

Background

- Learning intranasal anatomy can be challenging for the medical student learner
- Most medical school anatomy curriculums spend very little time teaching intranasal and paranasal sinus anatomy & rely on brief lectures, textbooks, and pre-dissected cadavers
- Hands-on training with rigid nasal endoscopy techniques are often inaccessible to medical students
- Endoscopic nasal scoping skills are useful in a growing number of medical specialties

AIMS:

Understand the utility of the novel 3D-Printed model for teaching medical students:

1. Intranasal anatomy
2. Rigid Nasal Endoscopy



Methods

- Rigid 3D-Printed models were constructed from selected patient CT scans
 - Silicone turbinates and silicone facial structures were added to simulate more realistic tissue movement
- Models were utilized during a scheduled hands-on scoping session with medical students in the Mayo Clinic School of Medicine Otolaryngology Interest Group
- Students were given an anatomy lecture, scope demonstration with guidance on an initial scoping trial to identify a host of basic intranasal structures
- Students then performed 3 separate “timed trials” – starting with scope on nasal tip, they were time while attempting to find 3 structures:
 - Inferior Turbinate
 - Middle Turbinate
 - Eustachian Tube Orifice
- Students were administered surveys before, during and after the scoping session

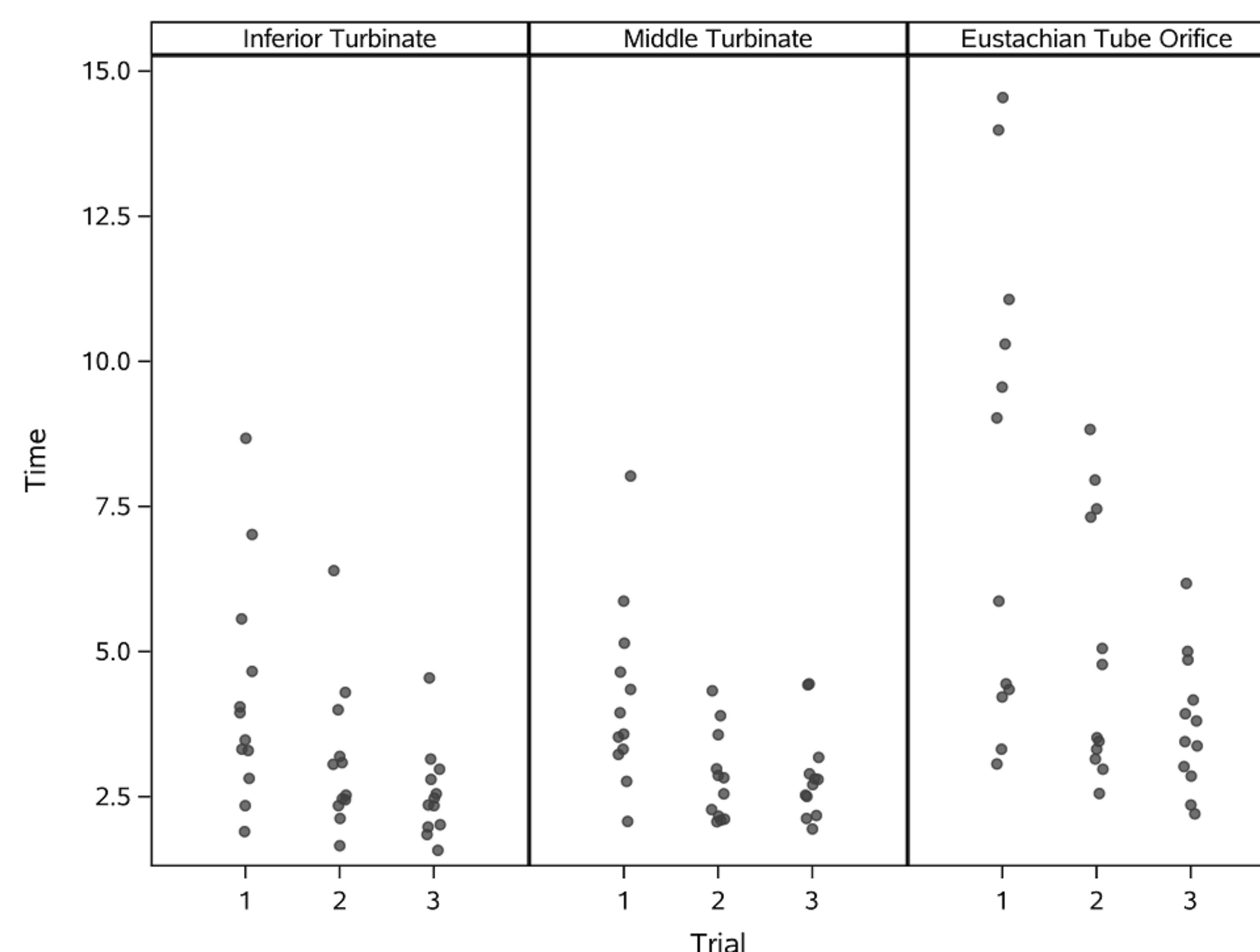


Figure 1. Timed Trials on 3D Model

Students scoped the 3D model and were timed while they located the inferior turbinate, middle turbinate, and eustachian tube orifice, three times each. Scatterplot demonstrates progression of time taken to locate each structure.

Table 2. Educational Utility of Novel 3D-Printed Model

Students asked questions pertaining to the accuracy and utility of the 3D model as a teaching tool

Questions	Likert Score	Participants n (%)
<i>When Scoping This model, I Was able to identify all of the required landmarks</i>	6 - Agree	2 (17)
	7 - Strongly Agree	10 (83)
	Average Score	6.8
<i>This model accurately depicted intranasal anatomy</i>	3 - Somewhat disagree	1 (8)
	5 - Somewhat agree	2 (17)
	6 - Agree	5 (42)
	7 - Strongly Agree	4 (33)
Average Score	5.9	
<i>The 3D Model was useful to learn the basics of endoscopy</i>	5 - Somewhat agree	2 (17)
	6 - Agree	3 (25)
	7 - Strongly Agree	7 (58)
Average Score	6.4	
<i>I found the 3D Model to be a useful educational tool</i>	5 - Somewhat agree	2 (17)
	6 - Agree	4 (33)
	7 - Strongly Agree	6 (50)
Average Score	6.3	
<i>This scoping session was a more effective way to learn intranasal anatomy compared to my medical school anatomy course</i>	4 - Neither agree nor disagree	1 (8)
	5 - Somewhat agree	1 (8)
	6 - Agree	3 (25)
	7 - Strongly Agree	7 (58)
	Average Score	6.3

Questions	Likert Score	Pre-Session n (%)	Post-Session n (%)
<i>I understand the basics of rigid nasal endoscopy</i>	1 - Strongly Disagree	0 (0)	0 (0)
	2 - Disagree	3 (25)	0 (0)
	3 - Somewhat disagree	1 (8)	0 (0)
	4 - Neither agree nor disagree	2 (17)	0 (0)
	5 - Somewhat agree	5 (42)	3 (25)
	6 - Agree	1 (8)	4 (33)
	7 - Strongly Agree	0 (0)	5 (42)
Average Score		4	6.2
<i>I am comfortable in my ability to perform rigid endoscopy on a real patient</i>	1 - Strongly Disagree	8 (67)	0 (0)
	2 - Disagree	2 (17)	1 (8)
	3 - Somewhat disagree	2 (17)	3 (25)
	4 - Neither agree nor disagree	0 (0)	4 (33)
	5 - Somewhat agree	0 (0)	1 (8)
	6 - Agree	0 (0)	3 (25)
	7 - Strongly Agree	0 (0)	0 (42)
Average Score		1.5	4.2

Table 3. Effect of Scoping Session on Participant comfortability with Rigid Nasal Endoscopy

Compares students' pre-session scores vs. post-session scores regarding comfort with rigid nasal endoscopy procedures.

Results

- All students in the study were first-year medical students who had completed the Head & Neck portion of their anatomy course
 - 67% of them had never observed a sinus surgery and 8% had seen 4+ sinus surgeries
- On average, students had the most difficulty initially locating the eustachian tube orifice (Fig. 1)
- The average time to finding each structure decreased over the course of the 3 timed trials (Fig. 1)
- Students on average felt the 3D model accurately depicted intranasal anatomy and was an effective way to learn anatomy and rigid nasal endoscopy (Table 2)
- On average, students became more comfortable with the basics of rigid nasal endoscopy (Table 3)



Limitations

- Possible biased student responses in attempting to impress research team
- Students had varying degrees of prior exposure to ENT and scope-related events

Conclusion

- Integration of hands-on-scope training with realistic 3D models into medical school interest group activities is an effective way to increase comfort with nasal endoscopy and intranasal anatomy

Future Directions:

- Improve durability of 3D-printed model
- Expand study to other medical student years
- Integrate hands-on scope training with a 3D model into medical student head & neck anatomy curriculum