Integrating Digital Dissection into Anatomy and Surgical Education of Head & Neck: A Personal Review of Teaching Strategies and Learning Outcomes

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Objective

Teaching Anatomy of head & neck is challenging due to the structural complexity. In recent years digital tools have emerged as new adjuncts in anatomy. One of the greatest challenges in training medical students and surgeons is the teaching of 3- dimensional competence concerning topographical relationships. The foundation for understanding functions and topography is based on effective teaching strategies. Based on my own teaching experience and data, this review summarizes key insights into the use of digital dissection and reflect its didactic value in medical education and surgical training.

Methods

A blended teaching approach with additional digital dissection table has been implemented in my teaching program with students & residents. Selected anatomical regions of head & neck were digitally dissected (such as pterygopalatine fossa and infrahyoid muscles). Pre- and postcourse tests were conducted. In total 49 medical students of the preclinical segment were offered virtual teaching over a period of one semester in addition to classical teaching on models and cadaver plastinates. Implementation of the supplementary teaching was exclusively digital: Onboarding was via QR code and teaching was given at a virtual dissection table. A performance evaluation survey was used to investigate the level of knowledge and expectations prior and after tutorial.

A **Plastinate** *<model head and skull base>*	B **Targeted virtual dissection** *<preset pterygopalatine fossa>*	C **3D skull model** *<skull base>*

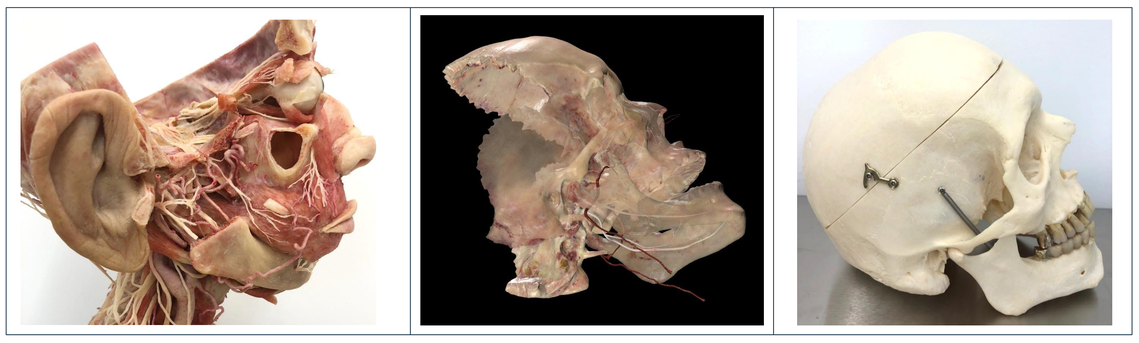

Fig.1: Teaching tools of the pterygopalatine fossa, lateral views; A: plastinate, B: preset at the virtual dissection table, 360° rotable, C: skull/ skull base

Conclusion

Using a digital scalpel on a virtual cadaver, dissection steps can be performed repeatedly at will and anatomical relationships can be individually designed. Tailored structures of body donors can be virtually displayed together with vascular and other structures. Our virtual teaching shows that students have improved with regard to topographical competence. The use of customizable, digital tools will pave the way for innovation in educational institutions. In conclusion, we propose this method should also find its way into the anatomical training of young residents and surgeons.

Results

Our questionnaire evaluated the perfomance as followed: 1= high performance/very likely, 5=low performance/very unlikely. Evaluations have revealed the following: The usage of virtual dissection table for self-study prior to our tutorial was estimated poorly (4,8 points). The level of knowledge was rated with 4,0 points. Post tutorial both ratings increased: Using virtual tools for self-study was now rated with 2,1 points and the level of knowledge improved (1,9 points). In general, teaching with digital features was universally accepted among students with an 2,3 rating.

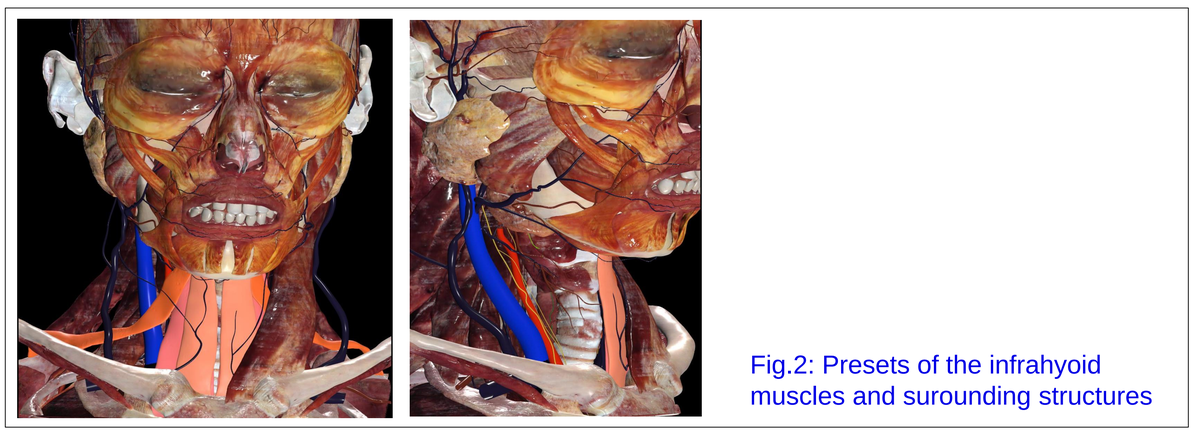

Fig.2: Presets of the infrahyoid muscles and surounding structures

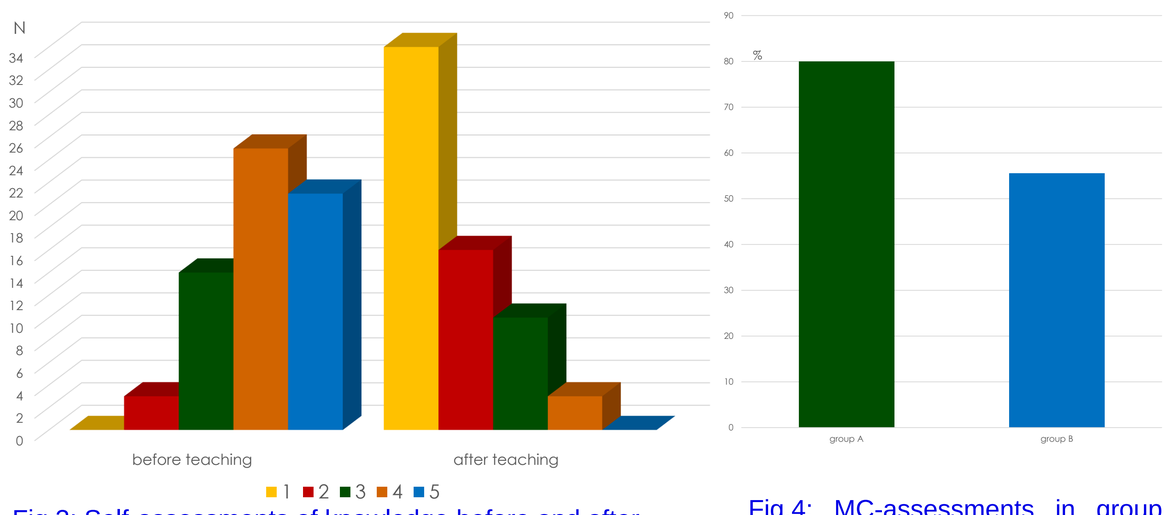

Fig.3: Self-assessments of knowledge before and after teaching with virtual tools **(=subjective rating)**

Fig.4: MC-assessments in group A (virtual tools) and group B (plastinate) **(=objective rating)**

Evaluation score:
1= high performance or very likely to 5= low performance or very unlikely

A

Evaluation questions	Score
Frequency of usage of virtual tools	4,7
Expectations before teaching	3,0
Level of knowledge before teaching	4,0

B

Evaluation questions	Score
3D dimentional competence	2,0
Virtual tools faciliated my learning	2,1
Level of knowledge after teaching	1,7

Fig.5: Course assessment features and scoring, A: before teaching, B: after teaching

A

B

Fig.6: Classical teaching tools; A: Cadaver plastinate of the skull base. B: skull base model

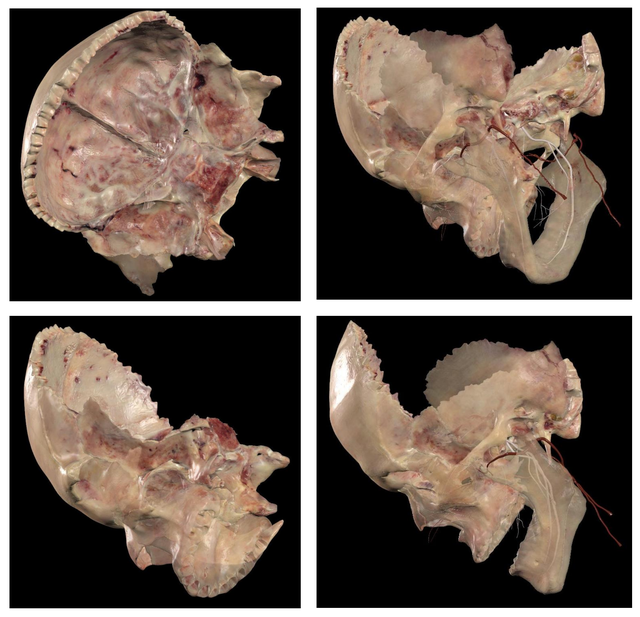

Fig.7: Samples of presets of the skull base and the pterygopalatine fossa, virtual tools created in a targeted manner

Disclaimer: The author is Anatomage ® keynote speaker 2025 and teaches with Anatomage ®

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