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Inner Spaces

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Points

- Though routine CT is a good technique for guiding biopsies, drainages and ablations, its non-real-time nature can be a problem in difficult cases
- When fluoroscopy is married to CT, we get CT fluoroscopy (CTF), which allows real-time monitoring and guiding of needles
- CTF thus simplifies guided procedures and improves the technical success rate

CT Fluoroscopy

For many years now, CT-guided procedures have been common and popular. Biopsies, aspirations, ablations can and are routinely performed under CT guidance.

However, the use of CT is a bit cumbersome, because it is not a real-time technique. We scan, decide on the position, then mark on the skin, then scan, then put a needle in, then come back to the console, then scan again, and so an so forth. In difficult cases, where angulation is required in multiple planes, this non-real-time nature becomes a serious problem. This is so even for small lesions, which are less than 10mm in diameter.

Fluoroscopy has been around for as many years as x-rays and is used for real-time x-ray based procedures such as barium studies, all angiographies, etc.

When fluoroscopy is applied to a CT scan machine, we get CT fluoroscopy (CTF) and the ability to perform procedures in real-time. CTF gives us upto 10 frames / second and without having to move out of the gantry room, we can position the needle or electrode perfectly under real-time vision. Also, using a foot-pedal, all table movement can also be controlled from the gantry room itself. This obviously improves the accuracy of all biopsies. (Figs. 1, 2), drainages and ablations (Fig. 3).

The radiation does used during CTF is also minimal and this helps in reducing the radiation not only to the patient, but more importantly to the radiologist performing the procedure.

Specifically for difficult procedures such as tiny lung nodules (Fig. 1), small complications during the procedures (Fig. 2), ablation of tiny osteoid osteomas (Fig. 3), trans-pedicular vertebral biopsies, CTF increases the technical success rate significantly.

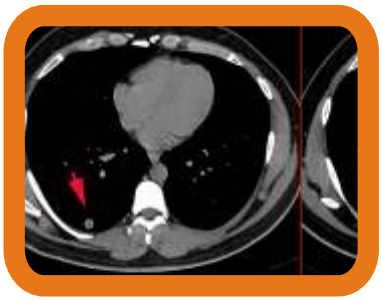

Fig. 1A

Fig. 1B

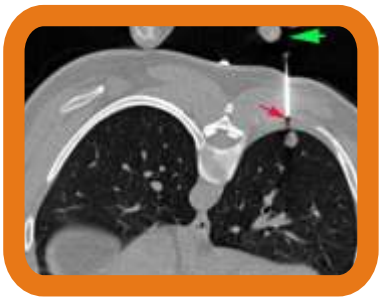

Fig. 1C

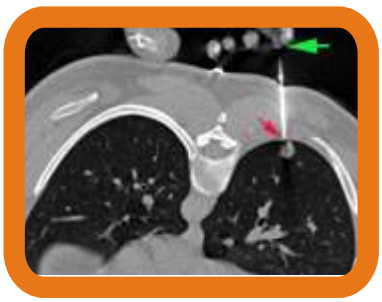

Fig. 1D

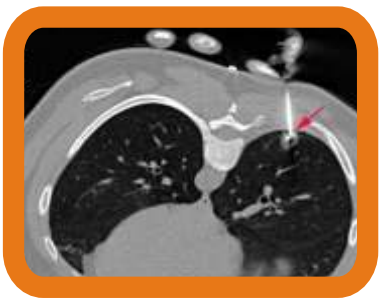

Fig. 1E

Fig. 1 (A-E). *Small right lower nodule. The CT (A) shows a tiny 8mm nodule in the superior segment of the right lower lobe (red arrow). The biopsy cannula is eccentrically positioned in the nodule using the standard technique (B). Using CTF (C), the needle is withdrawn a bit (red arrow), brought upto the pleura (D) and then plunged into the centre of the nodule (E). The red arrows in B-E show the needle tip, whereas the green arrows show the position of the radiologist's hands, as he is guiding the needle under CTF.*

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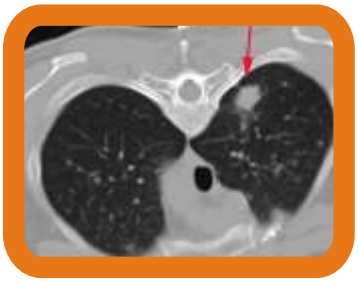

Fig. 2A

Fig. 2B

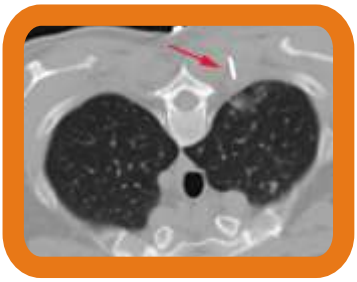

Fig. 2C

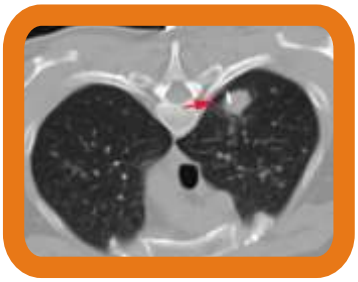

Fig. 2D

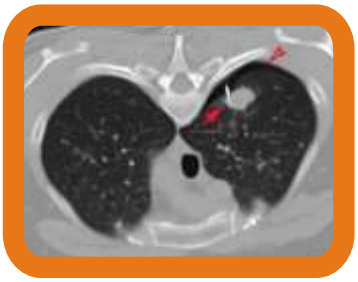

Fig. 2G

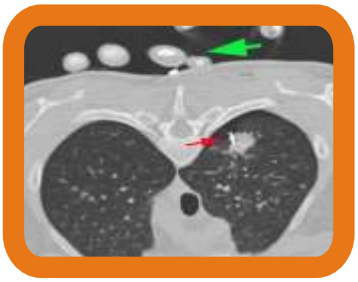

Fig. 2F

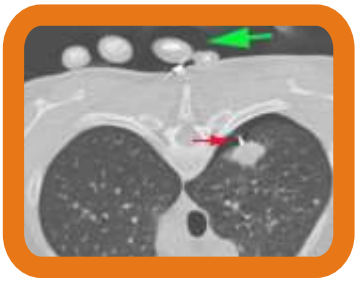

Fig. 2G

Fig. 2 (A-G): *Subpleural right upper lobe nodule. The CT (A) shows a subpleural nodule (A) lying underneath the rib. It was not possible to get a clear straight path to the nodule. By angulating the needle caudally (B-D), the needle was advanced into the nodule, but was again seen to be placed eccentrically (red arrow marks the tip in all images). Soon a small pneumothorax (red arrowhead) developed (E) and the needle tip (red arrow) seemed to be out of the nodule. Using CTF (F, G), the needle was withdrawn under vision and then re-positioned into the centre of the lesion (G). The green arrow in F & G marks the hands of the radiologist while guiding the needle under CTF.*

Fig. 3A

Fig. 3B

Fig. 3C

Fig. 3 (A-C): *This 17-years old boy had an osteoid osteoma (A) of the neck of the right femur (red arrowhead). Despite trying 3-4 times, the guiding cannula would slip medial to the osteoid osteoma onto a natural depression. Finally using CTF (A, B), the cannula was simply positioned into the osteoid osteoma (red arrow marks the tip). Note the position of the hands (green arrow). Subsequently, the electrode (yellow arrow) was introduced and a successful ablation was performed.*

Designed by

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