed the data. C.S. provided resources. J.W. conceptualized and supervised the study, managed project administration, and reviewed and edited the manuscript. All authors have read and approved the final manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or nonprofit sectors.

Declaration of Competing Interests

The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of Qianfoshan Hospital, The First Affiliated Hospital of Shandong First Medical University (Approval No: YXLL-KY-2024-082). Written informed consent was obtained from all participants.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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Figure 1. Flow diagram.

Figure 2. Violin plots of airway intervention intensity scores. The airway intervention intensity score (1–6) was treated as an ordinal outcome and compared via the Mann–Whitney U test. ***, indicates that the p value is less than 0.001

Figure 3. Forest plot of adjusted odds ratios from the multivariable logistic regression model. Multivariable logistic regression analysis included group (reference: N), sex (reference: male), modified Mallampati class (reference: I–II), obstructive sleep apnoea (OSA), age, BMI, and baseline SpO_2 to estimate adjusted odds ratios (aORs) with 95% confidence intervals for hypoxaemia.

Figure 4. Changes in perioperative haemodynamic and respiratory parameters at different time points between groups. A two-factor Aligned Rank Transform (ART) model (ARTool package) was used to evaluate group, time, and group×time interactions, with $P_{group\times time}$ and P_{group} being reported [35].

Table 1 Baseline characteristics of the study participants (n = 220). Data are presented as the mean (SD), median [IQR], or n (%). IQR, interquartile range; SD, standard deviation.

Table 1

	Group N (n = 112)	Group M (n = 108)
Age (yr), mean (SD)	51.9 (9.9)	49.9 (9.4)
Sex, n (%)		
Male	78 (69.6)	77 (71.3)
Female	34 (30.4)	31 (28.7)
BMI ($kg \cdot m^{-2}$), median [IQR]	30.5 [30.1, 31.2]	30.9 [30.4, 31.6]
BMI category, n (%)		
Class I (30.0–34.9 $kg \cdot m^{-2}$)	111 (99.1)	108 (100.0)
Class II (35.0–39.9 $kg \cdot m^{-2}$)	1 (0.9)	0 (0.0)
ASA physical status I–II, n (%)	112 (100.0)	108 (100.0)
Modified Mallampati score, n (%)		
I–II	44 (39.3)	34 (31.5)
III–IV	68 (60.7)	74 (68.5)
Obstructive sleep apnoea, n (%)	28 (25.0)	24 (22.2)
Baseline SpO_2 (%), median [IQR]	99.00 [98.00, 99.25]	99.00 [98.00, 99.25]

Table 2. Incidence of adverse events. The data are presented as n (%), RR (95% CI), or NNTB (95% CI), as appropriate. RR, relative risk; ARR, absolute risk reduction; 95% CI, 95% confidence interval; NNTB,

number needed to treat for benefit; —, not estimable; The NNTB and its CI are presented only when the 95% CI did not cross zero.

Table 2.

Event	N group (n = 112)	M group (n = 108)	RR (95% CI)	*P* value	NNTB (95% CI)
Hypoxaemia			0.26 (0.15, 0.46)	<0.001	3 (2, 6)
No	64 (57.14)	96 (88.89)			
Yes	48 (42.86)	12 (11.11)			
Severe hypoxaemia			0.86 (0.27, 2.75)	0.805	—
No	106 (94.64)	103 (95.37)			
Yes	6 (5.36)	5 (4.63)			
Subclinical respiratory depression			1.04 (0.75, 1.43)	0.826	—
No	68 (60.71)	64 (59.26)			
Yes	44 (39.29)	44 (40.74)			
Severe bradycardia			0.35 (0.01, 8.39)	1.000	—
No	111 (99.11)	108 (100.00)			
Yes	1 (0.89)	0 (0.00)			
MAP fluctuation			0.83 (0.41, 1.69)	0.606	—
No	97 (86.61)	96 (88.89)			
Yes	15 (13.39)	12 (11.11)			
Cough/laryngospasm			0.40 (0.18, 0.93)	0.025	—
No	94 (83.93)	101 (93.52)			
Yes	18 (16.07)	7 (6.48)			
Airway intervention			0.78 (0.66, 0.92)	0.002	6 (3, 59)
No	20 (17.86)	39 (36.11)			
Yes	92 (82.14)	69 (63.89)			

Figures

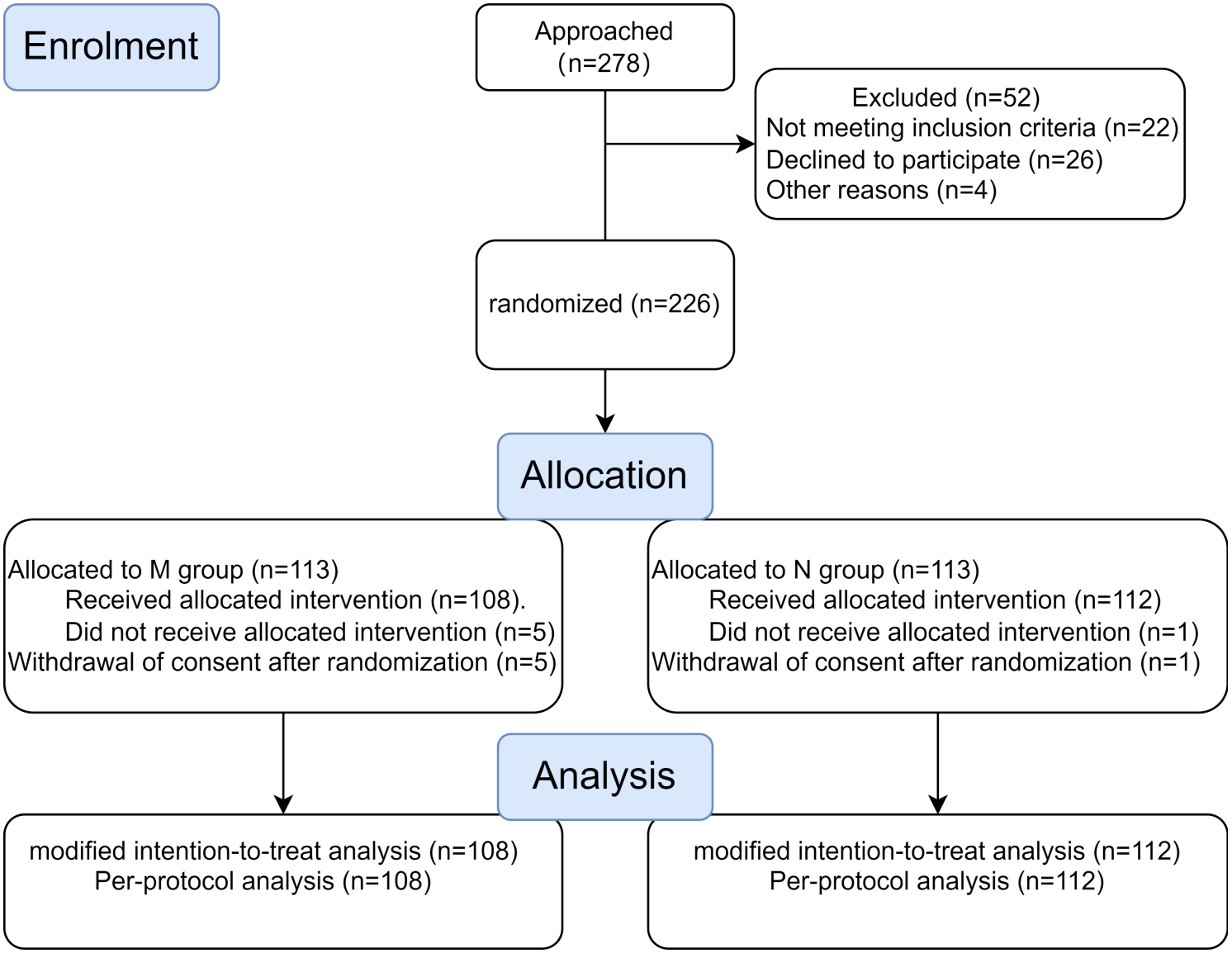


Figure 1

Flow diagram.

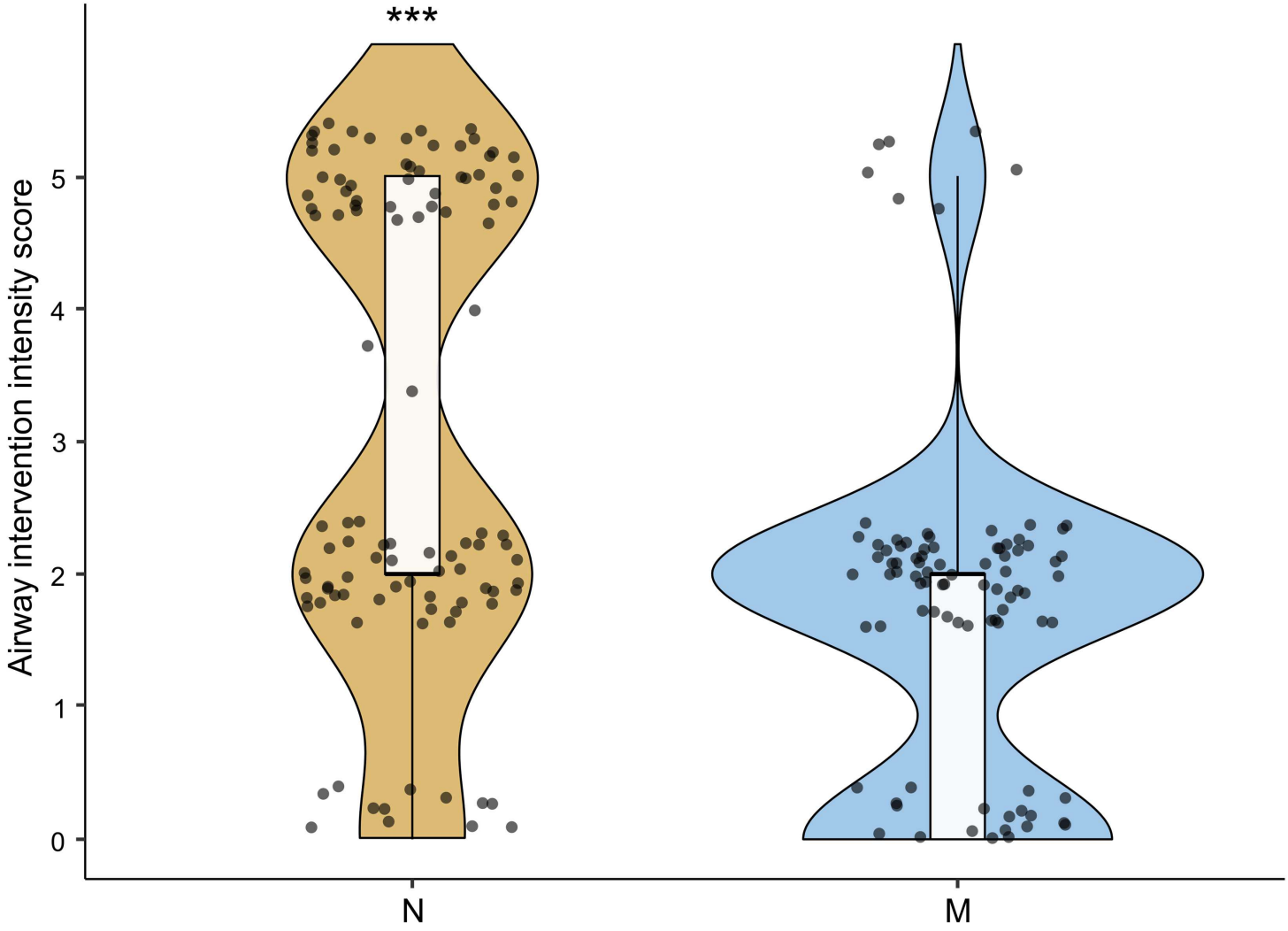


Figure 2

Violin plots of airway intervention intensity scores. The airway intervention intensity score (1–6) was treated as an ordinal outcome and compared via the Mann–Whitney U test. ***, indicates that the p value is less than 0.001

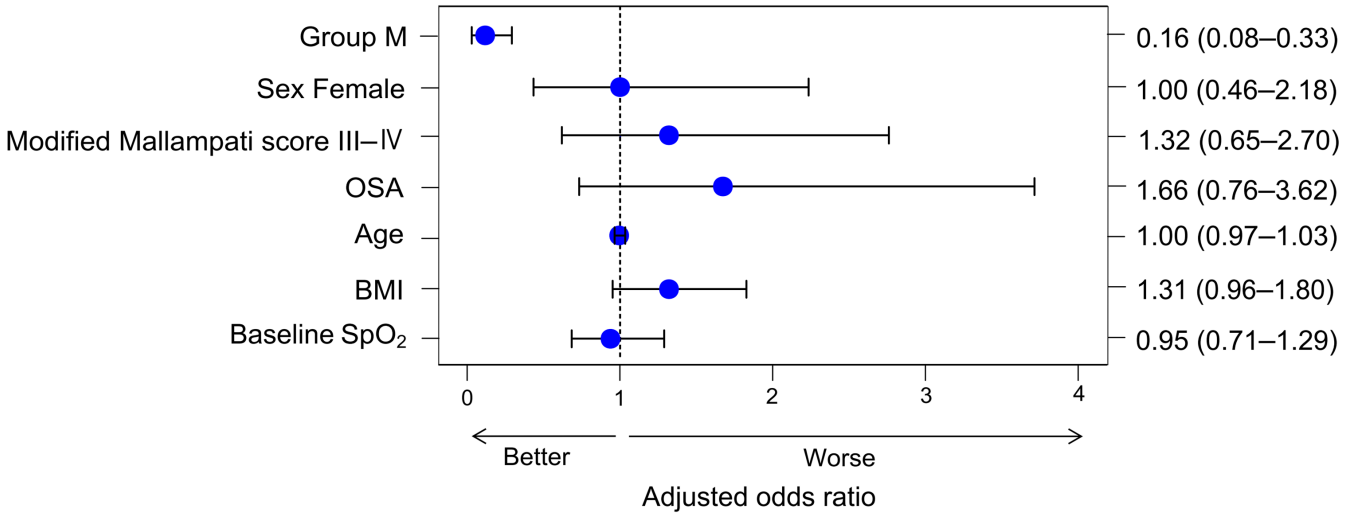


Figure 3

Forest plot of adjusted odds ratios from the multivariable logistic regression model. Multivariable logistic regression analysis included group (reference: N), sex (reference: male), modified Mallampati class (reference: I–II), obstructive sleep apnoea (OSA), age, BMI, and baseline SpO_2 to estimate adjusted odds ratios (aORs) with 95% confidence intervals for hypoxaemia.

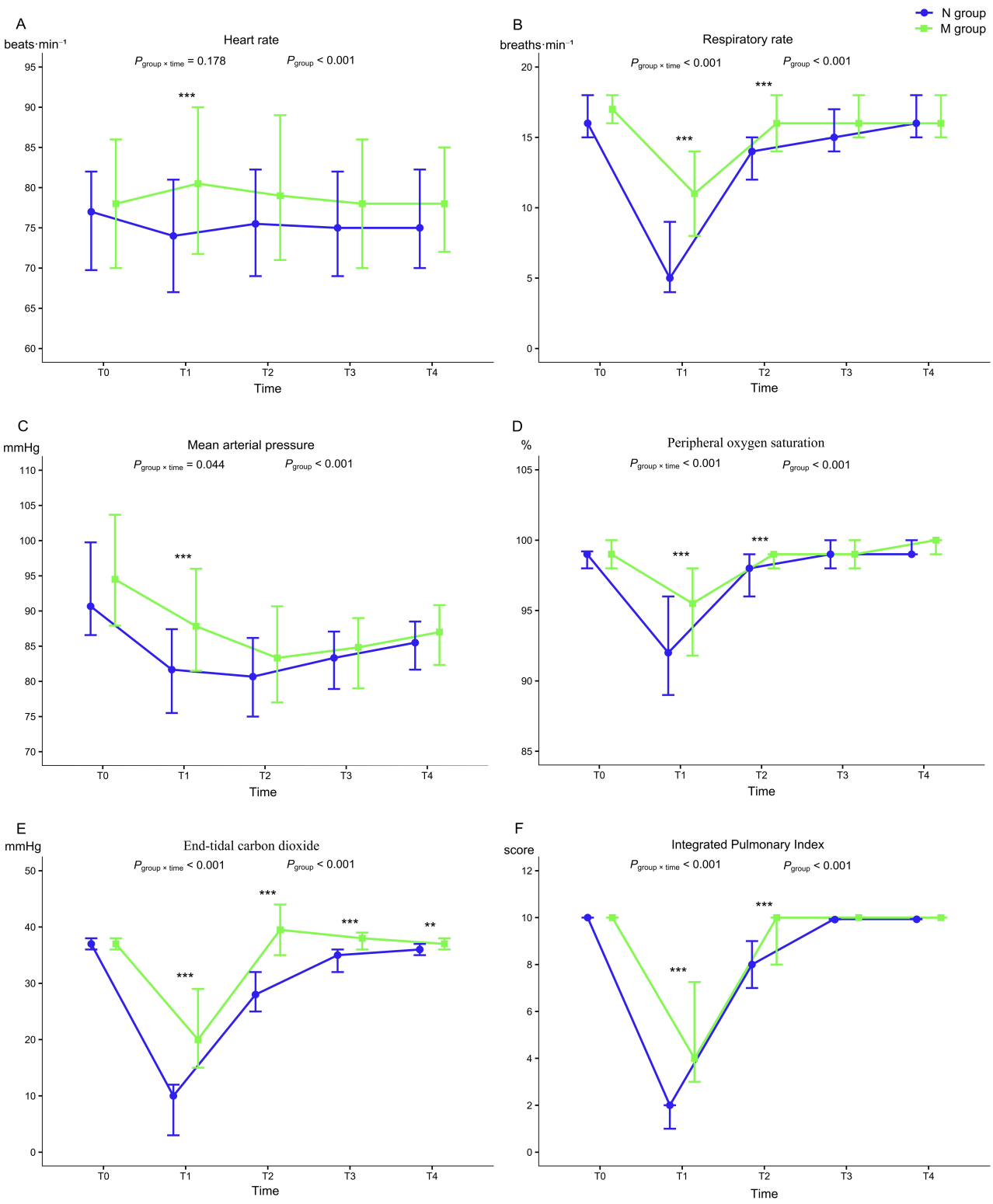


Figure 4

Changes in perioperative haemodynamic and respiratory parameters at different time points between groups. A two-factor Aligned Rank Transform (ART) model (ARTool package) was used to evaluate group, time, and group×time interactions, with P and P being reported[35].

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- CONSORT2025editablechecklist.docx
- SupplementaryTable1.docx
- SupplementaryTable2.docx
- SupplementaryTable3.docx
- SupplementaryTable4.docx
- SupplementaryTable5.docx
- SupplementaryTable6.docx