3D Fusion of preprocedural MRI with intraprocedural C-arm CT for confirmation of bone biopsy location in pediatric interventional radiology

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Purpose

Preprocedural magnetic resonance images (MRI) are used to identify the target lesion for a bone biopsy procedure, but are not typically used in the interventional suite to guide the biopsy needle. Additionally, MRI has the advantage of being able to visualize lesions, such as bone marrow abnormalities with an intact cortex that cannot be readily seen with computed tomography (CT) or C-arm CT, the modalities commonly used for biopsies. Therefore we present a pilot study to evaluate the application of *syngo* iGuide needle guidance and *syngo* InSpace 3D/3D Fusion (Siemens Healthcare AG, Forchheim, Germany) using preprocedural MRI and intraprocedural C-arm CT for bone biopsies in the pediatric population.

Materials and Methods

iGuide needle guidance software was used to create a needle trajectory from the skin to the target on an intraprocedural C-arm CT acquisition. The path was then dynamically overlaid onto live fluoroscopic images for needle guidance. When the target was reached, a collimated C-arm CT was acquired and fused with the preprocedural MRI using 3D/3D Fusion to assess needle localization within the lesion. Seven iGuide bone biopsies in combination with 3D/3D fusion were reviewed in 6 males and 1 female, with a mean age of 10.5 years (range 3.3 – 14.9 years).

Results

Using iGuide and 3D/3D fusion, all 7 biopsies achieved technical success at lesion localization and provided diagnostic samples. All 7 lesions were visualized on preprocedural MRI. 4/7 lesions were not visible on C-arm CT and 3D/3D fusion of the MRI helped to confirm that the biopsy was lesional.

Conclusion

Our pilot experience with iGuide and 3D/3D fusion of preprocedural MRI acquisitions in the interventional radiology suite yielded diagnostic specimens in all cases and provided added confirmation of target localization especially of CT negative lesions. Future studies will investigate initial fusion of the preprocedural MRI acquisitions with the C-arm CT to plan needle trajectory.