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Reduced Recovery Times with Total Intravenous Anesthesia in Patients with Obstructive Sleep Apnea

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Total IV Propofol vs. Sevoflurane Gas Anesthesia in Patients with Obstructive Sleep Apnea

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Disclosures

- No disclosures to report

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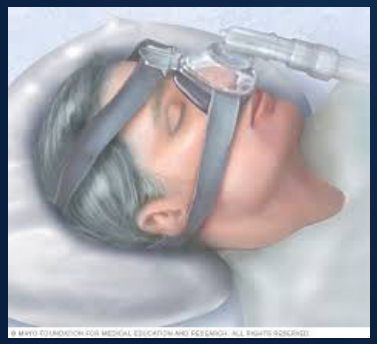
Introduction

- Obstructive sleep apnea (OSA) is a common, yet serious condition[1]
  - Repetitive nocturnal airway collapse, leading to cessation of breathing
  - Associated with stroke, hypertension, arrhythmias, decreased cognitive function, and diminished quality of life[2]
- Diagnosis of OSA includes either a home or in-laboratory sleep study to establish the extent of airway obstruction
  - Study results will typically report an apnea-hypopnea index (AHI), denoting severity of disease
  - AHI – apnea and hypopnea events per hour
- Effective first-line treatments of OSA include continued positive airway pressure (CPAP) therapy or mandibular repositioning[3]



= ↓ Compliance!

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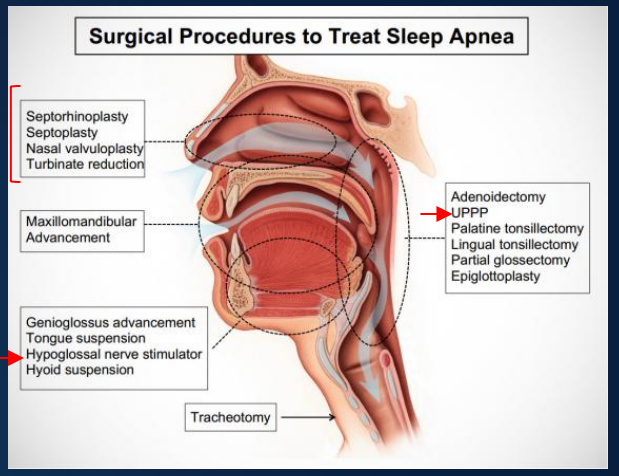
Introduction

- Following failure of CPAP or mandibular device, several surgical manipulations for OSA treatment exist
  - Procedures selected depend on location of obstruction and individual patient anatomy[4]



- <u>Currently, a standard of care does not exist for the anesthetic approach utilized for OSA patients receiving surgery</u>
  - Two highly utilized general anesthetic agents were evaluated in this study: Total Intravenous Anesthesia (TIVA) and Sevoflurane Gas (SEVO)
  - Conflicting literature exists as to which method is superior
  - Meta-analyses have shown that TIVA leads to faster recovery times with less postoperative nausea[5]
  - Potential impacts on efficiency and cost of recovery care, and patient satisfaction

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Objectives & Hypothesis

- Research Question: How does Total Intravenous Anesthesia (TIVA) compare with Sevoflurane Gas (SEVO) with respect to resultant postoperative experience and recovery time in OSA patients undergoing surgery?

- Hypothesis: OSA patients undergoing surgery will experience reduced postoperative nausea and faster recovery times following administration of TIVA compared with patients that receive SEVO.

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Approach & Results

- Study design: Retrospective Cohort Study
- Population: OSA patients undergoing corrective surgery (Jan. 2019-Dec 2019)
  - Surgeries included nasal surgeries, uvulopalatopharyngoplasty (UPPP) and upper airway stimulation (UAS)
  - SEVO (n=86)
    - Nasal (n=47)
    - UAS (n=29)
    - UPPP (n=10)
  - TIVA (n=62)
    - Nasal (n=24)
    - UAS (n=30)
    - UPPP (n=8)
- Intervention: Administration of TIVA with propofol + remifentanil
- Comparison: Outcomes of patients receiving SEVO
- All data was obtained from Epic medical history charts
  - Outcomes collected included time-based measures (total surgery and anesthesia time, time to emergence, time to PACU phase I/II completion, and total recovery time), incidence of postoperative nausea
- Rationale behind this approach:
  - Retrospective review of patients with known anesthesia modality
  - Appropriate time data was available to conclude if recovery times differed
  - Adverse events and complications occurring weeks later were also obtainable with this approach

Activity: able to move voluntarily or on command	
4 extremities	2
2 extremities	1
0 extremities	0
Respiration	
Able to deep breathe and cough freely	2
Dyspnea, shallow or limited breathing	1
Apneic	0
Circulation	
BP ± 20 mm of preanesthetic level	2
BP ± 20–50 mm of preanesthesia level	1
BP ± 50 mm of preanesthesia level	0
Consciousness	
Fully awake	2
Arousable on calling	1
Not responding	0
O_2 saturation	
Able to maintain O_2 saturation >92% on room air	2
Needs O_2 inhalation to maintain O_2 saturation >90%	1
O_2 saturation <90% even with O_2 supplementation	0

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Approach & Results

- Methods of analysis:
  - Analyses were performed using Graphpad Prism software using the following tests:
    - Unpaired nonparametric Mann-Whitney *U* tests (time comparisons/demographics)
    - Fischer's Exact tests (categorical data)
    - Multiple linear regression (correlating OSA severity with recovery time)

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Approach & Results

Demographics	SEVO Patients (n=86)	TIVA Patients (n=62)	P Value
Age	52.7 ± 11.2 years	55.4 ± 12.1 years	P=.1265
Sex	78% Males (n=67) 22% Females (n=19)	77% Males (n=48) 23% Females (n=14)	P=1.00
Race	78% Caucasian (n=67) 14% African American (n=12) 5% Hispanic (n=3) 6% Other (n=4)	91% Caucasian (n=56) 3% African American (n=2) 6% Hispanic (n=4) 0% Other (n=0)	P=.0737 **P=.0433** P=.4530 P=.1426
BMI	31.1 ± 4.7 kg/m^2	29.8 ± 3.6 kg/m^2	P=.1424
AHI	31.6 ± 24.9	30.5 ± 18.9	P=.8848
OSA Severity % Mild OSA AHI ≥5 - <15 % Moderate OSA AHI ≥15 - <30 % Severe OSA AHI ≥30	24% Mild OSA (n=21) 34% Moderate OSA (n=29) 42% Severe OSA (n=36)	19% Mild OSA (n=12) 37% Moderate OSA (n=23) 44% Severe OSA (n=27)	P=.0774 P=.1247 P=.3585
Surgical Procedure % Nasal Surgery % Upper Airway Stimulation (UAS) % Uvulopalatopharyngoplasty (UPPP)	55% Nasal (n=47) 34% UAS (n=29) 12% UPPP (n=10)	39% Nasal (n=24) 48% UAS (n=30) 13% UPPP (n=8)	P=.0672 P=.0893 P=.8051

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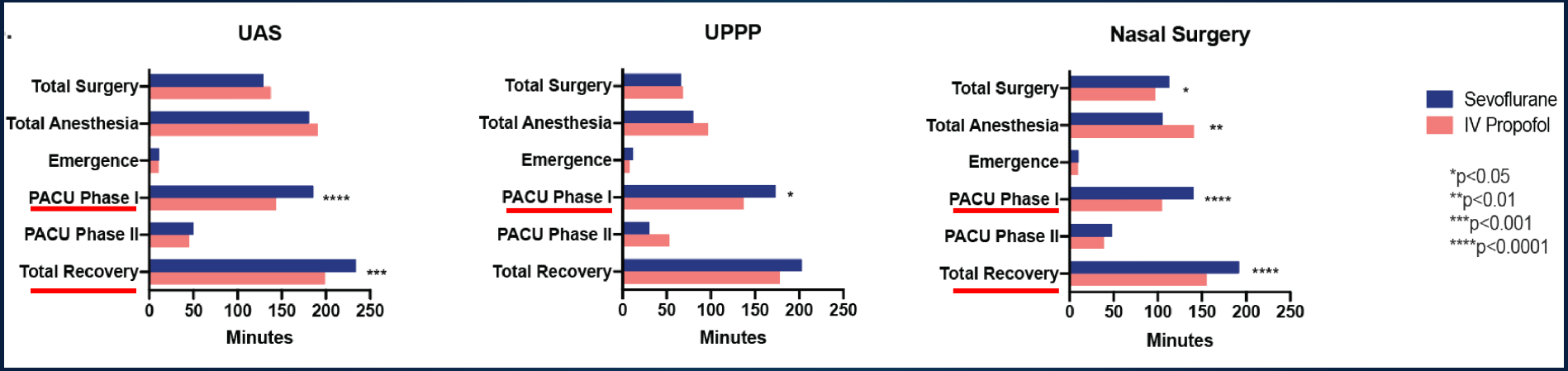
Approach and Results

Median PACU phase I time decreased with TIVA across all surgical subtypes. Total recovery decreased in all surgeries except UPPP.



UAS Median PACU phase I difference: 42.5 min (p<.001, 95% CI 20.00 - 61.00)
UPPP Median PACU phase I difference: 36 min (p=.022, 95% CI 6.00 - 83.00)
Nasal Median PACU phase I difference: 35.5 min (p<.001, 95% CI 18.00 - 52.00)

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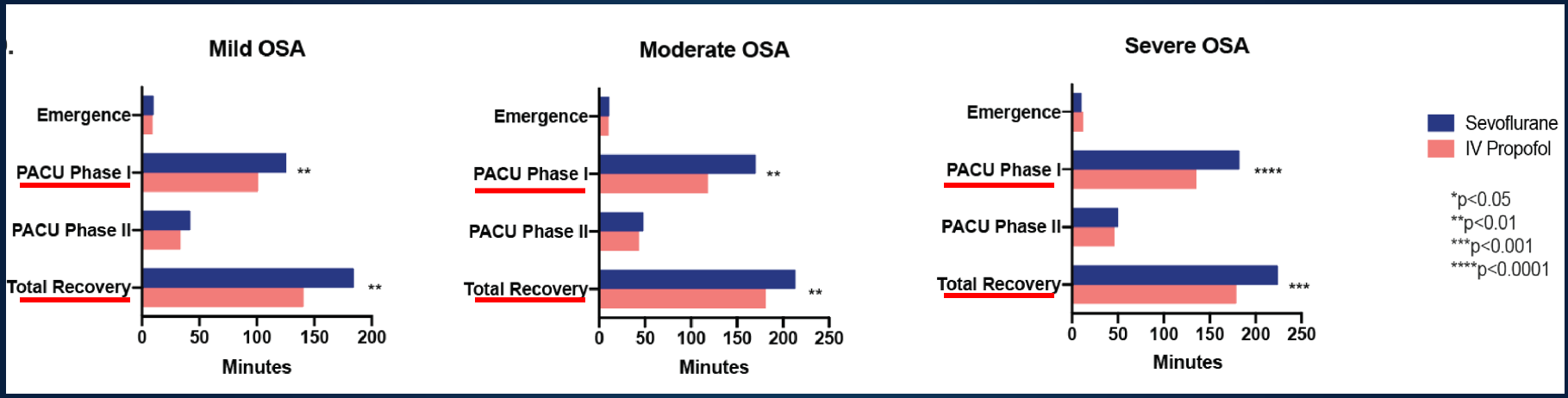
Approach and Results

Median PACU phase I time decreased with TIVA across all severities of OSA with surgeries combined.



Mild Median PACU phase I difference: 23.5 min (p=.004, 95% CI 11.00 - 55.00)
Moderate PACU phase I difference: 52 min (p=.004, 95% CI 11.00 - 63.00)
Severe Median PACU phase I difference: 47 min (p<.001, 95% 16.00 - 56.00)

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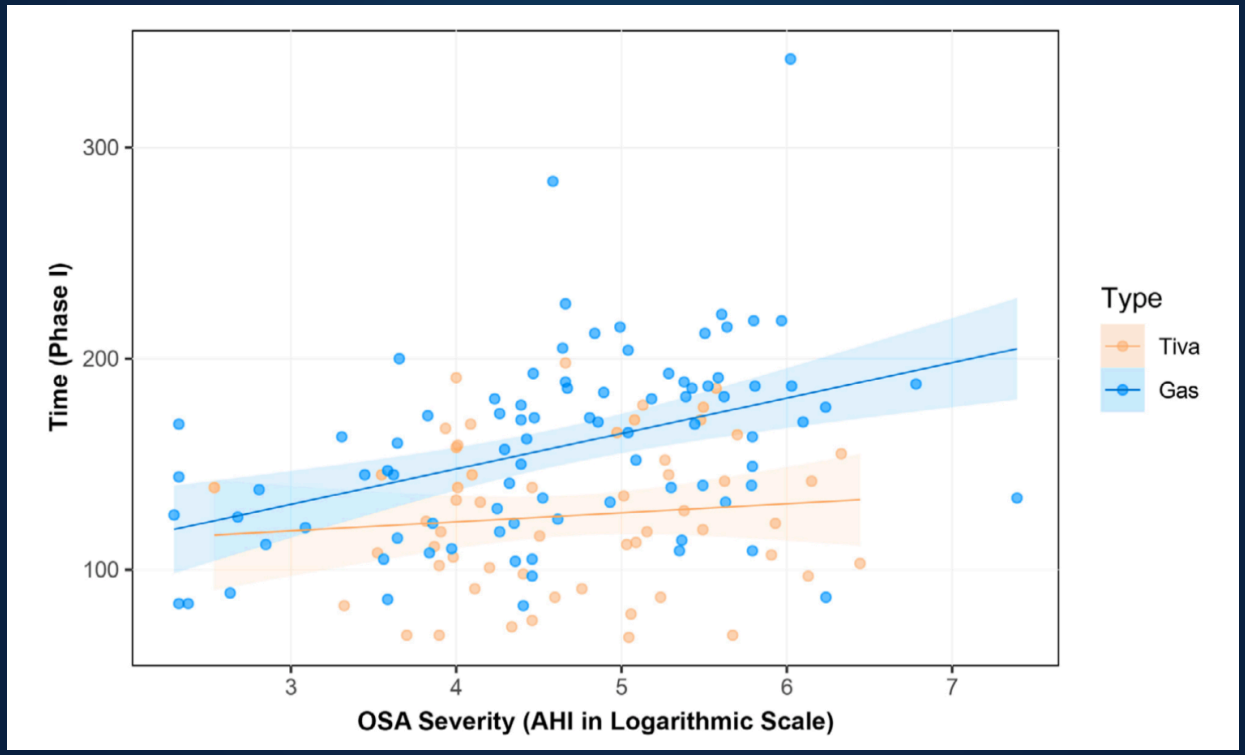
Approach and Results

Logarithmic 2-fold AHI increases correlates with increased PACU phase I time in SEVO patients.



SEVO phase I time increase: 16.8 min (p<.001, 95% CI 9.2 to 22.4)
TIVA phase I time increase: 4.3 min (p=.489, 95% CI -7.9 to 16.5)

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Approach and Results

Incidence of postoperative nausea and vomiting (PONV) did not differ in cohorts based on anesthesia received.

	PONV	No PONV
SEVO	10	76
TIVA	2	60

Fischer's Exact Test of PONV Incidence: p=.07

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Conclusions

- Based on this retrospective cohort:
  - Surgical OSA patients experience reduced recovery time with TIVA regardless of OSA severity or surgery received
  - OSA patients receiving SEVO experience increased time spent in recovery with increasing OSA severity
  - Incidence of PONV did not differ based on anesthesia received, but may do so with an increased sample size
- Overall, our findings of reduced recovery time after TIVA are consistent with meta-analyses of the general population[5]
- Implications of these findings may include improved efficiency of care delivery and patient satisfaction, and potentially reduced cost of recovery care
  - Further studies are needed to confirm these impacts

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Future Directions

- Extensions of this study include:
  - Prospective RCT placing patients in either a TIVA or SEVO group
    - More thorough assessment of postoperative pain and nausea
  - Cost analysis of this cohort utilizing Jefferson financial data and billing to insurance
  - Assessment of TIVA vs. SEVO in non-OSA patients undergoing otolaryngologic procedures (tonsillectomy, rhinoplasty, facelift, etc.)

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