Image Guided Adaptive Brachytherapy in Cervical Cancer. Implementation at Oxford University Hospitals (OUH) Foundation Trust

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Purpose

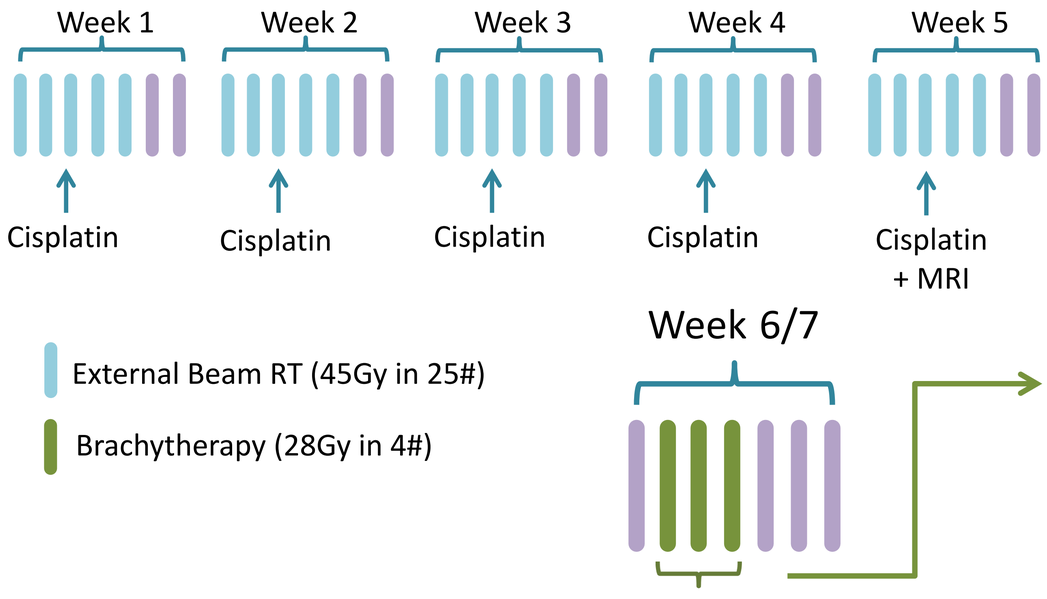
Data from RetroEMBRACE[1] and EMBRACE[2] studies have demonstrated that Image Guided Adaptive Brachytherapy (IGABT) with MRI to be the gold standard treatment in locally advanced cervical cancer. These studies also highlighted the importance of:

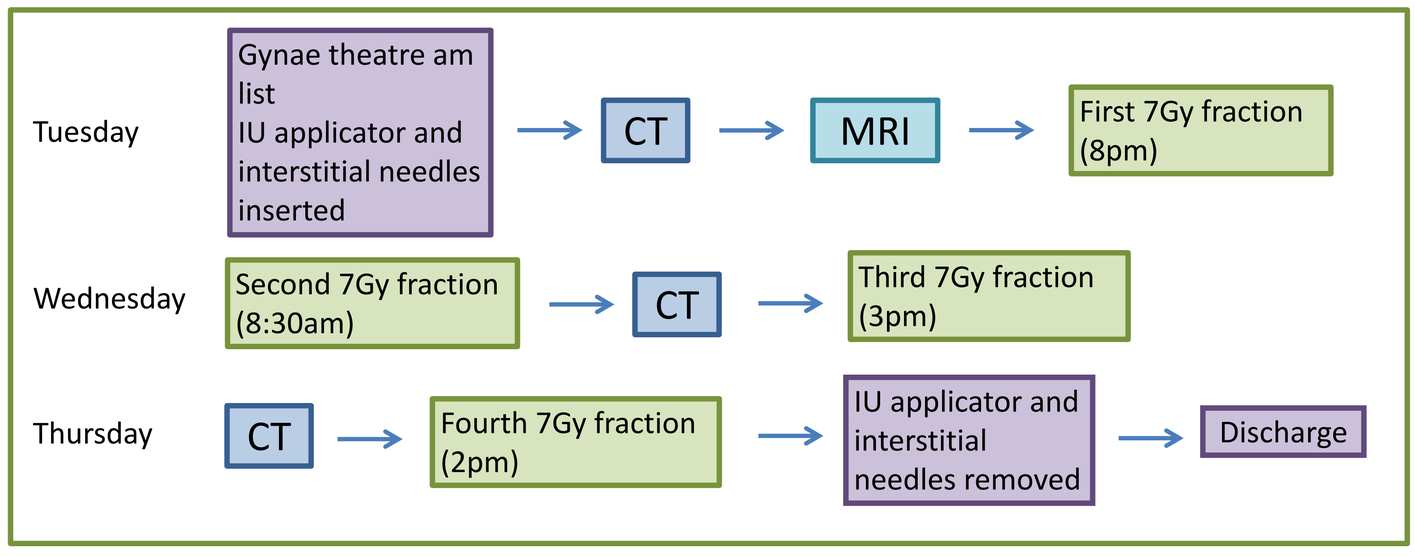
- Delivering a HRCTV D90 dose of >85Gy
- Using intracavity/interstitial brachytherapy to reduce OAR morbidity and reach HRCTV dose targets
- Limiting dose at 2cm³ to rectum <70Gy, sigmoid <75Gy and bladder <80Gy
- De-escalating vaginal dose to by reducing the loading of vaginal ring/ovoids
- Limiting OTT to ≤50 days

In this study we have evaluated our compliance to the above Gyn GEC-ESTRO recommendations between June 2016 and November 2019.

How IGABT is delivered at the OUH

When the brachytherapy service was first established patients were treated with two separate IU insertions, 1 week apart with 2 fractions per insertion. Since March 2018 the service is run with 1 IU insertion and all 4 fractions given over 3 days as shown below:



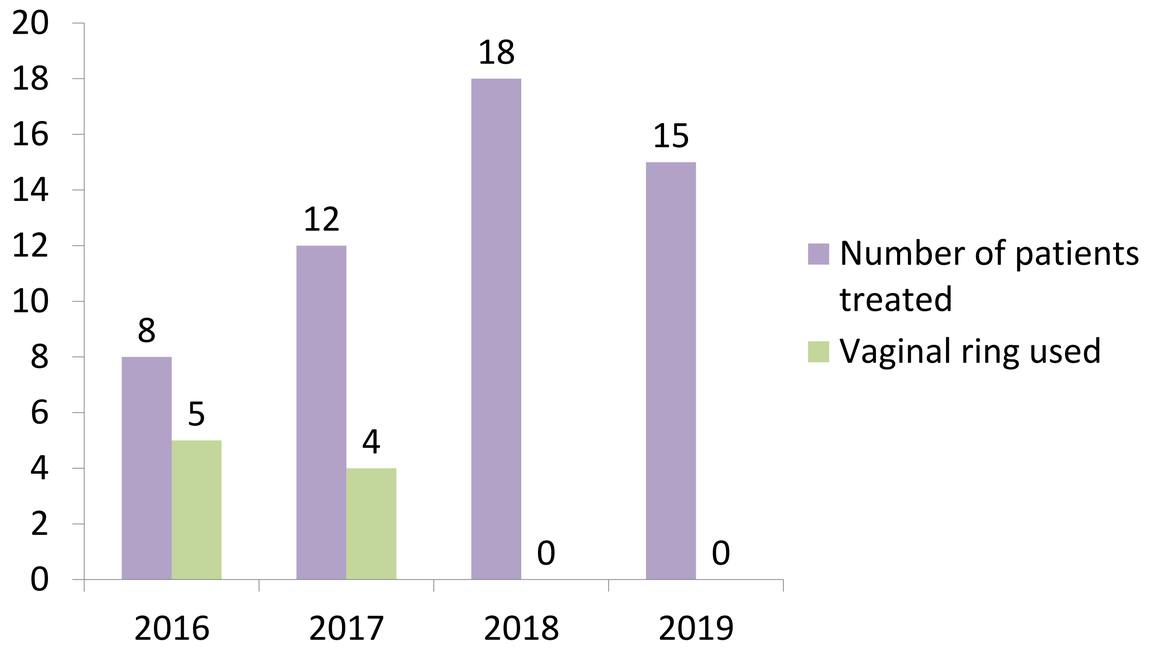


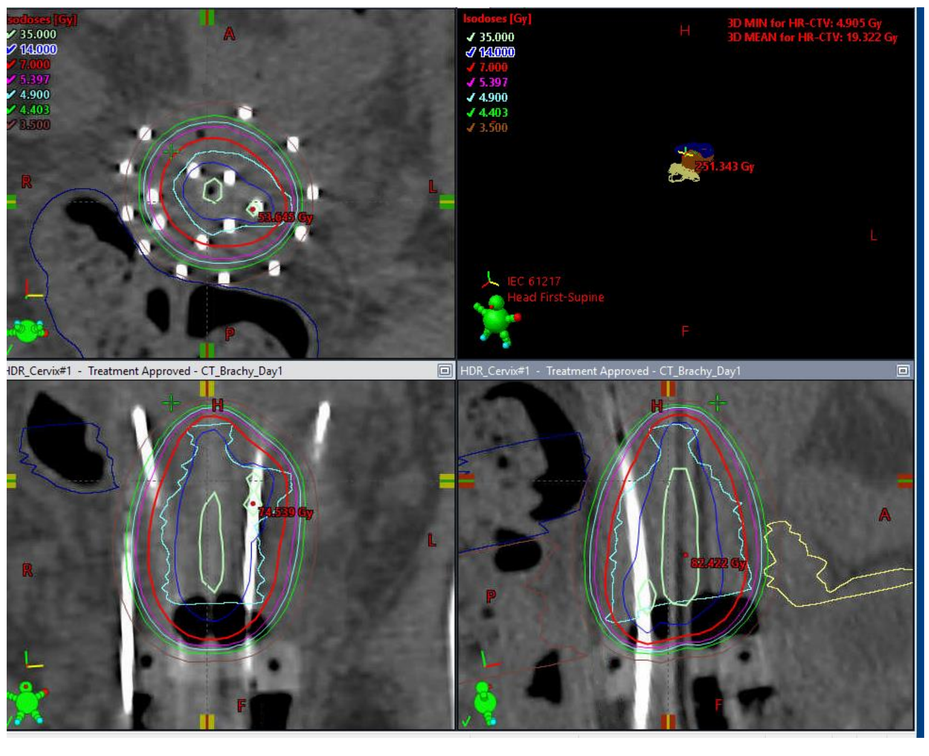
Results

53 women with locally advanced cervical cancer were treated with external beam radiotherapy and weekly cisplatin followed by IGABT from June 2016 to November 2019.

	Mean EQD2	Aim EQD2	Percentage achieved
HRCTV D90	88.74Gy (83-115.07)	>85Gy	96%
Bladder 2cm³	64.3Gy (47.74-79.55)	<80Gy	100%
Rectum 2cm³	54.6Gy (44.81-74.55)	<70Gy	98%
Sigmoid 2cm³	58.1Gy (43.88-74.80)	<75Gy	100%
OTT	42 days	<50 days	91%

Patients treated and use of the ring since June 2016





A cervical brachytherapy plan using interstitial needles

The use of interstitial needles

Mean number inserted	10 (2-21)
Mean number used	7 (0-17)

Conclusion

Since the implementation of the IGABT at OUH we have achieved the HRCTV D90 and OAR dose constraints recommended by the GEC-ESTRO group in over 96% of patients. As our confidence in using interstitial needles has grown we have stopped using the ring applicator, allowing us to de-escalate the vaginal dose and adapt each plan to cover the HRCTV and limit the dose to the OAR. We anticipate that this will reflect improved outcomes and reduced vaginal toxicity which will be reported at a later date. We will try to maintain an OTT to <50 days.

References

1. Sturdza A, Pötter R, Fokdal LU, Haie-Meder C, Tan LT, Mazeron R et al. Image guided brachytherapy in locally advanced cervical cancer: Improved pelvic control and survival in RetroEMBRACE, a multicenter cohort study. Radiother Oncol. 2016 Sep 30; 120(3): 428-33.
2. Pötter R, Tanderup K, Kirisits C, de Leeuw A, Kirchheiner K, Nout R et al. The EMBRACE II study: The outcome and prospect of two decades of evolution within the GEC-ESTRO GYN working group and the EMBRACE studies. Clin Transl Radiat Oncol. 2018 Jan 11; 9: 48-60