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First Experience with iGuide Navigational Software Application for Bone Biopsies in Pediatric Interventional Radiology

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Purpose or Case Report: syngo iGuide (Siemens Healthcare AG, Forchheim Germany) is a novel navigational software used for needle guidance whereby a path is defined on an intraprocedural C-arm computed tomography (CT) image and the 3D path is transposed onto fluoroscopic images to guide the biopsy. iGuide allows the procedure to be performed in interventional radiology (IR) rather than the conventional CT suite. The purpose of this study is to review the radiation dose and procedure time for our initial experience using iGuide in comparison to CT-guided biopsies.

Methods & Materials: Twelve iGuide bone biopsies (five lumbar, five pelvic, two extremity) were performed in nine males and three females (mean age 9.77 years) and compared to anatomically matched CT-guided bone biopsies performed from 2008 to 2012 (19 pelvic, 24 extremity, 7 lumbar). Parameters compared were radiation dose mean and procedure time mean using z-scores. Effective doses for iGuide biopsies were estimated using the PCXMC program (v2.0.1.3, STUK, Helsinki, Finland) with an age-appropriate model and study-specific techniques including kVp and dose-area product. Effective doses for CT-guided biopsies were calculated using doselength products and age-appropriate k-factors.

Results: 11/12 (91.67%) iGuide procedures were diagnostic. Compared to the corresponding CT-guided cases, average iGuide procedure time was longer for pelvic cases but shorter for lumbar and extremity cases, all without statistical significance ($p > 0.05$). 5/5 iGuide pelvic biopsies had lower radiation doses (0.5, 0.9, 1.5, 4.6, 4.8 mSv) than the CT-guided cases with a mean of 5.39 mSv ($z = -1.00, -0.92, -0.87, -0.79, -0.16$). 5/5 iGuide lumbar biopsies also had lower radiation doses (0.7, 0.8, 2.9, 1.8, 10.5 mSv) than the CT-guided mean of 15.6 mSv ($z = -1.21, -1.20, -1.12, -1.03, -0.41$). 2/2 iGuide extremity cases had lower radiation doses (0.03, 0.05 mSv) than the CT-guided mean of 0.47 mSv ($z = -0.73, -.70$).

Conclusions: In our initial experience, iGuide technology in the IR suite provided high diagnostic accuracy, lower radiation dose, and no significant change to procedure time. Increased experience and optimized imaging protocols may further decrease procedure time and radiation dose.

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