

Skin dose of vulvar carcinoma treatment without tissue compensator on flattening filter free photon beams

O. Apinorasethkul, MS, CMD; N. Taunk, MD, MS

Department of Radiation Oncology, University of Pennsylvania, Philadelphia, PA

OBJECTIVE

To analyze the skin dose of vulvar carcinoma treatment without traditional bolus on a flattening filter free (FFF) photon treatment platform.

MATERIALS AND METHODS

VMAT plans for 2 patients were generated on Halcyon (Varian Medical Systems), 6 MV FFF with 1 cm leaf width, using the Eclipse TPS (v15.6). Treatment plans utilized between 3-4 full arcs with the collimator angles determined by the arc geometry tool. Planning target volume (PTV) of the vulvar area was drawn to the skin for clinical skin involvement (Figure 1). No bolus material was placed at time of simulation. Typical vulvar patients would have a CT scan with bolus over the vulvar area to ensure the bolus placement reproducibility at time of set up and treatment. Patients were supine in a frog-legged position. The daily dose was 1.8 Gy per fraction with a total dose of 50.4 Gy and a conedown to the vulvar volume of 7.2 Gy - 9 Gy. Three OSLDs were placed at 3 locations; left labia, right labia and mons pubis, to measure the dose on skin surface during a treatment.

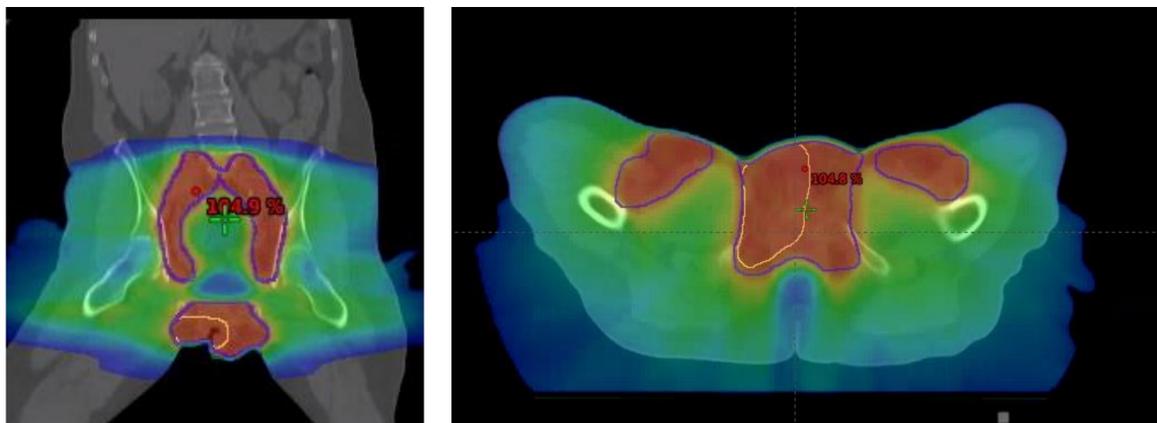


Figure 1: Initial PTV (blue) volume and conedown PTV (yellow) volume in coronal and axial view

CONCLUSIONS

Our result showed that without bolus, Halcyon plans were able to achieve adequate surface dose to the vulvar area. Because 6 MV FFF was used, it was one of the main contributions to the higher skin dose because of a lower build up region. Patients' comfort was improved with no bolus. The time spent during set up was generally less than the patients' with bolus, compared to prior experience. There was no dose uncertainty generated by the bolus air gaps. We believe that treating vulvar cancer patients on Halcyon without bolus positively impacts the skin dose when superficial dose is required.

OSLC location	OSLD reading (cGy)	% of rx
Left labia	191.68	106.5%
Right labia	193.47	107.5%
Mons Publis	203.55	113.1%

Table 1: OSLD readings of 3 different locations of Patient 1

OSLC location	OSLD reading (cGy)	% of rx
Left labia	179.66	99.8%
Right labia	172.31	95.7%
Mons Publis	188.01	104.5%

Table 2: OSLD readings of 3 different locations of Patient 2

RESULTS

Skin dose in the region of the superficial volume on Halcyon plan ranges from 95% to 113% of the prescription dose. Table 1 and Table 2 showed the OSLD readings of the 2 sample patients. Table 1 showed all 3 locations' average readings were all higher than the prescription dose - 106.5%, 107.4%, and 113.1%. Table 2 showed a diode readings on the mons pubis was the only location with higher dose than prescription dose, 104.5%. The other 2 locations were close to the prescription dose; 99.8% and 95.7%.



Figure 2: The 3 locations where OSLDs were placed on a patient

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