

Introduction

- Obstructive sleep apnea (OSA) is a disorder characterized by repetitive partial or complete collapse of the pharyngeal airway during sleep leading to airway obstruction [1]
- Currently, there is no standard of care guiding the type of general anesthesia utilized for OSA patients undergoing surgery [2]
- There are two types of general anesthesia typically used: inhalational volatile gas anesthesia and total intravenous anesthesia (TIVA) [3]
 - TIVA: Propofol, which is often combined with an opioid, commonly Remifentanyl (no inhaled anesthetics)
- TIVA has benefits during intra- and post-operative periods for certain procedures including decreased bleeding, shorter operative times, decreased post-operative nausea and vomiting, and faster recovery. However, TIVA is generally accepted to be more expensive than traditional anesthetic regimens using inhaled anesthetics [4,5]
- Our group has previously demonstrated a reduction in recovery time for OSA patients undergoing upper airway surgery with TIVA as compared to sevoflurane [2]

Hypothesis:

1. Patients with comorbid OSA will demonstrate a greater benefit in measured postoperative recovery parameters versus those without an OSA diagnosis with TIVA
2. TIVA will offer a greater benefit in decreasing Phase 1 recovery times for both OSA and Non-OSA cohorts

Methods

- Retrospective review of consecutive patients with or without OSA undergoing ambulatory surgery under general anesthesia between January 2019 and November 2020
- Surgeries included: Upper airway stimulator (UAS) placement, expansion sphincter pharyngoplasty (ESP), septoplasty and turbinectomy (S&T), tonsillectomy and adenoidectomy (T&A), and open reduction internal fixation (ORIF) of the nose

OSA and Non-OSA Cohorts

- Two cohorts:
 - OSA: Diagnosed with OSA by a physician
 - Non-OSA: No diagnosis of OSA
 - Divided into those at risk for OSA (STOP-BANG ≥ 3)

Anesthesia Definitions

- TIVA: Remifentanyl and propofol infusions
- Inhalational anesthesia: Sevoflurane

Outcome Measures

- Phase 1 recovery time was defined as the interval from operating room (OR) departure to the time it took a patient to reach $\geq 9/10$ on the Aldrete scoring system in post-anesthesia care unit (PACU) [6]

Results

- A total of 334 patients were included:
 - OSA: 142 (42.5%)
 - Non-OSA: 192 (57.5%)

TABLE 1:
Cohort Demographics and Operations

	OSA	Non-OSA
Gender		
Female	21.83% (n=31)	61.98% (n=119)
Age	54.46 ± 11.75	33.26 ± 13.38
BMI	30.45 ± 4.18	25.20 ± 5.48
Race		
White	82.39% (n=117)	77.6% (n=149)
Black	9.86% (n=14)	13.02% (n=25)
Asian	2.11% (n=3)	1.56% (n=3)
Hispanic	4.93% (n=7)	5.72% (n=11)
Unknown	0% (n=0)	2.08% (n=4)
Anesthesia type		
TIVA	41.5% (n=59)	62.0% (n=119)
Sevoflurane	58.5% (n=83)	38.0% (n=73)
Operation		
UAS Placement	38.73% (n=55)	0% (n=0)
ESP	12.68% (n=18)	0% (n=0)
S&T	47.89% (n=68)	0% (n=0)
T&A	0% (n=0)	28.65% (n=55)
ORIF of the nose	0.70% (n=1)	71.35% (n=137)
Operative time	112.93 ± 37.60*	129.33 ± 79.14*
Anesthesia time	140.35 ± 47.68*	156.40 ± 86.22*

Comparison of Phase 1 Recovery Times Between Cohorts:

- Cohorts OSA, Non-OSA, Non-OSA STOP-BANG < 3 , and Non-OSA STOP-BANG ≥ 3 were all compared to each other
- Significant comparisons:
 - *OSA TIVA vs. OSA sevoflurane*:
 - OSA TIVA recovered 41.29 minutes faster
 - *OSA TIVA vs. Non-OSA STOP-BANG < 3 TIVA*:
 - Non-OSA TIVA recovered 26.68 minutes faster
 - *OSA sevoflurane vs. Non-OSA sevoflurane*:
 - Non-OSA sevoflurane recovered 46.76 minutes faster
 - *OSA sevoflurane vs. Non-OSA STOP-BANG < 3 sevoflurane*:
 - Non-OSA TIVA recovered 57.27 minutes faster
 - *OSA sevoflurane vs. Non-OSA STOP-BANG ≥ 3 sevoflurane*:
 - Non-OSA TIVA recovered 56.23 minutes faster
- All other comparisons were not significant

PONV, Surgical Complications, Anesthesia Complications, ED Visits, Readmissions:

- When comparing all cohorts, there were no significant differences in PONV, complications, ED visits or readmissions.

Discussion

- When choosing general anesthesia options, inhalational gas anesthesia and TIVA are typically used—each has been described to have its own relative advantages and contraindications
- In our current study, we found:
 - OSA patients receiving TIVA to have a significantly shorter recovery time than those receiving sevoflurane
 - Inhalational anesthesia was also associated with significantly longer Phase 1 recovery times as compared to TIVA independent of the OSA diagnosis
 - The non-OSA group had significantly faster recovery times than OSA patients undergoing both inhalational anesthesia and TIVA
 - When assessing secondary outcome measures, there were no statistically significant differences in complications, ED visits, readmissions or PONV for any cohort
- Moving forward, TIVA is optimal in patients with and without OSA
- It is important to be mindful that patients with OSA had longer recovery times than patients without, regardless of anesthesia type
 - This could be secondary to OSA patients having a higher risk of postoperative desaturations in recovery and higher BMI's

Conclusion

- TIVA may be a favorable option for anesthesia for the majority of patients regardless of OSA diagnosis
- Overall, OSA patients had a longer Phase 1 recovery time compared to Non-OSA patients regardless of anesthesia used
- OSA patients with upper airway obstruction have significantly increased benefit when using TIVA over inhalational anesthesia in terms of reduced Phase I recovery times

References

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