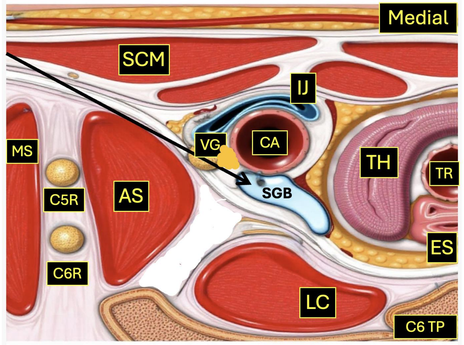
Image-guided Combined Ultrasound and Fluoroscopy Technique for Stellate Ganglion Block

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Introduction

Historically, described in the 1920s, SGB blocks have been performed blindly by palpating the C6 transverse process or Chassaignac tubercle and injecting local anesthetic at the junction of the transverse process and vertebral body medially. While effective, this method carried a significant risk of complications, such as inadvertent vascular or neural injury and pneumothorax. Fluoroscopy improved safety by visualizing bony landmarks, while ultrasound provided real-time imaging of soft tissues and vascular structures.

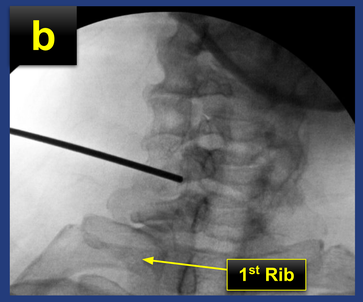


Rationale

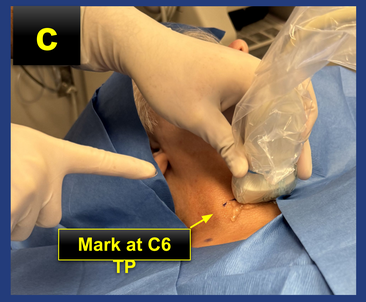
Stellate ganglion block poses significant technical challenges due to its complex anatomical location highlighted by the review of 260 SGB-related complications by Goel et al., where 26.9% and 24.6% of cases were with fluoroscopy and ultrasound, respectively. While cadaveric study shows that ultrasound-guided injections achieved better tissue staining than fluoroscopic guidance, fluoroscopy can visualize deeper bony landmarks and allow contrast visualization. The two imaging modalities, when combined, can complement their strengths and limitations.



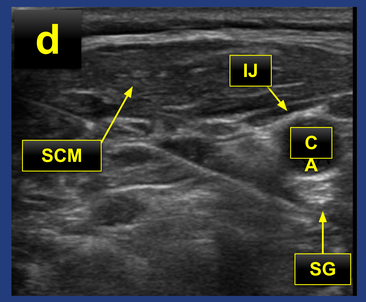
The patient's head was slightly rotated toward the contralateral side. A fluoroscopic beam was positioned using an anterior-posterior approach



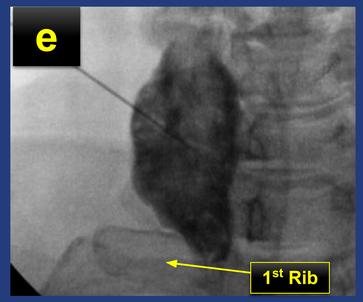
The skin over the C6 transverse process was identified and marked



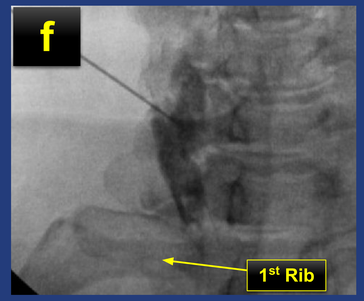
The C6 transverse process may also be identified using ultrasound guidance. A linear ultrasound probe with a 15 MHz imaging frequency, enclosed in a sterile sleeve, was aligned along the marked line



Using ultrasound guidance, the needle was advanced in-plane toward the anterior border of the longus colli muscle, located deep to the carotid artery



Afterwards, live, real-time fluoroscopy was utilized to evaluate the contrast spread pattern in the C7-T1 region



If appropriate contrast pattern and no vascular uptake, 5 cc of 0.25% bupivacaine was administered slowly and a washout image was obtained midway through the injection

Discussion

Stellate ganglion blocks (SGBs) have been performed at the C6 level in the context of minimizing risk of inadvertent vascular or neural injury and pneumothorax. Fluoroscopy improved safety by visualizing bony landmarks, while ultrasound provided real-time imaging of soft tissues and vascular structures. However, each modality has limitations: Fluoroscopy cannot visualize soft tissues, and ultrasound struggles with bony landmarks. A dual-modality approach combining ultrasound and fluoroscopy leverages their strengths, improving safety, accuracy, and efficacy.

Reference

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- Hughey S, Schafer J, Cole J, Booth G, Tuttle R, Stedje-Larsen E. Ultrasound Versus Fluoroscopy for Stellate Ganglion Block: A Cadaveric Study. Pain Med. 2021;22(10):2307

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