Accuracy of Ultrasound-Guided Biopsy Techniques are Quantified

Accuracy of Sonographically Guided Biopsy Using a Freehand Versus Needle-Guided Technique - Computed Tomographic Correlation Study

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Summary and Methods

The authors presented a correlation study using Computed Tomography (CT) that compared the differences between using a freehand and needle-guided ultrasound biopsy technique. The purpose was to assess the accuracy of the needle position in relation to the target and to quantitatively characterize the time required to insert a needle to the target and the number of needle passes required to reach the target using each technique.

Using gelatin-based convex ultrasound phantoms with olives implanted as targets, three radiologists and one radiology trainee performed four consecutive biopsy simulations; two using freehand and two using a needle guide approach. Simulated needle injection of anesthesia was performed to access the location of needle track in relation to anesthesia. Next, the biopsy was simulated 4 times and the time required for needle insertion was documented. Transferring the phantom to a CT scanner, the distance between the needle path, anesthesia and needle path and target were measured. A total of 128 successful passes were submitted for statistical analysis.

Discussion and Results

Using the needle guided technique, the mean number of passes required to reach the target was one. Using the freehand technique, the mean number of passes required to reach the target varied between the four physicians. The least experienced using this technique had a mean of 1.6 attempts with a maximum of 3 before accurate placement was achieved. Overall, the time difference required to perform the simulated procedure was statistically significant with a mean of 16.9 seconds using the freehand technique versus 5.3 seconds when using the needle guide.

Conclusions

Performing a successful ultrasound-guided biopsy requires development of specific skills and proper technique. The movement of organs due to breathing, deep target locations, inadequate needle visualization and patient inability to remain in a position for extended periods of time make performing a biopsy challenging.

The study’s findings suggest the use of an in-plane, fixed angle needle guide:
- improved needle visualization during real-time needle placement
- reduced the time required to perform the biopsy and the number of passes
- produced less needle punctures which could be related to a decrease in bleeding complications.