



Title: Does CT Image-Based Abbreviated HDR-BT regimens yield equivalent outcomes as MR-Based Brachytherapy? A Comparison of Institutional Cohorts



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BACKGROUND

Abbreviated high-dose rate brachytherapy (HDR-BT) regimens-delivering 3-5 fractions (#) in 1-3 applications over 7-12 days- instead of traditional 21-28 days reduce the overall treatment time(OTT) in cervical cancer¹. However, long-term clinical reports with this strategy are limited in literature, especially in the context of image-guided BT.

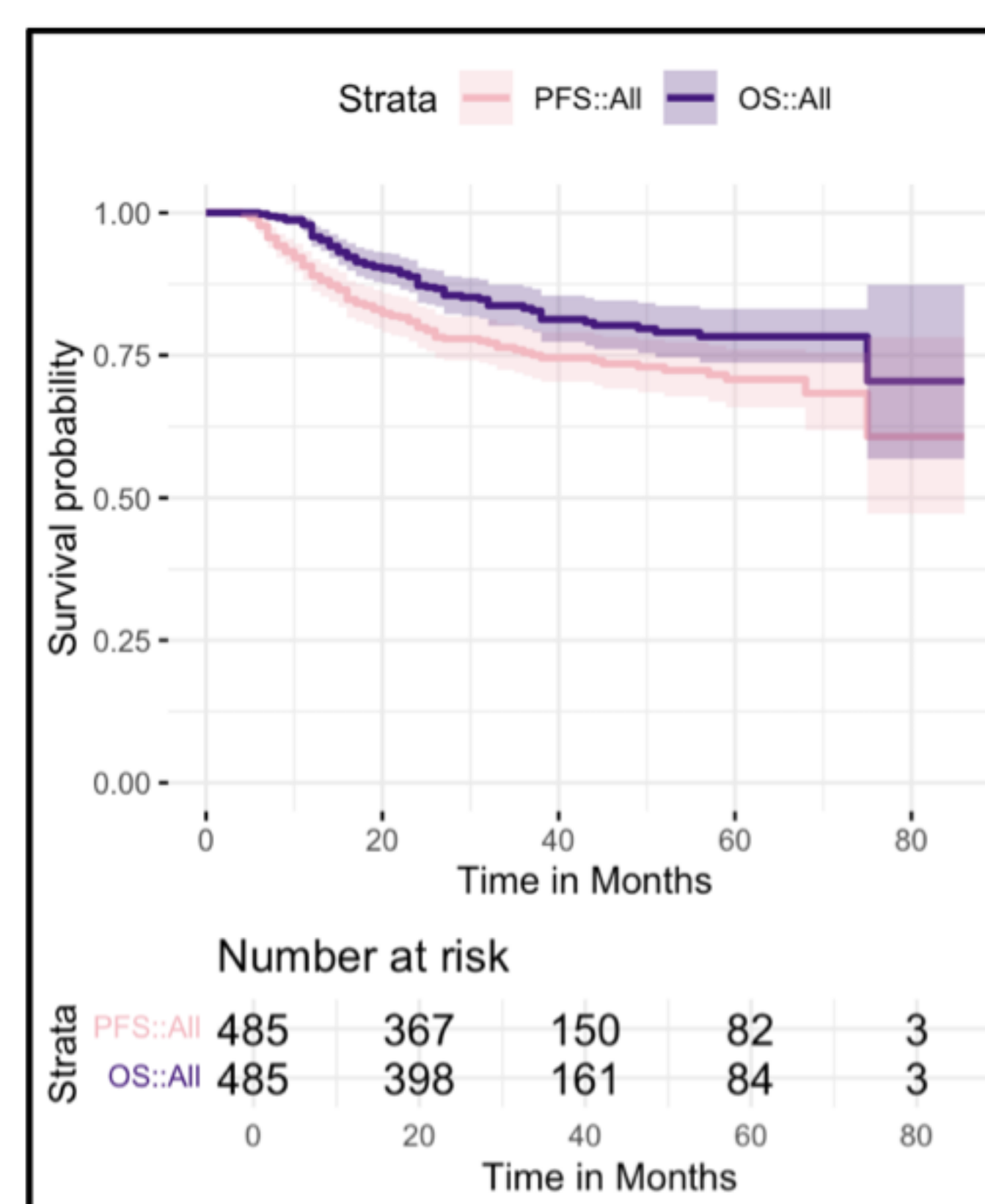
MATERIALS & METHODS

- **Design:** Retrospective observational study
- **Population:** Women with locally advanced cervical cancer (FIGO 2018- Stage IB3-IVA) treated with definitive external radiotherapy (RT)+/- chemotherapy followed by 3-5 fractions of CT/MRI-based abbreviated HDR-BT between 2016 and 2022
- **Exclusion:** single implant-single fraction treatment schedules, Post hysterectomy
- **BT dose fractionation:** 6-8Gy x 3-4#
- Planning goal adhered to standard International recommendations²
- **Primary endpoint:** 3-year estimate of local control (LC)
- **Secondary endpoints:** 3-year progression free survival (PFS; any recurrence &/or death from any cause), overall survival (OS), and late >= grade 3 gastrointestinal (GI) and genitourinary (GU) toxicities(CTCAE V5)

Descriptive characteristics (n=488)		
	Tumor-related	
Local stage	IB3-IIB	59.3%
	IIIB	37.7%
	IVA	3%
Nodal status	Negative	50%
	IIIC1	42.2%
	IIIC2	7.8%
Histology	SCC	87.5%
	Adeno	12.2%
	Treatment-related	
BT type	Intracavitary (IC)	64.4%
	Combined IC+ Interstitial	35.6%
BT Imaging	CT	40.9%
	MRI	59.3%
HRCTV volume	<30cc	44.6%
	>30cc	55.4%

RESULTS

- Median age: 53 years
- Median OTT: **50 days** (vs 63 days in the prespecified historical control)³
- Primary Endpoint: **3 year-Local control: 92.9%**
- Late ≥ Grade 3 GI & GU toxicity: **9.7% and 3.5%**.
- Poor EBRT responder: 55% [HRCTV >30cc]
- Median HRCTV D90: 89.4Gy; EQD2 for 2cc of bladder and rectum: 87.6Gy and 68.6Gy.



- Fig. 1 :**
- 3-year progression-free survival: 76% (95% CI: 71.8-80.1%)
 - 3-year Overall Survival: 83.7% (95% CI: 80.1-87.2%)

PREDICTORS OF OUTCOME

- **CT vs MR:** No significant difference was noted in 3-years local control (90.4% vs 94.5%; p=.1), PFS (71 vs 78%, p=.1).
- **Multivariable analysis:** **HRCTV Volume-** the most significant predictor of LC, PFS and OS.
- **OTT:** significantly impacted LC (p=0.02).
- No. of concurrent chemo cycles: strong predictor for PFS and OS (p=0.02, 0.01, respectively).
- Stage at diagnosis: influences PFS (p=0.008).
- In patients with poor EBRT response: MRI based planning and achieving an HRCTV D90 >85Gy significantly improved Local control (Fig. 2,3).

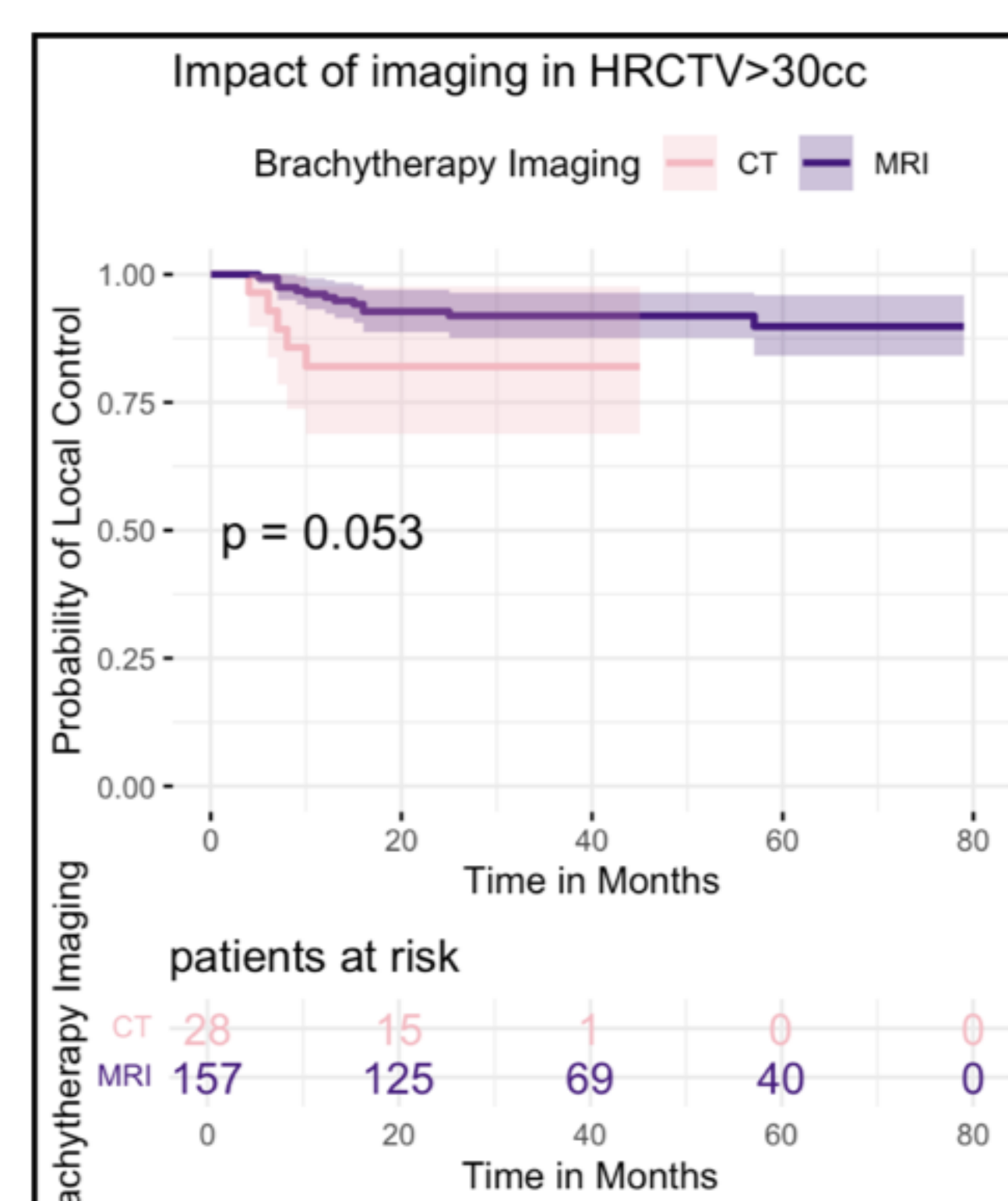


Fig. 2

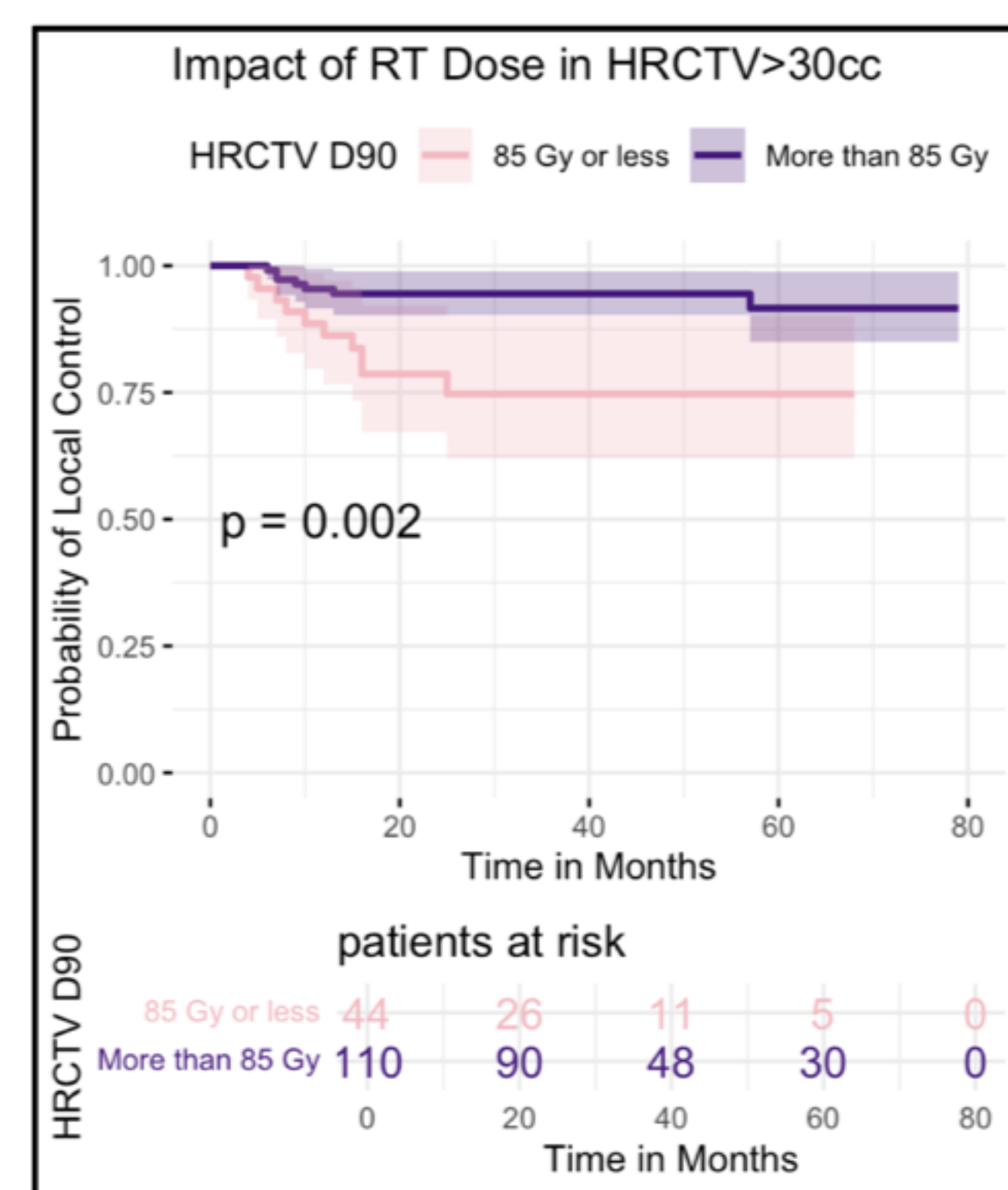
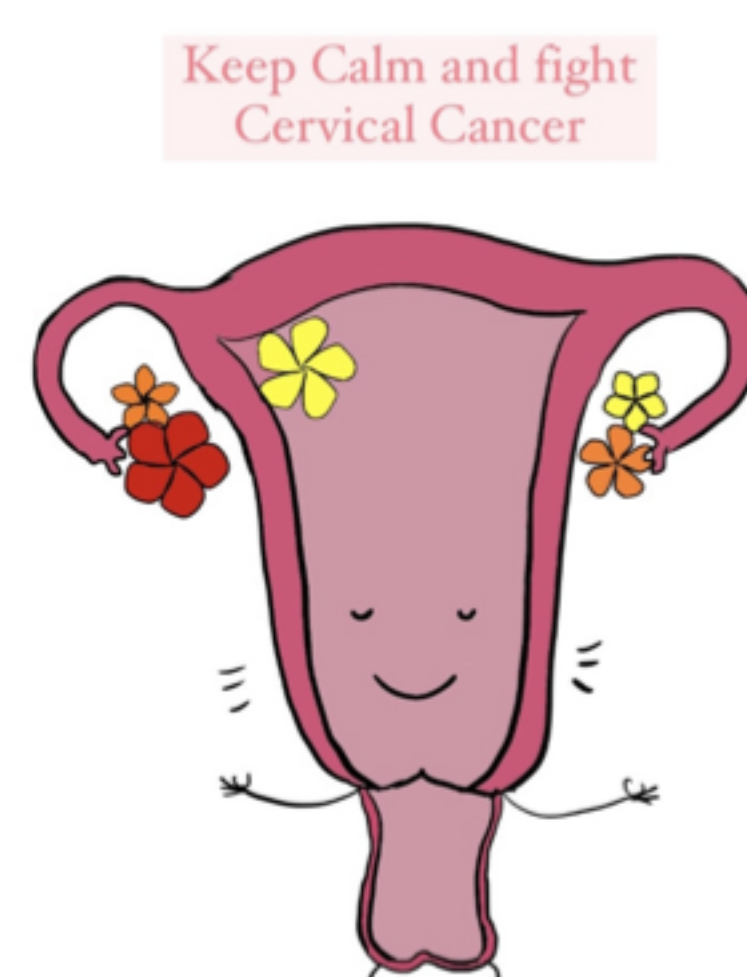


Fig. 3

CONCLUSIONS

- ✓ Abbreviated HDR-BT strategy of **4-5 fractions** delivered with **1-2-implants** reduces the OTT by almost 2 weeks and yields comparable outcomes with respect to traditional schedules delivered over 21-28 days.
- ✓ **MRI-based HDR-BT** improves local tumour control in patients with **poor response following EBRT** (defined by HRCTV vol >30cc) compared to CT based planning; hence may be considered in clinical practice.



1. Chopra S, et al: Early outcomes of abbreviated multi-fractionated brachytherapy schedule for cervix cancer during COVID-19 pandemic. Brachytherapy. 2023
 2. Pötter R, et al: EMBRACE Collaborative Group. MRI-guided adaptive brachytherapy in locally advanced cervical cancer (EMBRACE-I): a multicentre prospective cohort study. Lancet Oncol. 2021
 3. Mittal P, et al: Standard Chemoradiation and Conventional Brachytherapy for Locally Advanced Cervical Cancer: Is It Still Applicable in the Era of Magnetic Resonance-Based Brachytherapy? J Glob Oncol. 2018