Quantified Assessment of Resident Motion During Endoscopic Sphenoidotomy

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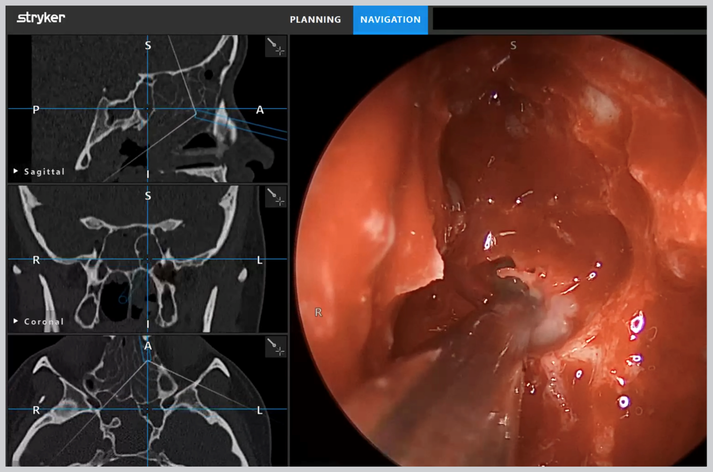
Background

- Feedback on technical skills given to surgical trainees is often qualitative and may lack in specificity on how to improve.
- The Objective Structured Assessment of Technical Skills (OSAT) is currently the primary tool available to quantify resident performance in sinus surgery,[1,2] but limited by low inter-rater reliability for untrained evaluators, inability to capture more granular detail as to why a trainee is struggling, and time burden to complete.[3,4]
- More objective and easier-to-implement measurement tools are needed to enable better study of educational interventions and to improve the quality and quantity of feedback given to learners.[5]
- Understanding nuances in surgeon motion may help learners more readily assimilate technical skills.

Objective

- We sought to determine whether endoscope and instrument motion tracking metrics are associated with competency in endoscopic sinus surgery (ESS).

Tri-Planar View of Navigation Technology



Methods

- Ten bilateral sphenoidotomy procedures at a single institution were identified. Expert (attending) surgeons were randomized to perform the procedure on one side while trainee (resident) surgeons performed the contralateral side.
- Total time and distance, idle time (speed of <20 mm/s for ≥0.5 s), and average distance and angle between instruments were tracked using Stryker Scopis navigation technology.
- After each procedure, attending and resident surgeons rated case difficulty and surgeon performance.

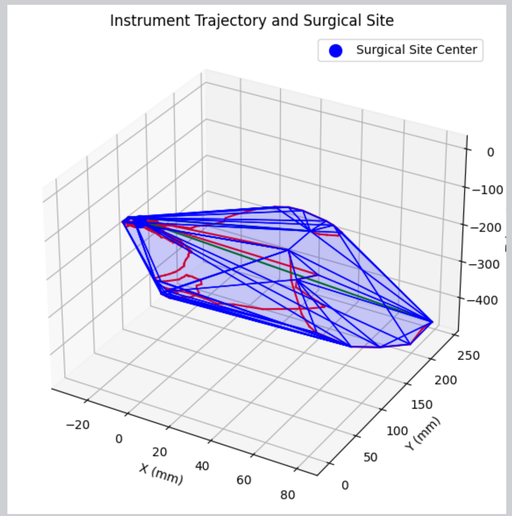
Results

- Motion tracking data were collected from two expert and three trainee surgeons.
- Mean idle time of selected instruments and total path length of both the scope and instruments were significantly less for experts compared to trainees.
- The mean distance and angle between the endoscope and a given instrument were not significantly different.
- Attending ratings of overall resident performance were weakly correlated with idle time and moderately correlated with total path length.

	Attending	Resident	*P* value
Idle time	**38.0 s**	**82.5 s**	**0.035**
Total path length	**1881 cm**	**2865 cm**	**0.013**
Distance between scope and instrument (SD)	19.5 cm (84.6)	10.7 cm (85.7)	0.152
Angle between scope and instrument (SD)	102.5 deg (38.1)	99.1 deg (37.5)	0.290

	Idle time	Total path length
Overall resident performance	R=-0.22	R=-0.58

Intra-Operative Motion Coordinates



Conclusions

- Expert and trainee surgeons can be reliably distinguished during sphenoidotomy using motion tracking technology.
- Total distance moved by the trainee's instruments is associated with overall performance, suggesting that this metric may be used by residents to track their progression.
- Further study is needed to create and validate a performance evaluation tool that can be used in a real-world setting.

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Navigation instruments provided by Stryker.