

Associations of Insurance Status, Frailty, and American Society of Anesthesiologists on Endoscopic Transnasal Transsphenoidal Surgery

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Background

- Socioeconomic factors, including insurance status, have been associated with disparities in outcomes across otolaryngology, but their impact on transnasal transsphenoidal (TNTS) surgery has not been well characterized.
- Frailty (modified frailty index [mFI]) and American Society of Anesthesiologists (ASA) classification are established measures of physiologic reserve but have limited evaluation as predictors of TNTS outcomes.

Objectives

- Investigate the association of insurance status, frailty, and ASA score with pre-operative presentation and postoperative TNTS complications
- Evaluate institutional TNTS practices over 10 years, including patient demographics, surgical factors, and postoperative outcomes.

Methods

- Retrospective chart review with REDCap at tertiary care center
- Inclusion criteria:** Patients who underwent TNTS 11/10/2014 – 11/10/2024
- Exclusion criteria:** Under 19 years of age
- Statistical analysis: Kruskal-Wallis & one-way ANOVA; Chi-square & linear regression analysis

Results

Variable	Total (n=190)	Variable	Total (n=190)	p-value
Age (y), median (IQR)	56 (40, 66)	Insurance status, n (%)		<0.001
Sex, n (%)		Uninsured	13 (6.8%)	
Female	97 (51.1%)	Private	101 (53.2%)	
Male	93 (48.9%)	Medicare	40 (21.1%)	
Race, n (%)		Medicaid	9 (4.7%)	
White	158 (82.7%)	Other non-private	27 (14.2%)	
Non-white	33 (17.3%)	mFI-5 score, median (IQR)	1 (0, 2)	<0.001
BMI, median (IQR)	31.3 (26.6, 36.2)	mFI-5 group, n (%)		
Corticosteroid user, n (%)	40 (21.1%)	0	77 (40.5%)	
Smoking history, n (%)	74 (38.9%)	1	63 (33.2%)	
Alcohol >2/day, n (%)	3 (1.6%)	2	45 (23.7%)	
OSA, n (%)	46 (24.2%)	3+	5 (2.6%)	
mFI-5 variables, n (%)		ASA score, median (IQR)	3 (3, 3)	<0.001
History of CHF	5 (2.6%)	ASA group, n (%)		
History of COPD	13 (6.8%)	I-II	40 (21.1%)	
Hypertension	93 (48.9%)	III	141 (74.2%)	
Diabetes mellitus	53 (27.9%)	IV+	9 (4.7%)	
Non-functional	5 (2.6%)			

Table 1. Patient demographics. *Abbreviations:* BMI, body mass index; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disorder; IQR, interquartile range; OSA, obstructive sleep apnea; mFI-5, five item modified frailty index.

Table 2. Distribution of insurance status, frailty index, and ASA score. *Abbreviations:* ASA, American Society of Anesthesiologists; mFI-5, five item modified frailty index.

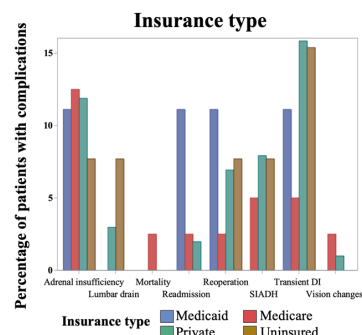


Figure 1. Postoperative complications stratified by insurance type.

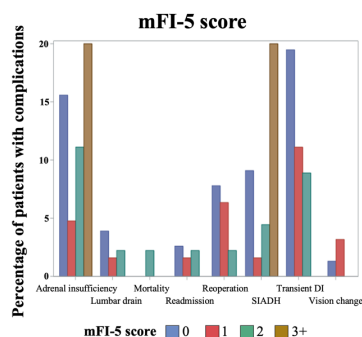


Figure 2. Postoperative complications stratified by mFI-5 score.

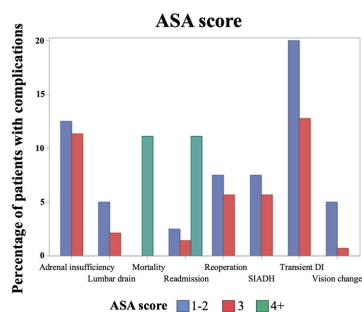


Figure 3. Postoperative complications stratified by ASA score.

Results

Variable	No CSF leak (n=131)	Positive CSF leak (n=57)	p-value
Age (y), median (IQR)	57 (41, 65)	51 (35, 66.6)	0.187
Sex, n (%)			<0.001
Female	56 (43.1%)	40 (70.2%)	
Male	74 (56.9%)	17 (29.8%)	
Race, n (%)			0.533
White	107 (81.7%)	49 (86%)	
Non-white	24 (18.3%)	8 (14%)	
BMI, median (IQR)	31.3 (27.3, 35.3)	31.2 (25.6, 38.2)	0.875
Corticosteroid user, n (%)	29 (22.1%)	11 (19.3%)	0.703
Alcohol >2/day, n (%)	3 (1.6%)	0 (0%)	0.554
OSA, n (%)	38 (29%)	8 (14%)	0.028
mFI-5 score, median (IQR)	1 (0, 2)	1 (0, 2)	0.895
mFI-5 variables, n (%)			
History of CHF	3 (2.3%)	2 (3.5%)	0.64
History of COPD	5 (3.8%)	8 (14%)	0.024
Hypertension	66 (50.4%)	25 (43.9%)	0.431
Diabetes mellitus	39 (29.8%)	14 (24.6%)	0.597
Non-functional	4 (3.1%)	1 (1.8%)	1
Pituitary apoplexy, n (%)	13 (9.9%)	0 (0%)	0.011
Hormone abnormality, n (%)	35 (26.7%)	16 (28.1%)	0.86
Vision changes, n (%)	55 (42%)	28 (49.1)	0.425

Intraop CSF leak, n=51
Postop CSF leak, n=6

- Positive association** between CSF leak and female sex, COPD
- Negative association** between CSF leak and OSA, pituitary apoplexy

Table 3. Descriptive statistics of relevant variables stratified by CSF occurrence. *Abbreviations:* BMI, body mass index; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disorder; CSF, cerebrospinal fluid; IQR, interquartile range; OSA, obstructive sleep apnea; mFI-5, five item modified frailty index.

Conclusions

- No statistically significant association was observed between preoperative presentation and insurance status, mFI-5 score, or ASA score
- No statistically significant association was observed between postoperative complications and insurance status, mFI-5 score, or BMI
- A significant positive association was found between ASA score and postoperative mortality, though this finding may not be clinically significant given small population size
- CSF leak significantly *positively* associated with female sex; CSF leak *negatively* associated with COPD, OSA, and pituitary apoplexy

References

- Varshney S, Gupta C, Bansal K K, Bhat S S, Bhagat S. Endoscopic trans-nasal transsphenoidal (TNTS) approach for pituitary adenomas: our experience. *Indian J Otolaryngol Head Neck Surg*. 2013;55(2):208-212.
- Tabaei A, Anand V K, Barrón Y. Endoscopic pituitary surgery: a systematic review and meta-analysis. *J Neurosurg*. 2009;111(03):545-554.
- Goudakos J K, Markou K D, Georgalas C. Endoscopic versus microscopic transsphenoidal pituitary surgery: a systematic review and meta-analysis. *Clin Otolaryngol*. 2011;36(03):212-220.
- Amirani M, Wei L, Cinci I. Short-term outcome of endoscopic versus microscopic pituitary adenoma surgery: a systematic review and meta-analysis. *J NeuroNeurosurg Psychiatry*. 2013;84(08):843-849.
- Sukys JM, Jiang R, Manes RP. Assessing Risk of Severe Complications after Endoscopic Transnasal Transsphenoidal Surgery: A Comparison of Frailty, American Society of Anesthesiologists, and Comorbidity Scores. *J Neurol Surg B Skull Base*. 2021 Dec 16;83(5):536-547. doi: 10.1055/s-0041-1740577. PMID: 36097501; PMCID: PMC8462967.