Perk Station image overlay improves training of facet joint injections

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Introduction

- The purpose of our study was to determine if medical trainees would benefit from augmented reality image overlay and laser guidance in learning how to set the correct orientation of a needle for simulated percutaneous facet joint injection.
- Augmented reality techniques allow the operator to maintain eye contact with the insertion site throughout the procedure.
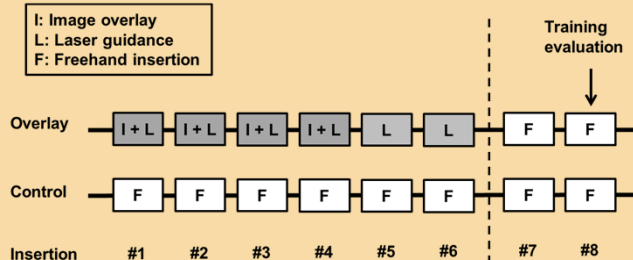
Methods

Hardware
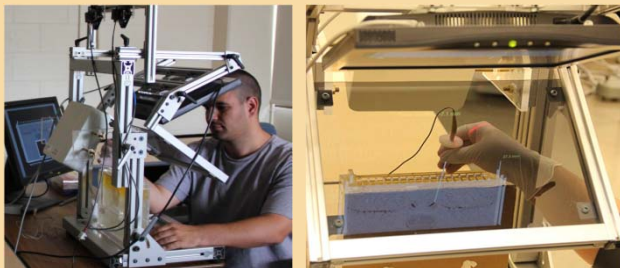
- Experiments were carried out using the PerkStation hardware and software system. The needle was tracked by an NDI Aurora (NDI, Waterloo, ON, Canada) electromagnetic measurement system, and its trajectory was recorded for off-line analysis.

Experiment Protocol

- A total of 40 participants were randomized into two groups of 20:
- The **Overlay** group received a training session with image and laser overlay;
- The **Control** group was trained by freehand insertions. Finally, two freehand insertions were used to evaluate the performance in each group.

Software
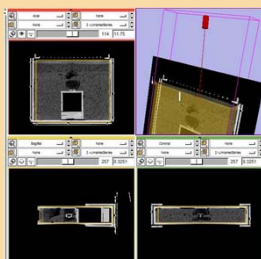
- The software to evaluate recorded procedures was implemented as an interactive module for 3D Slicer.
- The evaluator module measures potential tissue damage as the surface inside the phantom touched by the needle as an ideal line.
- The procedure can be replayed by models wile the CT of the phantom is also shown.

Results
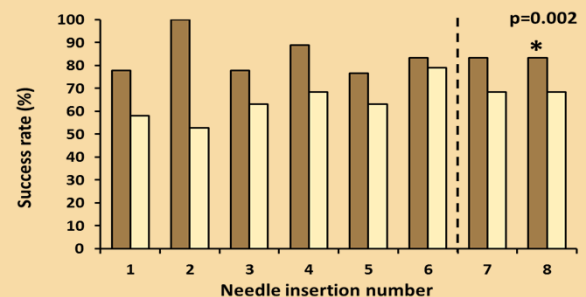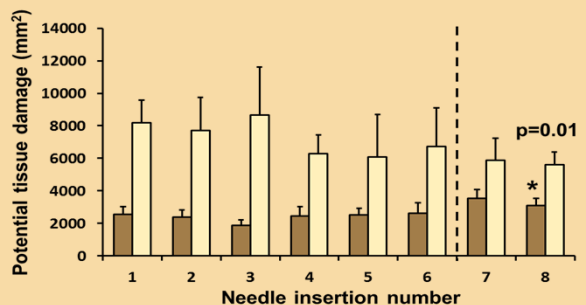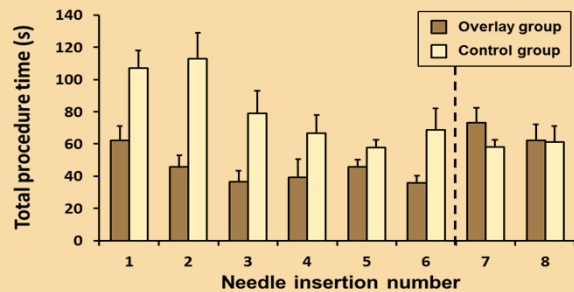
- Total procedure time converged to 62 seconds in both groups.
- Potential tissue damage was lower in the Overlay group for all insertions. It remained significantly lower when the group performed the freehand insertion.
- Success rate was higher in the Overlay group, which had received additional guidance for the first 6 insertions, and remained higher during the freehand insertions.

Conclusions

- Augmented reality image and laser overlay improves the training process of percutaneous facet joint injections.
- Participants trained with overlay guidance performed better even when required to do freehand insertions.

References

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2. Yeo CT, Ungi T, U-Thainual P, Lasso A, McGraw RC, Fichtinger G. The effect of augmented reality training on percutaneous needle placement in spinal facet joint injections. IEEE Trans Biomed Eng. 2011 Jul;58(7):2031-7.