Scoliosis is a pathological curvature of the spine which typically develops during adolescence. Quantification using ultrasound accessible landmarks is safer and less expensive than X-ray, although clinicians and patients would benefit from comprehendible visualizations of the spine, not provided by landmarks alone. We created a method for visualizing scoliotic spines by computationally deforming an average healthy spine model to the patient’s transverse processes, which are accessible in ultrasound. This method results in qualitatively accurate 3D visualizations of scoliotic spines when compared to ground truth CT. These visualizations may be used by clinicians to intuitively visualize the patient’s scoliosis.