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# Percutaneous computed tomography-guided lung biopsies: preliminary results using an augmented reality navigation system

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ABSTRACT

**Aims and background.** "Augmented reality" is a technique to create a composite view by augmenting the real intervention field, visualized by the doctor, with additional information coming from a virtual volume generated using computed tomography (CT), magnetic resonance or ultrasound images previously acquired from the same patient. In the present study we verified the accuracy and validated the clinical use of an augmented reality navigation system produced to perform percutaneous CT-guided lung biopsies.

**Methods.** One hundred and eighty consecutive patients with solitary parenchymal lung lesions, enrolled using a nonrandom enrollment system, underwent percutaneous CT-guided aspiration and core biopsy using a traditional technique (group C, 90 patients) and navigation system assistance (group S, 90 patients). For each patient we recorded the largest lesion diameter, procedure time, overall number of CT scans, radiation dose, and complications. The entire experimental project was evaluated and approved by the local institutional review board (ethics committee).

**Results.** Each procedure was concluded successfully and a pathological diagnosis was reached in 96% of cases in group S and 90% of cases in group C. Procedure time, overall number of CT scans and incident x-ray radiation dose (CTDIvol) were significantly reduced in navigation system-assisted procedures ($P$ <0.001; z = 5.64) compared with traditional CT-guided procedures. The percentage of procedural complications was 14% in group S and 17% in group C.

**Conclusion.** The augmented reality navigation system used in this study was a highly safe, technically reliable and effective support tool in percutaneous CT-guided lung biopsy, allowing to shorten the procedure time and reduce the incident x-ray radiation dose to patients and the rate of insufficient specimens. Furthermore, it has the potential to increase the number of procedures executed in the allocated time without increasing the number of complications.

***Key words:*** percutaneous CT-guided lung biopsy, augmented reality navigation system, solitary lung nodule, lung neoplasms.

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