

Perk Tutor Improves Ultrasound-Guided Facet Joint Injection Training

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BACKGROUND: Facet joint injections are a common procedure used to treat and diagnose facet joint syndrome, which is a causal factor in chronic lower back pain. Due to the importance of accurate needle placement within the joint, these injections are performed using image guidance. Ultrasound (US) is a safe image guidance modality that is often preferred over other modalities due to its reduction in procedure time and radiation exposure. US-guided needle insertions, however, are difficult because they demand simultaneous mastery of sonography and needle placement. These facts motivate the development of computer-assisted teaching methods that provide trainees with the necessary skills for accurate and efficacious US-guided facet joint injections.

OBJECTIVES: This study aims to assess whether students trained with computer-assisted simulation can perform US-guided facet joint injections with a higher degree of accuracy than those trained using traditional methods.

METHODS: The Perk Tutor is a customizable computer-assisted open source software platform developed earlier for supporting training of image-guided interventions [1]. The Perk Tutor was configured to provide augmented reality assistance in the training of US-guided needle insertion in the lumbar spine region. In this pilot study with 28 students, we evaluated the effect of Perk Tutor training on US-guided facet joint injection. Students were randomly placed into a Control group and a Perk Tutor group, each having 14 subjects. The Control group underwent the traditional training using only US imaging, while the Perk Tutor group was trained using US and Perk Tutor together. Each student performed four test insertions immediately after their training session was complete, with neither group having access to the Perk Tutor during testing. During these insertions, the motion of the US probe and needle were tracked and recorded for analysis.

RESULTS: The Perk Tutor group had a mean success rate of 64.3%, while the Control group had a mean success rate of 35.7% ($p = 0.005$).

CONCLUSION: This pilot study suggests that training with the Perk Tutor system improves the accuracy of needle placement for students learning to perform US-guided facet joint injections.

[1] Ungi T, Sargent D, Moulton E, Lasso A, Pinter C, McGraw R, Fichtinger G. Perk Tutor: An open-source training platform for ultrasound-guided needle insertions. *IEEE Trans Biomed Eng.* 2012 Sep 17. [Epub ahead of print]

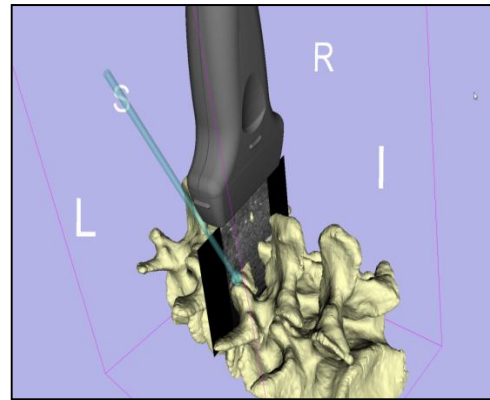


Fig. 1: Photo of the Perk Tutor display

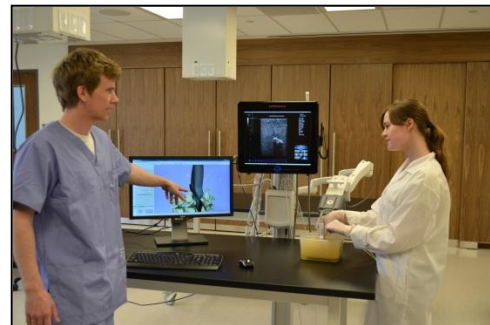


Fig. 2: Trainee instructed during Perk Tutor training on how to perform US-guided facet joint injection in phantom