Using a 3D-Printed Pterygopalatine Fossa Model to Enhance Student Learning in Medical Gross Anatomy

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The pterygopalatine fossa is a complex space in the skull base. It contains:

- Maxillary artery (terminal branches)
- Maxillary division of the trigeminal nerve
- Pterygopalatine ganglion

It is poorly visualized in cadaveric dissection.
“The infraorbital and zygomatic nerves pass anteriorly through the infraorbital fissure; the greater and lesser palatine nerves pass inferiorly through the greater and lesser palatine canals...”
Study Design

• Target
  • Education project for first–year medical students enrolled in gross anatomy at the Brody School of Medicine (BSOM)

• Intervention
  • 3D-printed model of the pterygopalatine fossa reconstructed from CT scan
  • Accessed during voluntary review sessions, with 3D model as a supplement

• Outcome measure
  • Pre- and post-session assessment scores
  • Post-session survey
  • BSOM M1 Medical Gross Anatomy assessments (course-level)
Developing a Model using a CT Scan

Selected pixels indicate manual segmentation used for 3D rendering
3D Rendering of Selected Pixels

Anterior View

Posterior View
Timeline

**Spring 2022**
- **Model Creation:**
  - Acquire CT, create model using 3DSlicer, label model for clarity

**Fall 2022**
- **Recruitment:**
  - Email, use BSOM Class of 2026 Facebook page and GroupMe
- **Session:**
  - Voluntary, 30-minute sessions with access to labeled model, pre- and post-session quiz
- **Post-session:**
  - Email post-session survey

**Winter 2022**
- **Data analysis**
Future Directions

• Increase model complexity
  • “Hollowed out” model vs. negative-space model
  • Show nerves and vasculature passing through

• Develop 3D models of other complete anatomical structures from radiological images