VIDEO 7

How I do it: Multiparametric MRI - Ultrasound fusion targeted biopsies using Varian brachtherapy software: A practical solution to deliver targeted biopsies and therapy

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Multiparametric MRI (mp-MRI) and Ultrasound (US) fusion targeted biopsies of MRI identified lesions are a developing area in prostate cancer diagnostics. However there is still a concern about how best to systematically biopsy the “normal” prostate. This video describes our technique for MRI-US fusion targeted biopsies using standard brachtherapy software Variseed 8.0.2 (Varian Medical Systems), available in most cancer centres. The only additional requirement is the “image – fusion” license option, purchasable from Varian Medical Systems. The system delivers targeted biopsies of the lesion and provides a method to systematically evaluate the MRI normal gland using transperineal sector mapping, providing an archived record of the study which can be used to plan targeted therapy.

Methods: MRI lesions identified on axial T2 and/or diffusion weighted images are marked for biopsy by as a Region of Interest (ROI). The MRI images are imported in to the Variseed software and both the identified lesion (ROI) and peripheral zone sectors are contoured separately. Live US images of the prostate are acquired from base to apex and fused with the contoured MRI images. After fusion the MRI contours are transferred onto the live ultrasound images and fine adjustments completed manually prior to the biopsy.

The ROI is targeted first, biopsied and the biopsy needle paths recorded on the software. Targeted peripheral zone sector biopsies are carried out using our localisation protocol and each biopsy path recorded within the software to create a final biopsy study, which is archived. The primary pathological outcome measure was detection rate of clinically significant prostate cancer. Clinically significant disease (CSD) was defined using maximum cancer core length (MCCL) ≥ 4mm and/or Gleason Grade (GG) ≥ 3+4 and correlated with the region of interest and the peripheral zone sector biopsies.

Results: 70 patients with a mean age 62 years (45-80), mean PSA 7.5 µg/L (1.2-34) and a mean prostate volume 47mls (14-120) underwent MRI-US fusion targeted biopsy. All patients had an identified lesion on MRI. 53 patients had no previous biopsy (primary), 11 were on active surveillance (AS) and a further 6 had previous negative transrectal or transperineal biopsies.

In the 53 primary cases CSD was detected in 32 (60%), of which 27 (84%) had CSD identified within the known lesion, but 12 (37%) also had CSD outside the known lesion and 5 had no cancer within the lesion but clinically insignificant disease elsewhere.

Of the 11 patients on AS, 9 had CSD within the identified lesion.

Discussion: The Varian brachtherapy software can be used to successfully carry out mp-MRI-US fusion targeted biopsies and is easily accessible in most cancer centres. If only the lesion is targeted for the purposes of focal therapy then some clinically significant disease will be missed, additional systematic biopsies are therefore necessary to select candidates for focal therapy. The combination of MRI – US Fusion Targeting with transperineal sector mapping biopsies could help stratify those patients suitable for focal therapy, hemi-gland therapy or who require definitive whole gland treatment.