

ULTRASOUND

LECTURE SERIES

3D Ultrasound: General

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Objectives

By the end of the presentation, the viewer will be able to discuss:

- Principles of 3D image acquisition and processing.
- 3D imaging modalities.
- Advantages of 3D ultrasound.
- Postprocessing tools.
- 3D artifacts.
- Future of 3D imaging.

Topics

1. Principles of 3D image acquisition and processing
2. Imaging modalities
 - Multiplanar view
 - Surface-rendering mode
 - Other imaging modes in 3D eg, Power Doppler, etc
3. 3D vs 2D ultrasound: comparison of accuracy (brief review of pertinent literature)
4. 3D Ultrasound application
 - Anomaly evaluation
 - Fetal growth
 - Others
5. Normal 3D imaging
 - Cranium
 - Face
 - Skeleton
 - Chest and abdomen
 - Extremities
6. First-trimester fetus using 3D
7. 3D imaging of some common defects:
 - Face
 - Cranium
 - Chest and abdomen
 - Spine
 - Skeleton
 - Extremities

Review Questions

1. When acquiring a 3D volume, the following procedure will optimize the quality of the volume:
 - A. Optimize the 2D ultrasound image as the first step.
 - B. Ensure the smallest region of interest box that provides the anatomic information for the target organ.
 - C. Ensure the largest angle of acquisition that provides the anatomic information for the target organ.
 - D. A and B.
 - E. A, B, and C.
2. Which of the following statements is correct?
 - A. The reference point and the rotational point within a volume are two distinct points.
 - B. Any location within a 3D volume can be mapped to the X and Y axis only.
 - C. The reference plane is depicted in plane A in the multiplanar display.
 - D. The multiplanar display is a display of the surface anatomy of a volume.
3. Advantages of 3D ultrasound include:
 - A. Review planes unobtainable by 2D ultrasound.
 - B. Rotate volumes to view all sides.
 - C. Review topographic anatomy of an anatomic organ.
 - D. Highlight elements within a volume.
 - E. All of the above.
4. The angle of acquisition of a volume can be seen in:
 - A. Plane A of a multiplanar display.
 - B. Plane B of a multiplanar display.
 - C. Plane C of a multiplanar display.
 - D. The surface mode.
5. Artifacts in 3D ultrasound include:
 - A. Motion artifact.
 - B. Surface-rendering artifact.
 - C. Shadowing artifact.
 - D. Slicing artifact.
 - E. All of the above.