Introduction: Besides the appreciation of loss-of-resistance to either saline or air, the key factor to success of labor epidurals is the proper orientation of the epidural needle. Epidural placement can be challenging in the obstetric patient due to exaggerated lumbar lordosis and increased body weight, which can obscure landmarks. Epidural placement can be particularly difficult in patients with scoliosis given the rotational component associated with spine curvature. The concepts of needle direction in these situations can be difficult to teach. Demonstration using osseous or plastic spine models can be helpful but not always practical at the bedside. Two–dimensional (2D) images of the spine lack depth perception and cannot be used to demonstrate needle trajectory. Use of 3D animation has been used to teach regional anesthesia techniques (1), but no study has evaluated the utility of 3D visualization for teaching epidural techniques in the obstetric population.

Methods: A Viking 3D surgical field camera was utilized to obtain close-up 3D images on a spine model depicting the most common reasons for obstetric epidural failure. The 2-channel video recordings were integrated into 3D video images using free web software. These videos can be projected on a 3D screen and viewed with color notching Inflitec eyewear. In addition, integrated 3D videos were created that can be viewed on conventional iphone, ipad and PC-compatible computers using paper 3D glasses. Short 3D video clips of the following scenarios on a spine model were recorded: normal epidural needle placement, normal CSE needle placement, unilateral catheter migration through intervertebral foramina, failed CSE, and epidural placement in lordotic and scoliotic spines. A short 6-question survey presented to a group of anesthesia trainees before and after viewing the 3D videos of epidural needle direction in the above scenarios.

Results: All anesthesia trainees tested found the 3D format easy to use and 92% of trainees felt that the 3D videos improved their understanding of labor epidurals. The average score on the 6-question survey improved from 52% before watching the videos to 85% following the videos. The greatest improvement was seen in trainees in their first year of anesthesia training with minimal epidural experiences, with an average of 42% improvement.

Discussion: 3D visualization allows greater appreciation of the trajectory of the epidural needle in a spine model. Needle orientation can be demonstrated for straightforward epidurals as well as replicated common failures in obstetric epidurals. This 3D technology enhances depth perception of the vertebral anatomy. The advantage of this technology is that the videos can be viewed on the web, on ipad, iphone, smartphones and other PC compatible devices, making it a portable educational tool that can be utilized in daily teaching with the aid of inexpensive, paper 3D glasses.