Ultrasound Sessions are Highly Effective in Teaching Anatomical Structures and Basic Ultrasound Skills to First-Year Medical Students

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BACKGROUND

- ❖ Ultrasound education has become increasingly prevalent in undergraduate medical education nationwide.
- ❖ Three ultrasound sessions (ocular, abdominal, aorta) were hosted for M1 students with 2 components:
  - 1) Didactic portion: teaching basic ultrasound physics, machine operation, image acquisition, and image interpretation.
  - 2) Hands-on portion: allowing students to perform ultrasound scans on standardized patients.
- ❖ The purpose of this study is to evaluate the effectiveness of these sessions as well as the students' perception of the usefulness of including ultrasound as an adjunct to current Gross Anatomy teaching.

METHODS

- ❖ M1 students voluntarily participated in 3 ultrasound sessions correlated in conjunction with the Gross Anatomy curriculum:
  - 1) Ocular (n=11)
  - 2) Abdominal (gallbladder, kidney, spleen) (n=25)
  - 3) Aorta (celiac trunk, SMA, IMA, iliac bifurcation) (n=15)
- ❖ The students received didactic training on ultrasound physics and machine use followed by teaching on session specific anatomy and common pathology seen on ultrasound.
- ❖ This was followed by a hands-on practice of ultrasound scans to identify session specific anatomy.
- ❖ Pre-session and post-session tests consisted of two parts:
  - 1) Basic Ultrasound Knowledge Questions
  - 2) Image Based Anatomical Questions
  - Data analysis completed using paired t-tests with SAS 9.4 (statistical significance*, p<.05):
- ❖ 2 5-point Likert scale surveys were also given:
  - 1) Post session survey: assess attitudes toward the course and ultrasound training as part of the educational curriculum.
  - 2) Post anatomy exam survey: determine efficacy in preparing students for the exam.

RESULTS

Average Test Scores for Basic Ultrasound Knowledge Questions

	Pre-test Average Percent Correct	Post-test Average Percent Correct
Ocular (n=11)	15.91%	100%*
Abdominal (n=25)	35%	85%*
Aorta (n=15)	50%	96.67%*
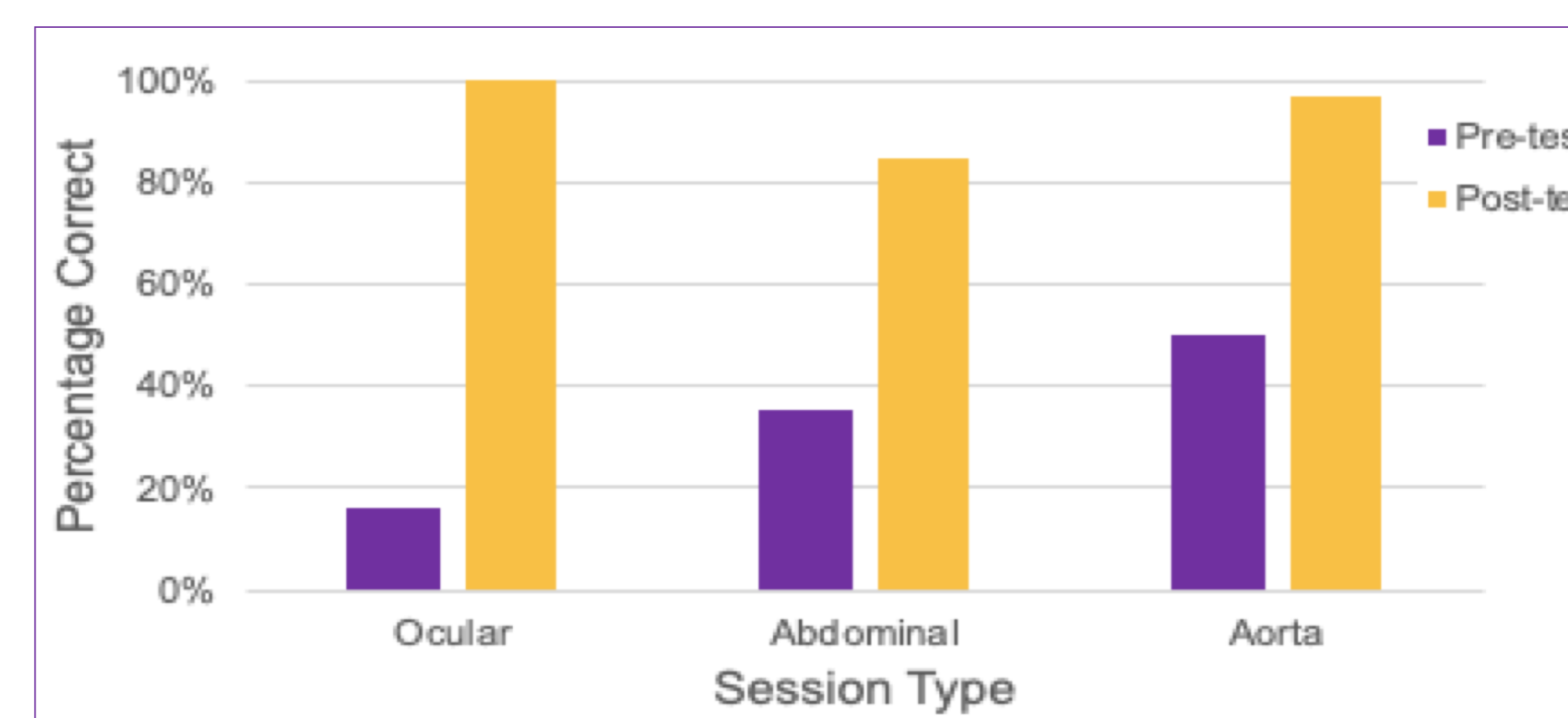
Average Test Scores for Image Based Anatomical Questions

	Pre-test Average Percent Correct	Post-test Average Percent Correct
Ocular (n=11)	68.18%	95.45%*
Abdominal (n=25)	7.2%	94.4%*
Aorta (n=15)	40%	95%*
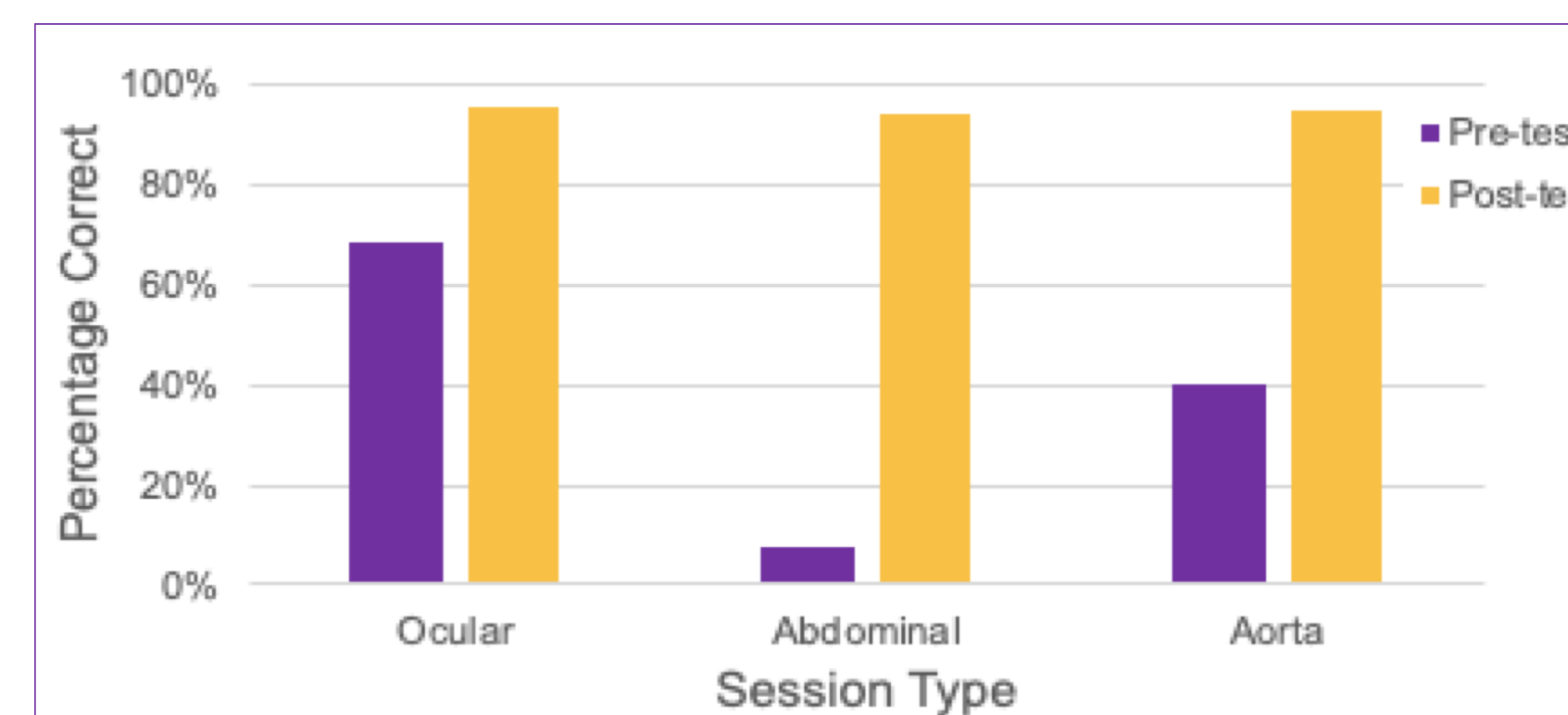
Image Based Anatomical Picture Examples

Ocular
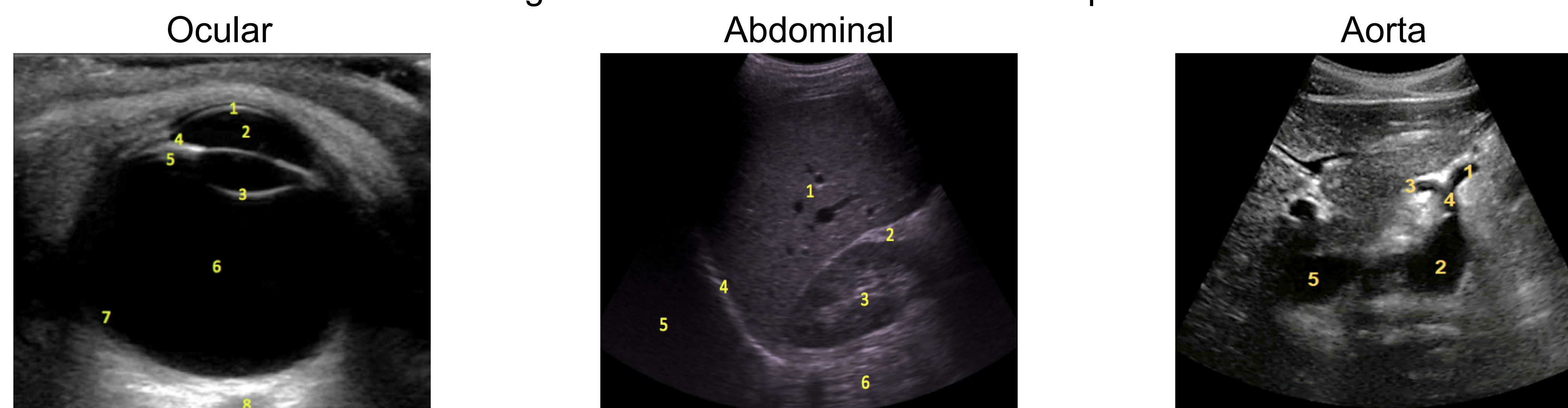
Abdominal

Aorta

Survey Question:	Average Score (5 point scale)		
	Ocular (n=11)	Abdominal (n=25)	Aorta (n=15)
I enjoyed this course.	5.00	4.6	4.8
Ultrasound education is relevant to my level of training.	4.73	4.52	4.8
The pre-session lecture helped with my understanding of ultrasound.	4.82	4.6	4.93
This session increased my understanding of normal anatomy.	4.91	4.48	4.87
This session helped me identify anatomical features.	4.91	4.6	4.87
This session was well correlated with the first-year anatomy curriculum.	4.73	4.68	4.93
This session should be incorporated into the first-year anatomy curriculum.	**4.73**	**4.48**	**4.8**
Post Test Survey: This session prepared me for the anatomy examination.	4.28	4.44	4.5
Post Test Survey: This session benefitted my long term retention of anatomy.	4.43	4.55	4.5

DISCUSSION

- ❖ Participation: Ocular (11 students), Abdominal (25 students), Aorta (15 students)
- ❖ Students have shown a significant increase in basic ultrasound knowledge (basic ultrasound physics, machine operation, image acquisition, and image interpretation) after a brief educational session in all three sessions.
- ❖ Students have shown a significant increase in their ability to identify anatomical structures on ultrasound images after a brief education session.
- ❖ The students found the sessions helped increase their understanding of ultrasound procedure and helped improve their anatomical identification skills.
- ❖ The students found the ultrasound sessions helped prepare them for their anatomy examination and benefitted long term retention of anatomy.
- ❖ Most students agree or strongly agree that ultrasound training is both relevant to their level of training, well correlated with the Gross Anatomy class, and should be incorporated into the M1 curriculum.

CONCLUSIONS & NEXT STEPS

- ❖ Brief ultrasound sessions that correlate with the Gross Anatomy curriculum are highly effective in increasing first–year medical students' knowledge of basic ultrasound imaging and interpretation of anatomically relevant ultrasound images.
- ❖ First-year medical students feel that ultrasound is relevant to their medical training and helped with long term retention of knowledge and preparation for anatomy examinations.
- ❖ First-year medical students would like to have ultrasound integrated into their Gross Anatomy curriculum.

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