# UAS as a salvage procedure for persistent OSA after ESP

Thomas Jefferson University
HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

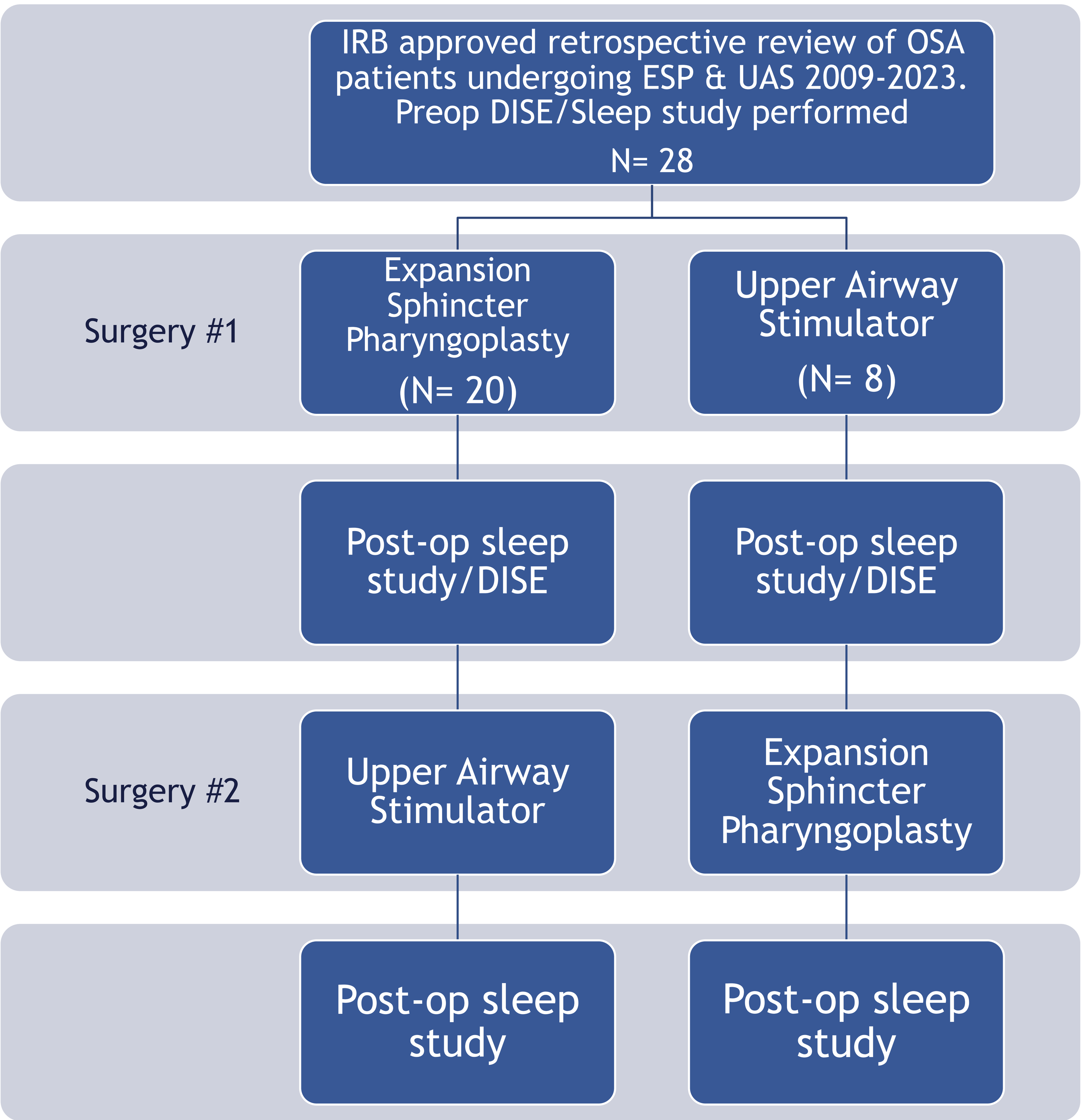
Chihun Jim Han MD[1], Praneet Kaki BS[2], Thomas Kaffenberger MD[1], Sophia Shah BS[2], Maurits Boon MD[1], Colin Huntley MD[1]

[1]Department of Otolaryngology, Thomas Jefferson University Hospital; [2]Sidney Kimmel Medical College, Thomas Jefferson University

## Introduction

- Hypoglossal nerve stimulation (HGNS) or Upper airway stimulation (UAS) has emerged as a viable option for those patients who cannot tolerate CPAP therapy.
- The efficacy of UAS for persistent obstructive sleep apnea (OSA) is unclear in patients who have undergone expansion sphincter pharyngoplasty (ESP).
- We investigated if there is a difference in the outcome of patients who underwent UAS followed by ESP with those who underwent ESP followed by UAS.

## Method




Graphic 1. Study workflow

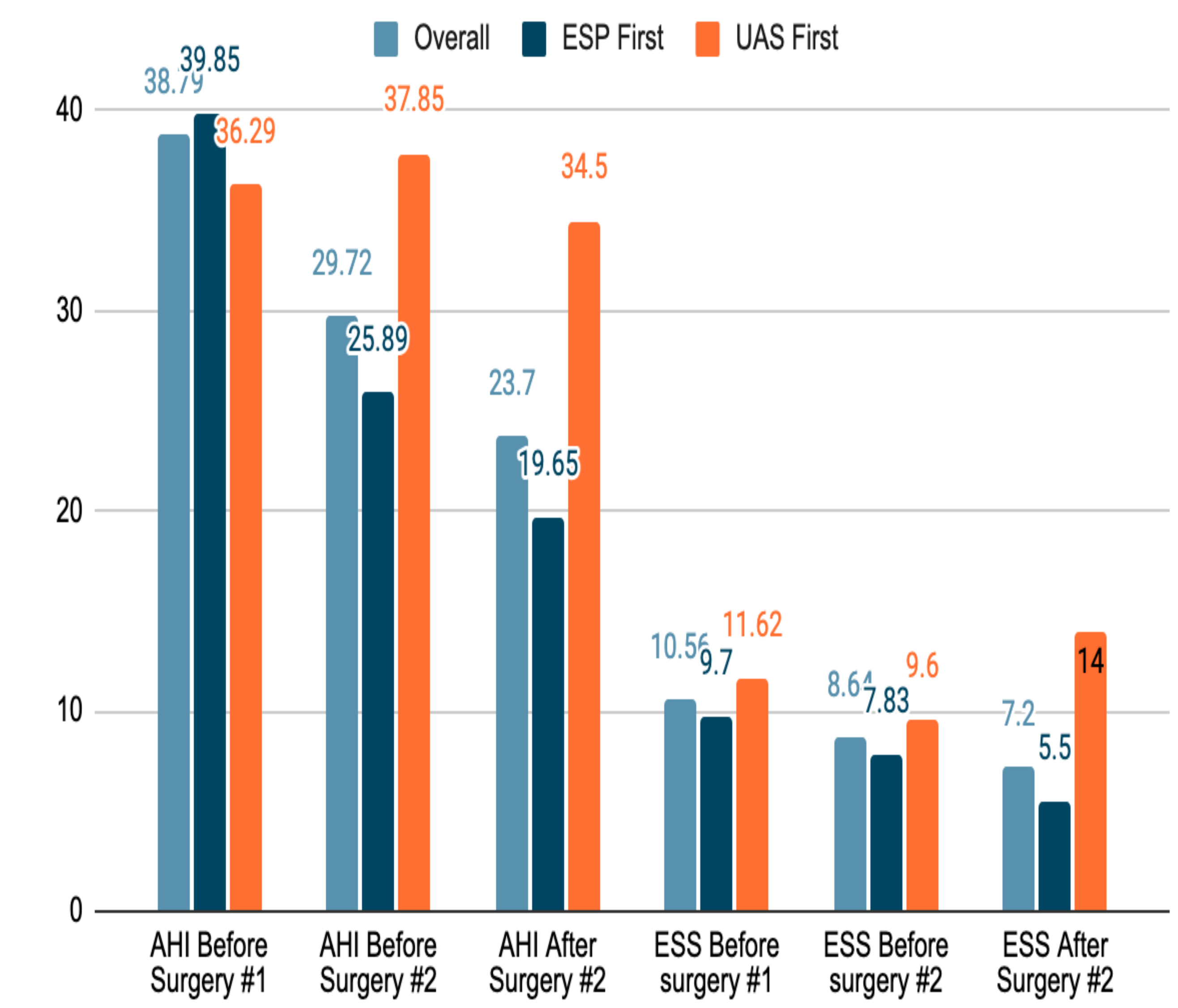
## Results

| Characteristics | N | ESP First N = 20[1] | UAS First N = 8[1] | p-value[2] |
|---|---|---|---|---|
| Gender | 28 | | | >0.9 |
| Female | | 4 (20%) | 2 (25%) | |
| Male | | 16 (80%) | 6 (75%) | |
| Race | 28 | | | >0.9 |
| Black or African-American | | 1 (5.0%) | 0 (0.0%) | |
| White | | 19 (95%) | 8 (100%) | |
| Age | 28 | 50.75 (11.34) | 53.75 (9.50) | 0.8 |
| Months between surgeries | 28 | 27.70 (32.62) | 16.75 (8.51) | >0.9 |
| Pre-UAS BMI | 27 | 31.19 (4.11) | 29.43 (3.15) | 0.4 |
| Pre-ESP BMI | 28 | 31.11 (4.34 | 28.82 (3.19) | 0.15 |
| Reason for Second Intervention | 28 | | | 0.017 |
| Suboptimal Treatment | | 20 (100%) | 5 (62%) | |
| UAS Intolerance | | 0 (0%) | 2 (25%) | |
| Both | | 0 (0%) | 1 (12%) | |

[1] n(%); Mean (SD)
[2] Fisher's exact test; Wilcoxon rank sum test

Table 1. Demographics/preoperative Characteristics

## Results (continued)

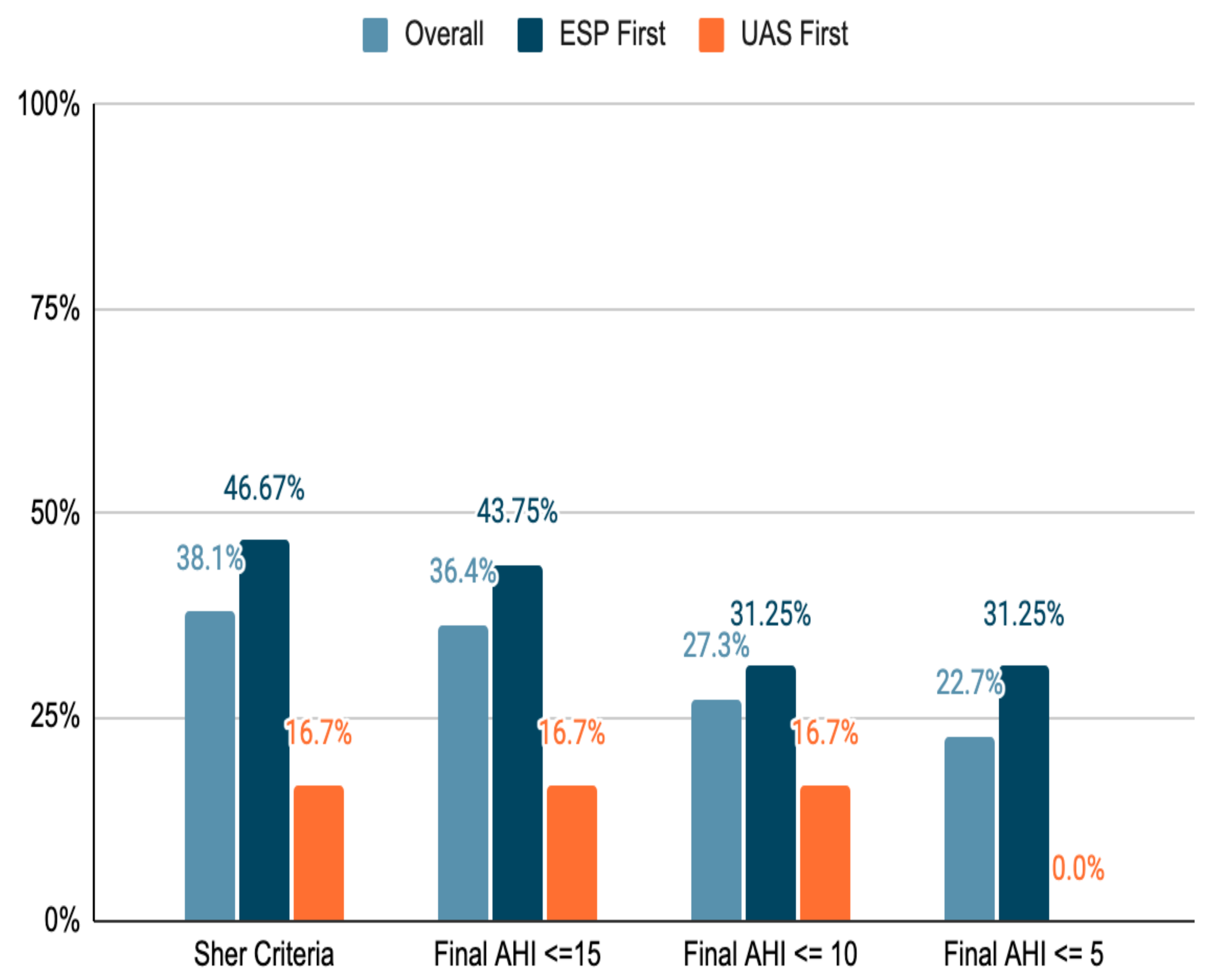



Graph 1. AHI and ESS before surgery #1, Before surgery #2, and After Surgery #2

| DISE Findings | Pre-ESP[1] N = 20 | Post-ESP[1] N = 13 | p-value[2] |
|---|---|---|---|
| AP Velum Collapse | | | 0.003 |
| 0 | 10 (50%) | 0 (0%) | |
| 1 | 6 (30%) | 4 (31%) | |
| 2 | 4 (20%) | 9 (69%) | |
| Concentric Velum Collapse | | | 0.002 |
| 0 | 10 (50%) | 13 (100%) | |
| 1 | NA | NA | |
| 2 | 10 (50%) | 0 (0%) | |
| Oropharynx Collapse | | | 0.005 |
| 0 | 6 (30%) | 2 (15%) | |
| 1 | 4 (20%) | 10 (77%) | |
| 2 | 10 (50%) | 1 (7.7%) | |

[1] n(%)
[2] Fisher's exact test

Table 2. DISE changes on ESP first cohort after ESP




Graph 2. Final Therapy outcomes in overall, ESP first and UAS first cohort after both interventions

## Central Findings/Discussion

- A paucity of research has been conducted to explore the role of UAS in multi-level or multi-staged sleep surgery. To the best of our knowledge, only one prior study has investigated the association between UAS and ESP (Steffen et al 2018[1]). Our study stands as the largest cohort study on this topic to date.
- DISE in the ESP-first group was significant for improved lateral oropharyngeal wall collapse (p = 0.005) and conversion of complete concentric to anteroposterior velum collapse (p=0.003)
  - This supports the findings noted in, Chiu et al 2021[2], Liu et al 2020[3] Hasselberg 2018[4], where ESP led to the resolution of the complete concentric palatal pattern. ESP may potentially be utilized as the first stage procedure for patients with concentric collapse who otherwise may be a good candidate for UAS.
- The final AHI and treatment success after UAS in the ESP-first group was 19.65 ± 17.59 and 47%, compared to 36.6 ± 27.66 and 20% in the UAS-first group after ESP. This did not meet statistical significance.
  - Improved treatment success in patients undergoing ESP followed by UAS may be secondary to changes in the palatal configuration and improved lateral wall collapse.
- Limitations: The sample size in this study was insufficient to achieve statistical significance, especially in the UAS first cohort.

## Conclusion

Our data suggests ESP may be limited as a rescue procedure after UAS non-response. ESP followed by UAS could be a practical staged approach for well-selected patients. Additional investigations is needed to understand the role of UAS in multi-level and multi-staged surgeries

## References

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3. Liu, S. Y., Hutz, M. J., Poomkonsarn, S., Chang, C. P., Awad, M., & Capasso, R. (2020). Palatopharyngoplasty Resolves Concentric Collapse in Patients Ineligible for Upper Airway Stimulation. *The Laryngoscope*, *130*(12), E958-E962. https://doi.org/10.1002/lary.28595
4. Hasselbacher, K., Seitz, A., Abrams, N., Wollenberg, B., & Steffen, A. (2018). Complete concentric collapse at the soft palate in sleep endoscopy: what change is possible after UPPP in patients with CPAP failure?. *Sleep & breathing = Schlaf & Atmung*, 22(4), 933-938. https://doi.org/10.1007/s11325-018-1657-z

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