The Gulf Journal of Oncology

Indexed By PubMed and Medline Database

Issue 49, Sep. 2025
ISSN No. 2078-2101



The Official Journal of the Gulf Federation For Cancer Control

Table of Contents

Original Articles

Survival Outcomes of Penile Cancer Patients undergoing Primary Surgery: Experience from a Tertiary Cancer Care Centre in South India **07**
Ricky Koshy Benjamin, Sivaranjith J, Madhu Muralee, Aswin Kumar, Jagathnath Krishna K. M

Incidental Radiation Exposure to the Internal Mammary Lymph Nodes in Breast Cancer Patients Undergoing Intensity–Modulated Radiation Therapy: A Retrospective Analysis **16**
Vishwadeep Mishra, Shashank Shekhar, Sudeep Bisht, Rachita Chatterjee, Laxman Pandey, Archana Pandey

Safety and Outcome Analysis of Preoperative chemoradiation in Esophageal carcinoma **22**
Shuchita Pathak, Santhosh KD, Parikshith J, Rasmi Palassery, Vinayak V Maka

Impact of size of ovoids with Intra–cavitary Brachytherapy on dose to point A in patients with Cancer Cervix **28**
Dr. Tanvir Pasha, Dr. Nikhila Radhakrishna, Dr. Rekha Reddy Buchapudi, Dr. Saritha Sunny Pullan, Dr. Hamsini R S, Dr. Elna Jerod, Dr. Naveen Thimmaiah, Dr. Sridhar Poojar, Dr. Uday Krishna, Dr. Siddanna Rudrappa Palled, Dr. Thejaswini B, Dr. Lokesh Viswanath

De novo mutation of the RET proto–oncogene revealing multiple endocrine neoplasia type 2A: a sporadic case from Western Algeria **35**
Amina Chami, Pauline Romanet, Fatima Mohammedi, Nadia Benabadji, Narimane Habour, Dalia Derkaoui, Tewfik Sahraoui

Predictors of Recurrence and Long–Term Outcomes of Intracranial Meningiomas: A Retrospective Multicenter Study from Saudi Arabia **40**
Afnan Alkhotani, Rothaina Saeedi, Haneen Alomar, Fahad Alghamdi, Joudah Almaghrabi, Mohammed Binmahfoodh, Saleh Baeesa

Quality of Life (QoL) using EORTC QoL–C30 and BN20 among Patients who Underwent Brain Tumor Resection in a Tertiary Care Center in Saudi Arabia **53**
Rana H. Moshref, Leena H. Moshref, Fatemah A. Alhalawani, Masaheer A. Aljehani, Noor M. Shibriq, Wafa A. Saber, Ahlam B. Khojah, Rawan M. Alsayed, Razan Daghistani , Khalid M. Bajunaid, Mohammed A. Alyousef, Abdulrahman J. Sabbagh, Saleh S. Baeesa

Is there a Correlation between estrogen receptor expression level and early breast cancer survival? A Retrospective Study **65**
Ayman Rasmy, Ahmed Zeeneldin , Walid Abozeed, Saeed Al–Ghamdi and Shereef Elsamany

Efficacy and Safety of Paclitaxel Plus Ramucirumab as Second–Line Therapy in Advanced Gastric Cancer: A Retro–Prospective Single–Centre Study **75**
Varun Goel, Arpit Jain, Nivedita Patnaik, Dharmistha Basu, Shaifali Goel, Akanksha Jaju, Vineet Talwar, Shivendra Singh

Single Centre Experience of Treating Children with Cancer in the United Arab Emirates **80**
Mehnaz Aabideen, Arya Ashokan, Dr.Sagar Mohan Nivargi, Dr. Mohammed Ramzan, Dr. Deepthi Boddu, Dr. Fouzia Aboobacker, Abdullah Odat, Mohammed Taher, Dr. Rawia Mohamed, Dr. Rajasekhar Cingapagu, Prof. Dr. Humaid O. Al Shamsi, Dr. Zainul Aabideen

Review Articles:

Histopathological and Molecular Features of the Mammary Sclerosing Adenosis Lesions and Their association with breast carcinoma: Review of literature **85**
Rabab Ahmed Mohammed, Amina Ismaeel, Fayek Al Hilli

Conference Highlights/Scientific Contributions

- **News Notes** **93**
- **Advertisements** **96**
- **Scientific Activities** **97**

Original Article

Impact of size of ovoids with Intra–cavitary Brachytherapy on dose to point A in patients with Cancer Cervix

Dr. Tanvir Pasha, Dr. Nikhila Radhakrishna, Dr. Rekha Reddy Buchapudi, Dr. Saritha Sunny Pullan, Dr. Hamsini R S, Dr. Elna Jerod, Dr. Naveen Thimmaiah, Dr. Sridhar Poojar, Dr. Uday Krishna, Dr. Siddanna Rudrappa Palled, Dr. Thejaswini B, Dr. Lokesh Viswanath

Kidwai Memorial Institute of Oncology, Bengaluru, Karnataka 560029, INDIA

Abstract:

Background: Intracavitary Brachytherapy(ICBT) applications alone offer suboptimal coverage in some patients with medial parametrial(<2cms) residual disease after optimization. This retrospective study aims to identify the commonly accommodated size of ovoids in ICBT to identify the dose delivered to the parametrial disease and organs at risk (OARs).

Methods: Cancer cervix Patients treated with concurrent chemoradiotherapy and High Dose Rate(HDR) BT of 6–7 Gy in 3–4 fractions prescribed to point A were identified.. Dosimetric details were documented from BT plans.

Results: 219 ICBT applications were performed for 142 patients. 115 (52%) with semi–small (20mm), 69 (32%) small (25mm) and 35 (16%) medium (30mm) ovoids. Mean distance of 100% isodose curve obtained by above ovoids were 3.48 ± 0.53cm, 3.57 ± 0.45cm and 3.80 ± 0.44cm respectively ($p = 0.005$). Point A doses for respective ovoids were 5.40 ± 0.71 Gy, 5.59 ± 0.75 Gy and 5.79 ± 0.70 Gy ($p=0.016$) and Total Reference Air Kerma(TRAK) was 4137.35 ± 509.35, 4433.60 ± 554.80 and 4604.72 ± 381.45 mGy m^2 h^{-1} ($p < 0.001$). No significant impact was observed in the OAR doses.

Conclusion: Majority of our patients could accommodate semi–small ovoids. This compromises the distance covered by 100% isodose curve at the level of Point A and the dose to medial parametrial disease (<2cms) as well. Such patients may be receive higher dose within medial parametrium by use of Intracavitary + Interstitial Brachytherapy (IC + ISBT)

Key Words: Intra–cavitary Brachytherapy, Size of Ovoids

Introduction:

Concurrent Chemoradiotherapy followed by Brachytherapy (BT) is the accepted standard of care in management of inoperable Cancer cervix.[1,2,3] BT has remained an irreplaceable part of radiotherapy for Cancer Cervix. Choice of ideal BT application depends upon the tumour volume and topography post External beam radiotherapy (EBRT)[3]. Broadly, intracavitary brachytherapy (ICBT) is chosen when the residual disease remains limited to cervix, upper vagina and medial parametrium. When residual disease at BT extends beyond the medial third of parametrium, a combination of Intracavitary and Interstitial brachytherapy (IC+ISBT) is considered. [4] However, centres which lack provision of hybrid applicators for IC+ISBT use ICBT only or perineal template based ISBT for similar clinical situations. ISBT has been performed for indications such as lower third vaginal involvement, large residual disease extending up to lateral pelvic wall, non– negotiable os, distorted cervical anatomy or narrow vaginal apex. While ISBT remains a procedure done less commonly owing to lack of expertise and applicators, ICBT remains largely the technique of choice in majority of the centres. An objective definition of the residual disease vs choice of applicator seems to be unclear.

It is always attempted to place the largest size of ovoid that the vagina can accommodate in ICBT. This has been principled in order to provide maximum possible lateral dose throw off as well as shield the rectum as much

Corresponding Author: Dr. Nikhila Radhakrishna, MBBS, MD, DNB (Radiation Oncology) Assistant Professor, Department of Radiation Oncology, Kidwai Memorial Institute of Oncology, Dr M H, Marigowda Rd, Bengaluru, Karnataka 560029,
Phone: 09655403407, E-mail: dr.nikhilakr@gmail.com

as possible. However, we have observed that ovoids as large as 2.5 cm can be accommodated in the vagina of patients with much difficulty in our patient population. In the current retrospective study, we aim to identify the most commonly accommodated size of ovoids in ICBT in our cohort of patients and identify the dose that we have been able to deliver to Point A and organs at risk (OARs) in various clinical scenarios. The current study aims to report the feasible coverage in optimised ICBT applications in order to identify the subset of patients with medial parametrial (<2cms) residual disease who would still benefit from IC+ISBT.

Methods:

Records of patients with biopsy proven Cancer cervix treated in the year July 2019– July 2020 were identified for the current retrospective cohort study. Out of these patients, the ones who have completed the planned EBRT and ICBT were selected. Patients who had residual disease extending up to the lateral pelvic wall or involving the lower third of vagina, who were treated with template based ISBT were excluded from the current study.

The demographic details of the patient were collected, along with other parameters such as stage at presentation, Histology, Pre–treatment imaging, EBRT received, number of cycles of chemotherapy and overall treatment time.

All patients received 45–50 Gy EBRT by 3–Dimensional Conformal Radiotherapy (3–DCRT) technique along with 4–6 cycles of platinum based weekly chemotherapy. All patients received High Dose Rate (HDR) BT using Iridium 192 remote after–loading system either by Fletcher Suit applicator or Manchester Applicator. A dose schedule of 6–7 Gy in 3–4 fractions was prescribed to point A and size of colpostats used were 20 mm (semi–small), 25 mm (small) and 30 mm (medium) ovoids in both Fletcher Suit and Manchester Applicators. The dosimetric details were obtained by reviewing their BT plans. Parameters documented are the doses achieved to point A, Total Reference air kerma (TRAK), Minimum dose received by the maximally irradiated 2 cc (D2cc) of Rectum, Bladder and sigmoid colon. The distance covered by the 100% isodose curve at the level of Point A were also documented.

Patients were subjected to clinical examination at follow–up. Imaging was performed only when clinically indicated. Follow up data of clinical examination and available imaging was documented until the most recent available follow up.

Statistical Analysis:

Descriptive statistics has been used for analysis of numerical data using mean ± standard deviation (SD) for those with normal distribution and median with inter–quartile range (IQR) for those with outliers. One way Analysis of Variance (ANOVA) was used to compare the mean of Maximum distance of 100% isodose curves (at level of Point A) achieved with the three different sized ovoids.

Results:

219 ICBT applications were performed for 142 patients. Median OTT was 65 ± 12 days. 115 (52%) applications with semi–small (20mm), 69 (32%) with small ovoids (25mm) and 35 (16%) with medium (30mm) sized ovoids (Figure 1). The patient parameters have been described in table 1.0

The mean distance of 100% isodose curve obtained by semi–small , small and medium ovoids were 3.48 ± 0.53cm, 3.57 ± 0.45cm and 3.80 ± 0.44cm respectively ($p = 0.005$). This reflects that the near maximum distance which can be covered on either side is 1.74cm, 1.78cm and 1.9 cm using the respective ovoids. The difference between the three ovoids with respect to point A doses 5.40 ± 0.71 Gy, 5.59 ± 0.75 Gy and 5.79 ± 0.70 Gy respectively was statistically significant ($p=0.016$). TRAK, which is reflective of the isodose surface volume was 4137.35 ± 509.35, 4433.60 ± 554.80 and 4604.72 ± 381.45 mGy m^2 h^{-1} for the respective ovoids ($p < 0.001$). However, no significant impact was observed in the OAR doses (Table 2.0).

Clinical follow up data was available for 65% of the patients . The remaining 35% of the patients were lost to follow up owing to pandemic. Out of the available data, 74% of patient had a complete response, while 8 % had locally progressive disease, and the remaining 18% had a stable partial response at 3 years.

Discussion:.

We have observed that the majority of south–Indian female patients have a small vaginal diameter and a large volume of disease at presentation. Post EBRT, the vaginal apex is often found to be narrow and fornices appear obliterated. As a result, the vagina post EBRT permits only semi–small (52%) to small ovoids (32%) in the majority of our patients. The use of medium or large ovoids is considerably low (16%). This has been observed to provide unsatisfactory lateral throw off of the dose to the parametrial disease due to the proximity of bowel and bladder.

Recent evidence has demonstrated the importance of three–dimensional image based adaptive BT for Cancer Cervix [4–8]. Although Magnetic Resonance Imaging (MRI) based target volume delineation has been found to

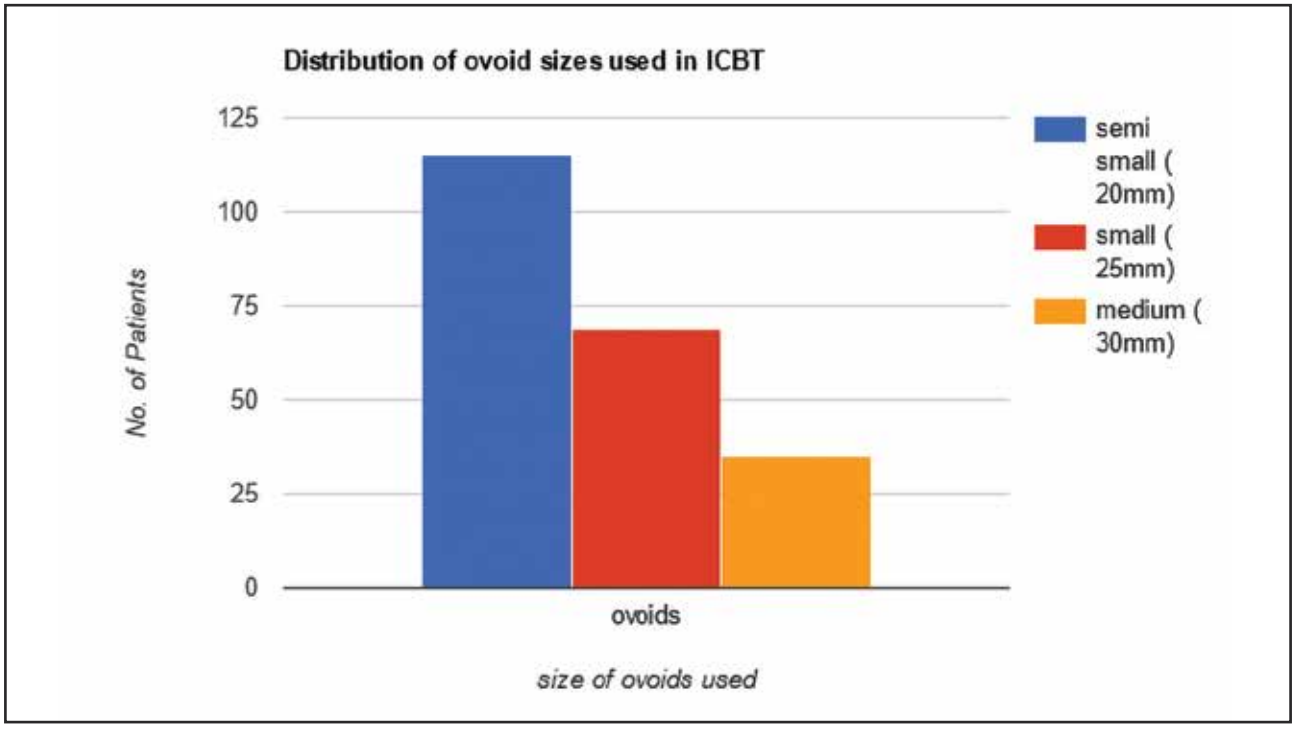


Fig. 1: Distribution of different sizes of ovoids used in the ICBT applications for 219 applications.

Sl. No.	Parameters	
	Mean Age	49.30 years
	Stage at presentation	
	IIA	2
	IIB	55
	IIIA	7
	IIIB	78
	Histology	
	Squamous Cell Carcinoma	94%
	Adenocarcinoma	3%
	Poorly differentiated carcinoma	3%
	No. of chemotherapy cycles	4–6 cycles
	Median OTT	64 $\pm$ 18.5 days
	Dose of EBRT	45–50Gy

Table 1.0 Patient parameters at baseline.

be superior [7,9], several centres in developing nations continue to prescribe to Point A owing to lack of facilities for a transition to image guided adaptive volume–based BT [10,11]. Indian Brachytherapy Society (IBS) recommends a minimum of 75Gy EQD2 to Point A or a minimum of 85 Gy to the HRCTV.[9] The current EMBRACE data suggests to achieve a minimum of 65 Gy to Point A, whereas 85 Gy to the HRCTV [5]. IBS has also categorized residual disease post EBRT in cervical cancers into 4 classes. Category I_{BT} refers to no residual disease or residual disease confined to the cervix / upper 2cm of vagina/ proximal 1/3 of uterocervical junction. Such residual disease is amenable to be adequately treated by regular intracavitary brachytherapy alone. Category II_{BT} involves significant residual disease in the cervix, proximal parametrium, upper third of vagina and disease extending upto mid uterine corpus. The residual medial parametrial involvement may be best demonstrated objectively by MRI. However, clinical bimanual bi–digital examination along with CT scan may be adequately employed for the same. Premature change of practice into volume based planning without a learning curve on MRI based contouring may result in undue underdosing of certain areas of the target, thus compromising local control. The availability of dedicated MRI equipment in many centres is limited by logistics. CT scan along with clinical examination is the best available alternative [12,13] and the same was used during this study period.

Target volume delineation based on CT scan in different clinico–radiological settings has been recently described [12] and is yet to be uniformly adopted in all centres. This recommendation has been published after the current study has been commenced and has thus not been applied in our cohort of patients.

Point based prescription has shown good outcomes in patients with limited residual disease[14]. In the current study, Point A based dose prescription, optimization and reporting has been used. Owing to lack of dedicated CT

Parameter	Semi–small ovoids (20mm)	Small ovoids (25mm)	Medium ovoids (30mm)	P value
Distance covered by 100% isodose curve at level of Point A (cm)	3.48 ± 0.53	3.57 ± 0.45	3.80 ± 0.44	0.005*
Achieved Dose to Point A (Gy) [Prescribed dose 6–7 Gy Mean = 6.3 Gy/Fr]	5.40 ± 0.71	5.59 ± 0.75	5.79 ± 0.70	0.016*
TRAK ($mGy\ m^2\ h^{-1}$)	4137.35 ± 509.35	4433.60 ± 55.4	4604.72 ± 38.14	<0.001*
D2cc rectum (Gy)	4.22 ± 0.64	4.10 ± 0.65	4.22 ± 0.80	0.46
D2cc bladder (Gy)	5.02 ± 0.63	4.96 ± 0.70	4.88 ± 0.65	0.56
D2cc sigmoid (Gy)	3.79 ± 1.16	3.66 ± 0.99	3.94 ± 1.04	0.45

Table 2.0 Mean doses achieved to target and OARs per fraction of ICBT

simulator and MRI at the time of this study, target volume contouring could not be used under logistic constraints. With the use of semi–small/small ovoids, the lateral throw–off of the dose was not satisfactory. Therefore, delivering the full intended dose to point A was not always possible in our attempt to optimize the doses to the OARs [15,16]. Disease limited to the cervix alone, would get adequately covered by an optimized ICBT Plan. However, in cases with parametrial extension even upto medial third alone (Near Maximum Distance (NMD) extending within 2 cm), the diseased parametrium would get underdosed with ICBT alone, without additional source dwell positions in the form of extra needles in the parametrium.

While we expect the maximum dimension of 100% isodose curve at level of point A to cover a width of 4 cm, in reality, the maximum dimension of the 100% isodose curve in an optimized pure ICBT plan was found to be mean of 3.48 ± 0.53 mm, 3.57 ± 0.45mm and 3.80 ± 0.44mm using semi–small, small and medium sized ovoids (Figure 2). Although this is common knowledge, this has not been highlighted in literature and our study is the first to attempt highlighting this deficiency in routine ICBT applications. In reality, it is very rare that we are able to stretch the 100% beyond 2 cm at level of point A, owing to the limitations created by the OARs. Dose constraints of D2cc < 75 Gy EQD2 to rectum and Sigmoid and D2cc < 80 Gy to bladder have been adopted uniformly in the current study, as per the American Brachytherapy Society (ABS) recommendations [17]. Japanese centres accept a lower median cumulative dose of HR–CTV D_{90} of 65.0 Gy (52.7–101.7 Gy) achieved for a median distance of tandem to HRCTV lateral edge of 29.2mm for their patients. They have also reported difficulty in being able to deliver HRCTV D90 doses more than 70 Gy even when the HRCTV is less than 22cc, corresponding to a tandem to edge of HRCTV distance of >2cm. [18,19]

IBS Category I_{BT} disease may be adequaltely covered by ICBT alone. However, the residual parametrial disease upto 2 cm (IBS Category II_{BT}) may be under–dosed by the use of semi–small and small ovoids in several optimized plans. This calls for attempting the use of hybrid applicators in such cases which use needles in the parametria to cover the disease adequately without increase in dose to organs at risk.

The limitation of the study is the lack of target volume delineation. During this study period, owing to logistic constraints, point A based BT was practised. Also, free hand needle placement beside the ovoids was not attempted owing to the common problem of divergence of such needles. With the availability of recent CT based contouring guidelines by IBS as well as acquisition of a dedicated CT simulator and new applicators for advanced IC+ISBT, we are now able to practise volume based adaptive brachytherapy and would report the same in future studies.

Conclusion:

Majority of South Indian patients with cancer cervix could accommodate semi small ovoids. This often compromises the distance covered by 100% isodose curve at the level of Point A, which in turn compromises the target dose achieved especially within medial parametrial disease (<2cms). Identification of such patients is essential as they be benefited by use advanced applications on a case to case basis.

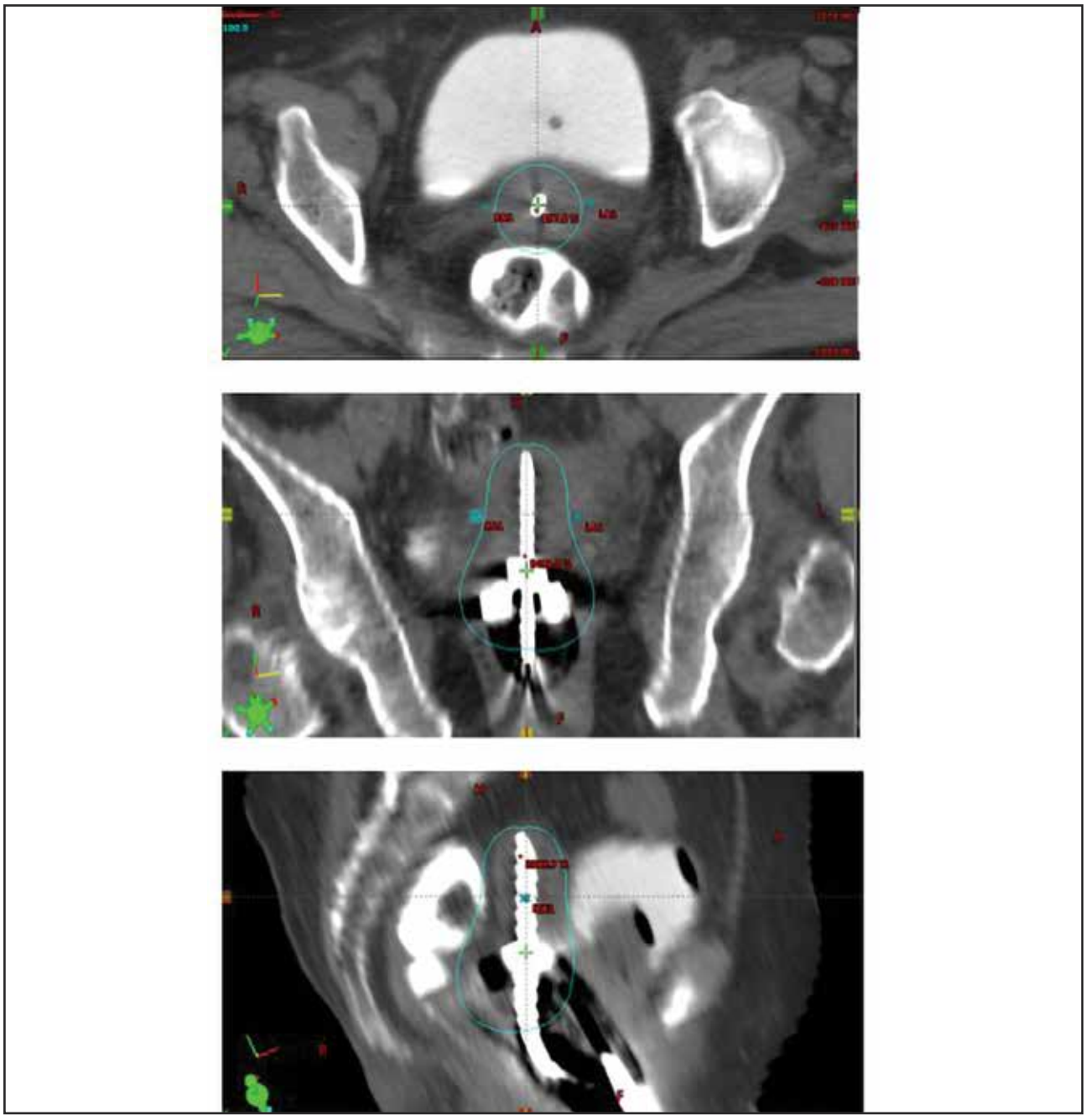


Fig. 2: CT images showing optimized ICBT plans, thus delivering less than expected dose to Point A.
(Blue – 100 % isodose curve)

List of Abbreviations:

BT – Brachytherapy

EBRT – External Beam Radiotherapy

ICBT – Intracavitary Brachytherapy

ISBT – Interstitial Brachytherapy

OAR – Organ at Risk

3–DCRT – 3–Dimensional Conformal Radiotherapy

HDR – High Dose Rate

TRAK –Total Reference Air Kerma

ANOVA – Analysis of Variance

IQR – Interquartile Range

MRI – Magnetic Resonance Imaging

IBS – Indian Brachytherapy Society

HRCTV – High Risk Clinical Target Volume

NMD – Near Maximum Distance

Declarations:

Ethics Approval and consent to participate: This study was approved by Institutional Ethics Committee. Patients' Consent to participate has been obtained.

Consent for Publication: Has been Obtained.

Funding: Nil

References

1. Vale C, Tierney J F, Stewart L, Brady M , Dinshaw K, Jakobsen A et al, Chemoradiotherapy for Cervical Cancer Meta–Analysis Collaboration. Reducing uncertainties about the effects of chemoradiotherapy for cervical cancer: a systematic review and meta–analysis of individual patient data from 18 randomized trials. J Clin Oncol. 2008 Dec 10;26(35):5802–12.
2. Shrivastava S, Mahantshetty U, Engineer R, Chopra S, Hawaldar R, Hande V, Kerkar RA, Maheshwari A, Shylasree TS, Ghosh J, Bajpai J, Gurram L, Gulia S, Gupta S; Gynecologic Disease Management Group. Cisplatin Chemoradiotherapy vs Radiotherapy in FIGO Stage IIIB Squamous Cell Carcinoma of the Uterine Cervix: A Randomized Clinical Trial. JAMA Oncol. 2018 Apr 1;4(4):506–513
3. Lanciano RM, Won M, Coia LR, Hanks GE. Pretreatment and treatment factors associated with improved outcome in squamous cell carcinoma of the uterine cervix: A final report of the 1973 and 1978 patterns of care studies. Int J Radiat Oncol Biol Phys 1991; 20:667–76
4. Jastaniyah N, Yoshida K, Tanderup K, et al. A volumetric analysis of GTVD and CTVHR as defined by the GEC ESTRO recommendations in FIGO stage IIB and IIIB cervical cancer patients treated with IGABT in a prospective multicentric trial (EMBRACE). Radiother Oncol 2016;120:404–11
5. Pötter R, Tanderup K, Schmid MP, Jürgenliemk–Schulz I, Haie–Meder C, Fokdal LU, et al; EMBRACE Collaborative Group. MRI–guided adaptive brachytherapy in locally advanced cervical cancer (EMBRACE–I): a multicentre prospective cohort study. Lancet Oncol. 2021 Apr;22(4):538–547.
6. Pötter R, Georg P, Dimopoulos JC, Grimm M, Berger D, Nesvacil N, et al. Clinical outcome of protocol based image (MRI) guided adaptive brachytherapy combined with 3D conformal radiotherapy with or without chemotherapy in patients with locally advanced cervical cancer. Radiother Oncol 2011;100:116–23.
7. Sturdza A, Pötter R, Fokdal LU, et al. Image guided brachytherapy in locally advanced cervical cancer: improved pelvic control and survival in RetroEMBRACE – A Multicenter cohort study. Radiother Oncol 2016;120:428–33.
8. Dimopoulos JC, Petrow P, Tanderup K, Petric P, Berger D, Kirisits C, et al. Recommendations from Gynaecological (GYN) GEC–ESTRO Working Group (IV): Basic principles and parameters for MR imaging within the frame of image based adaptive cervix cancer brachytherapy. Radiother Oncol 2012;103:113–22.
9. Mahantshetty U, Gudi S, Singh R, Sasidharan A, Sastri SC, Gurram L, et al . Indian Brachytherapy Society Guidelines for radiotherapeutic management of cervical cancer with special emphasis on high–dose–rate brachytherapy. J Contemp Brachytherapy. 2019 Aug;11(4):293–306.
10. Chatterjee A, Grover S, Gurram L, Sastri S, Mahantshetty U. Patterns of cervical cancer brachytherapy in India: results of an online survey supported by the Indian Brachytherapy Society. J Contemp Brachytherapy. 2019 Dec;11(6):527–533.
11. Suneja G, Brown D, Chang A, Erickson B, Fidarova E, Grover S, et al American Brachytherapy Society: Brachytherapy treatment recommendations for locally advanced cervix cancer for low–income and middle–income countries. Brachytherapy. 2017 Jan–Feb;16(1):85–94.
12. Mahantshetty U, Poetter R, Beriwal S, Grover S, Lavanya G, Rai B, Petric P, Tanderup K, Carvalho H, Hegazy N, Mohamed S, Ohno T, Amornwichet N. IBS–GEC ESTRO–ABS recommendations for CT based contouring in image guided adaptive brachytherapy for cervical cancer. Radiother Oncol. 2021 Jul;160:273–284
13. Viswanathan AN, Erickson B, Gaffney DK, Beriwal S, Bhatia SK, Lee Burnett O 3rd, D'Souza DP, Patil N, Haddock MG, Jhingran A, Jones EL, Kunos CA, Lee LJ, Lin LL, Mayr NA, Petersen I, Petric P, Portelance L, Small W Jr, Strauss JB, Townamchai K, Wolfson AH, Yashar CM, Bosch W. Comparison and consensus guidelines for delineation of clinical target volume for CT– and MR–based brachytherapy in locally advanced cervical cancer. Int J Radiat Oncol Biol Phys. 2014 Oct 1;90(2):320–8.
14. Gupta A, Dey T, Rai B, Oinam AS, Gy S, Ghoshal S. Point–Based Brachytherapy in Cervical Cancer With Limited Residual Disease: A Low– and Middle–Income Country Experience in the Era of Magnetic Resonance–Guided Adaptive Brachytherapy. JCO Glob Oncol. 2021 Sep;7:1602–1609.
15. Tan LT, Tanderup K, Kirisits C et al. Image–guided adaptive radiotherapy in cervical cancer. Semin Radiat Oncol 2019; 29: 284–298.
16. Pötter R, Tanderup K, Kirisits C 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; 9: 48–60.
17. Viswanathan AN, Beriwal S, De Los Santos JF, Demanes DJ, Gaffney D, Hansen J, Jones E, Kirisits C, Thomadsen B, Erickson B; American Brachytherapy Society. American Brachytherapy Society consensus guidelines for locally advanced carcinoma of the cervix. Part II: high–dose–rate brachytherapy. Brachytherapy. 2012 Jan–Feb;11(1):47–52.

18. Masanori Someya, Tomokazu Hasegawa, Takaaki Tsuchiya, Mio Kitagawa, Toshio Gocho, Yuuki Fukushima, et al. Retrospective DVH analysis of point A based intracavitary brachytherapy for uterine cervical cancer, Journal of Radiation Research, Volume 61, Issue 2, March 2020, Pages 265–274

19. Murakami, N., Kasamatsu, T., Wakita, A. et al. CT based three dimensional dose–volume evaluations for high–dose rate intracavitary brachytherapy for cervical cancer. BMC Cancer 14, 447 (2014).