

Assessing the Feasibility of Cone Beam CT Soft Tissue Matching to the Urethra during Prostate SBRT

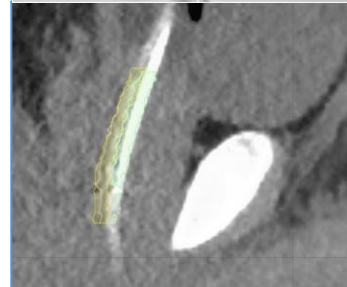
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Background and purpose : The Raypilot Hypocath (RH), a urinary catheter based device, allows for real time motion tracking of the prostate gland during hypofractionated prostate Stereotactic Body Radiotherapy (SBRT) treatment. It also allows for visualisation of the urethra on Cone Beam CT (CBCT) images, which is advantageous for supporting accurate patient setup and image matching. Highlighting the urethra as a dose limiting structure during linac based prostate SBRT is a new concept. The aim of this study was to test the feasibility of image matching CBCTs to the urethra by the Therapeutic Radiographer (TR).

Fig 1: The raypilot hypocath device



Fig 2: Image highlighting Infraction Urethra motion



Methods and Materials

All pre-treatment CBCT images of the first ten patients fitted with the hypocath device, treated as part of a local prostate SBRT clinical trial, were included in this study. Three experienced TRs independently analysed each CBCT dataset undertaking an initial soft tissue match, using 3 degrees of freedom, on the prostate gland, ensuring the gland was positioned within the PTV. Images were then shifted in the anterior, posterior direction to a 'best fit' match on the urethra. The resultant match was confirmed in sagittal, coronal and axial views. New match co-ordinates were recorded on a study spreadsheet. Suitability of the new match was recorded using the following scale; **1** not clinically acceptable, **2** need advice, **3** clinically acceptable. Any comments concerning the new match position were noted on the spreadsheet. Completed spreadsheets were then anonymised and handed back to the investigating TRs. Each TR received different results to verify. Matches were verified against the co-ordinates recorded on the spreadsheet, scored for suitability and comments added.

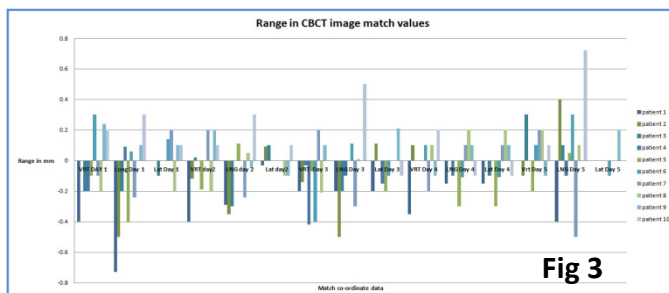


Fig 3

Results

Range in the variation between the match values are highlighted in figure 3, with clinical acceptance and comments received reported in table 1.

Conclusion

Our initial investigations demonstrate CBCT soft tissue matching to the urethra is feasible. The findings from this study are currently being used to develop a training package to educate RTTs in the clinical setting.

Results			
	RTT 1	RTT 2	RTT 3
Unacceptable	3	0	6
verify	1	0	10
Not Sure/ Need advice	8	7	7
verify	6	4	3
Clinically acceptable	39	43	37
verify	43	46	37

Table 1

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