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# 12-Month Outcomes and Toxicities of Dose-Escalated Template-Based High Dose Rate Interstitial Brachytherapy Boost via a Single Application for Locally Advanced Gynecologic Malignancies

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**Abstract**
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## Abstract

Purpose/Objective(s): Current guidelines from the American Brachytherapy Society (ABS) recommend increasing the achieved dose to the target to a $D_{90}$ goal >80Gy $EQD2_{10}$, with a goal as high as 85-95Gy for cervical cancer patients. However, achieving a $D_{90}$ goal of >80Gy $EQD2_{10}$ via a single template-based interstitial application is not possible with the fractionation schemes suggested by ABS. Our institution has used a dose-escalated regimen of 28Gy in 4 fractions via a single Syed application. This retrospective study reports disease control rates and toxicity of patients treated with this regimen.

Materials/Methods: In total, 46 patients were analyzed from 8/2019-3/2024 who met the following inclusion criteria: received (1) definitive-intent external beam radiotherapy (RT), (2) concurrent cisplatin-based chemotherapy, (3) High dose rate (HDR) Syed interstitial brachytherapy boost using 28Gy in 4 fractions (using twice-a-day treatments with ⩾6h between fractions), and (4) ⩾3 months of follow up. Patients who did not complete RT as prescribed and those who received re-irradiation were excluded. A retrospective review was conducted for late toxicities using Common Terminology Criteria for Adverse Events version 5.0. Disease outcomes with recurrence rates, recurrence location, and vital status were collected. A one-sample t-test was used to compare the sample to established control and toxicity rates in the literature.

Results: Median follow up was 13 months (range 3-50). Median age at diagnosis was 51 years (range 20-85). Most patients were treated for a cervical primary, followed by endometrial cancer recurrence, endometrial primary, and vaginal primary (78%, 10%, 9%, 2% respectively). 13% of patients initially presented as FIGO stage I, 7% stage II, 67% stage III, and 13% stage IV. Median cumulative $D_{90}$ was 87.06Gy $EQD2_{10}$ (range 79.96-105.71). Significant late toxicities include 4/46 (9%) G3 urinary incontinence, 2/46 (4%) G3 urethral stricture, 1/46 (2%) G3 GI bleeding, 1/46 (2%) G3 diarrhea. Crude vaginal stenosis rates were 21/46 (46%), with 8/46 (17%) being G3. Overall, 9/46 (20%) patients developed rectovaginal or vesicovaginal fistula. Of these patients, 8/46 (17%) were G3. After censoring for initial involvement of bladder/rectosigmoid, 5/46 (11%) of patients developed G3 fistula. No late G4-G5 toxicities were seen. In total, 16 patients (34.8%) developed recurrence (median 5 months; range 1-34) with the majority being distant failures (11/16, 69%). Four of the 5 patients deceased at the time of review died due to their malignancies. Median time from treatment completion to death was 7.5 months (range 6-38). Late toxicity, patterns of recurrence, and survival were similar to historically published outcomes (all p>0.05).

Conclusion: In this high-risk patient cohort, dose-escalated template-based HDR interstitial brachytherapy boost using 28Gy in 4 fractions via a single Syed application appears safe and tolerable with disease outcomes similar to historical data.