COMPUTER-ASSISTED INSTRUMENT GUIDANCE: ENHANCED PROCEDURAL EFFICACY AND SAFETY

Type:
Abstract

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Introduction/Hypothesis:
The Clear Guide ONE (Clear Guide Medical, Baltimore, MD) is a Computer-Assisted Instrument Guidance (CAIG) device, which optically tracks a procedure needle and calculates a "projected" path, which is displayed on a screen for live guidance. We hypothesize that CAIG will enhance the efficacy and decrease the risk of complication for ultrasound-guided procedures, especially for less-experienced operators.

Methods:
Fifteen surgery residents performed simulated central venous cannulations on a training mannequin. The first attempt was performed with standard ultrasound guidance (SUG); the second attempt was performed with CAIG. Puncture time (PT), number of skin punctures (#SP), and number of needle passes (#NP) were recorded for all attempts. PT was defined as time from skin puncture until visible venous return. Participants were encouraged to minimize procedure time and number of attempts, but were blinded to the purpose of the study and were unaware that their performance was being recorded.

Results:
Relative to SUG, CAIG significantly decreased procedure duration and the number of attempts required. CAIG decreased mean PT by 27.3 seconds (79% decrease, p=0.007), #SP by 0.7 (42%, p=0.03), and #NP by 2.4 (64%, p=0.001). Greatest improvement was observed in novice ultrasound operators. Six of the 15 participants had previously performed 10 or fewer SUG procedures; for these users, CAIG decreased mean PT by 45.3 seconds (86%, p=0.03), #SP by 1.3 (57%, p=0.04), and #NP by 3.8 (70%, p=0.01).

Conclusions:
These results suggest that supplementation of ultrasound-guidance with CAIG enhances procedural efficacy and decreases risk of damage to adjacent tissue. The benefits of CAIG, especially for novice ultrasound operators, reflect its potential value as a clinical and educational tool. We will next perform
randomized controlled trials to examine whether the addition of CAIG to ultrasound-guided internal jugular central venous catheterizations and fine needle aspiration (FNA) biopsies improves procedural efficacy and/or decreases the rate of complications.

**General Classification:**
Clinical Research

**Patient Type:**
Adult

**Category:**
Surgery/Trauma/Burns

**Category Alternate 1 (optional):**
Education

**Category Alternate 2 (optional):**
Quality and Safety

**Keywords:**
imaging
procedures
surgery