

INTRODUCTION

Intracavitary brachytherapy is a critical component of the therapeutic pathway for locally advanced cervical cancer. During the commissioning of intracavitary gynecological applicators, the accuracy of the source path modelled in the treatment planning system is validated. Systematic errors in the digitized source path may be possible through the following routes: uncertainties in source position during QA via autoradiography/fluoroscopy or error in the library model of the applicator itself.

AIM

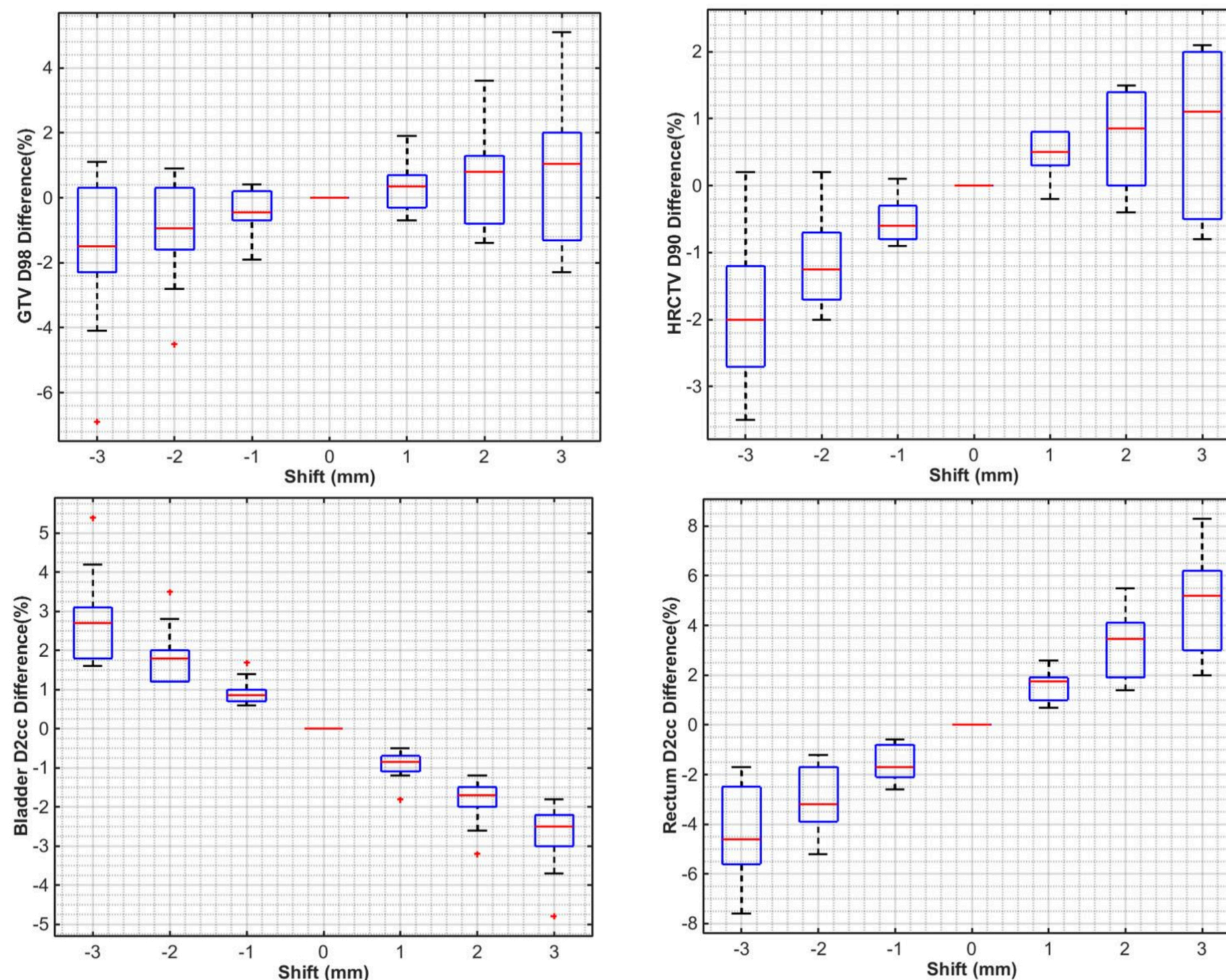
In this work, we have evaluated the dosimetric impact of systematic errors in ovoids source path for intracavitary cervical cancer treatment using the Venezia applicators (Elekta).

METHOD

Ten patient plans were retrospectively selected and anonymized. Systematic shifts (-3, -2, -1, 1, 2, and 3mm) in the ovoid paths along the length of the applicator path were applied and the plans were reevaluated in OncentraBrachy™ treatment planning system (Elekta). A percentage difference in clinically relevant dosimetric quantities for targets (GTV D98%, HRCTVD90%) and OARs (Bladder D2cc and Rectum D2cc) were reported between the shifted plans versus a reference plan with no offset. A p value < 0.05 was considered statistically significant in the paired T-test for the mean.

RESULTS

Figure 1. Variation of the percentage difference in GTV D98%, HRCTV D90%, Bladder D2cc and Rectum D2cc from the corresponding parameters in a reference plan for 10 patients as a function of source path shift inside the Venezia applicator ovoids. The positive shift means the source dwell positions are shifted along the source path distal to the connector end. The reference plan is the one with no shift.



RESULTS CONTD.

- HRCTVD90%, BladderD2cc and RectumD2cc but not the GTVD98% were significantly different from the reference plan for all the shifts studied.
- A trend of increase in GTVD98%, HRCTVD90% and RectumD2cc was found with increase in positive shift (i. e., when source positions were more distal from the connector end) whereas the trend was opposite for the BladderD2cc.
- The mean differences in (GTV D98%, HRCTVD90%, BladderD2cc, RectumD2cc) for the largest shifts of -3mm and 3mm were (1.6±2.5, -1.8±1.2, 2.8±1.2, -4.4±1.8%) and (0.8±2.4, 0.9±1.2, -2.8±0.9, 5.0±2.1%), respectively.

CONCLUSIONS

There is a significant difference in HRCTVD90%, BladderD2cc and RectumD2cc with the systematic error in the source path along the length inside the ovoids of Venezia applicator used for intracavitary cervical cancer brachytherapy except for GTVD98%.

CONTACT INFORMATION

Moti.paudel@sunnybrook.ca