East of England Radiotherapy Network:

Endometrium Protocol V1.0

Contents

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EofE RTN Endometrium Protocol V1.0
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1 Indications and patient population

This protocol covers treatment in the following situations:

a. **Adjuvant-Post Operative Pelvis Radiotherapy [PORT]**

The decision to offer PORT will be based on post operative pathology and after an MDT decision.

b. **Primary Radiotherapy**

i. Early stage medically inoperable tumours

ii. Locally advanced inoperable tumours (usually combined with neoadjuvant chemotherapy)

iii. Salvage radiotherapy for isolated pelvic recurrences in previously unirradiated patients

c. **Palliative Radiotherapy**

i. Locally advanced endometrial cancer

ii. Metastatic endometrial cancer

iii. Recurrent endometrial cancer

1.1 Curative treatment eligibility

1.1.1 Inclusion criteria

Clinically indicated:

a. Post-operative/ Adjuvant pelvic radiotherapy [PORT]
b. Radical pelvic radiotherapy (inoperable)

1.1.2 Exclusion criteria

Contra-indications to pelvic radiotherapy e.g. prior radiotherapy, significant inflammatory bowel disease, previous pelvic and /or abdominal surgery.

These are all relative contraindications and consideration for radiotherapy in these situations should be discussed in a multidisciplinary setting.

1.1.3 Essential Pre-Radiotherapy investigations for curative patients

Bloods: FBC U&E LFT eGFR

Pathology: Pathological / histological confirmation of endometrial cancer

Biopsy proven and inoperable

Examination: postoperatively clinical examination

Imaging: CT scan chest, abdomen, and pelvis / PETCT. MRI to assess extent of soft tissue extension.

It is assumed that each centre will have imaging protocols developed for initial staging and post treatment imaging protocols.

2 Localisation

2.1 EBRT

Localisation		Notes
Position	Supine	
Arm position	Hands on chest Arms above head if PA nodes to be treated.	
Immobilisation and supports	Knee support and foot support	
Organ pre-requisites	Comfortably full bladder	Suggested drinking protocol if full: Void 1 hour before imaging and drink 300ml water/ clear fluid before CT/ treatment delivery
	Empty bowels	Bowels should be emptied before CT and treatment. Deflation or rescan should be considered if rectum diameter greater than 4cm. Bowel preparation may be given prior to radiotherapy planning scan and treatment to ensure empty rectum, individual department protocols may vary.
Contrast	IV Contrast	Unless contra-indicated
CT acquisition	Slice thickness: 2-2.5mm Sup scanning limits: Top of L3 Inf scanning limits: 2cm below ischium	Will need to increase superior scan limit if elective nodes indicated
Examination	Gynaecological examination preferably with diagrammatic documentation, if indicated	

2.2 Brachytherapy

Radical treatment using ovoids and IU - as per Cervix protocol.

Vaginal vault/vaginal treatment - for standard treatments, clinical examination and direct visualisation may be utilised. If reporting of the doses to organs at risk is required or there is unusual anatomy then CT localisation with the applicator in situ may be considered, this is particularly the case if there is concern that the anatomy may prevent close apposition of the applicator to the vaginal surface.

For non-standard treatment planning, CT or MRI images should be taken to identify the target and organs at risk.

3 Dose prescription (EBRT & BT) & chemotherapy:

NOTE – Vault Brachytherapy should be carried out as outlined in the Endometrial clinical protocol. Intracavitary brachytherapy using ovoids and an IU tube should be carried out as per the Cervix protocol.

Intent	Info	External Beam Radiotherapy (EBRT)		Brachytherapy (BT)			Chemotherapy
		Dose (Gy)/#	#/week	Dose (Gy)/#	#/week	Vault or Intracavitary	
Adjuvant RT (operable disease)	High risk, post operative RT	45Gy/25# or 46Gy/23#	5	Optional for pts with cervical involvement 8Gy / 2# or 7Gy / 1#	1	Vault	Stage III patients should receive chemoradiation with cisplatin followed by adjuvant carboplatin & paclitaxel
	High risk, post operative RT	50.4Gy/ 28#	5				
	High risk, post operative RT	48.6Gy/ 27#	5				
	High risk, post operative RT	55Gy - 60Gy/ 25# simultaneous integrated boost	5				
	Intermediate risk	None – BT only		22Gy / 4# or 21Gy / 3#	2 or 1	Vault	
Primary RT (inoperable)	Combination Therapy	45Gy/25# or 50.4Gy/ 28#	5	28Gy / 4# 25Gy/ 5#	2 or 4	Intracavitary	
	Brachytherapy only	None – BT only		36 – 37.5Gy / 5-6#		Intracavitary	
	Brachytherapy only – vaginal recurrence	None – BT only		30-36Gy / 5-6#		Vault/ Intracavitary	
Palliative Radiotherapy		8Gy/ 1#	1	N/A			
		20Gy/ 5#	5				
		30Gy/ 10#	5				

4 Target volumes

4.1 EBRT

4.1.1 Volume based adjuvant pelvic radiotherapy [PORT]

There is no GTV.

- CTV_T includes the upper third of vagina, residual parametrial and paravaginal tissues.
- CTV_N encompasses the internal, external, and common iliac, AND obturator NODES. These nodes are delineated by adding a 5-7mm margin to the corresponding contrast enhancing pelvic blood vessels using existing nodal atlases.
- PTV = CTV + 5 – 10 mm around the vaginal vault and 5-7mm around other [nodal] volumes.

Target volumes should match agreed naming conventions unless there are operational reasons for use of other naming. PTV ProKnow nomenclature should be used for NHSE ProKnow Collections and Scorecard Templates for upload.

4.1.2 Volume based radical radiotherapy

This includes the more common setting of PORT and also in case of an intact uterus.

- GTV_T is the visible tumour on T2W MRI registered with the planning CT scan. In PORT it is expected that there will be no GTV
- $CTV_{T:}$ includes CTV_T with the uterine body, cervix, upper half of vagina (if no vaginal involvement), parametria, and ovaries. If the vagina is involved, the whole length of the vagina is included in the CTV_T.
- In the setting of PORT, the CTV will include the upper 4 cm of the vagina.
- CTV_e:
    - In patients without nodal disease on imaging, the CTVe encompasses the internal, external, and common iliac, obturator and presacral nodes. These nodes are delineated by adding a 7mm margin to the corresponding contrast enhancing pelvic blood vessels using existing nodal atlases.
    - In patients with nodal disease, a margin of 5mm may be added to the enlarged nodes. Elective nodal areas involved are as above. If the whole vagina is involved by primary tumour, bilateral inguinal nodes should be included in the CTV_e.
- PTV: A margin of 15-20 mm is added [in case of an intact uterus] to the CTV_T and 7-10 mm around the CTV_N.

4.1.3 Salvage radiotherapy

- Isolated vaginal recurrence in patients who have had no previous radiotherapy is treated with EBRT (target volume similar to volume-based technique for adjuvant radiotherapy) followed by vaginal brachytherapy.

4.1.4 Palliative radiotherapy

Radiologically visible tumour in the uterus, cervix, parametria, vagina and involved lymph nodes is treated with a 2cm margin.

4.2 Brachytherapy

4.2.1 Radical treatments using ovoids and IU tube

For complex planned treatments using ovoids and IU tube the brachytherapy guidelines from the Cervix protocol should be followed in terms of target and OAR doses.

4.2.2 Vaginal Vault Treatments

For standard treatments, clinical examination and direct visualisation may be utilised. If reporting of the doses to organs at risk is required or there is unusual anatomy then CT localisation with the applicator in situ may be considered, this is particularly the case if there is concern that the anatomy may prevent close apposition of the applicator to the vaginal surface.

For non-standard treatment planning, CT or MRI images should be taken to identify the target and organs at risk.

5 Organs at risk

5.1 EBRT

- Aim for the use of standard nomenclature as per Global Harmonization Group consensus guidelines: https://www.thegreenjournal.com/action/showPdf?pii=S0167-8140%2820%2930294-2

Structure name	Description
Bladder	Whole organ including the bladder neck
Rectum	From the ano-rectal sphincter to recto-sigmoid junction
Colon_Sigmoid	From recto-sigmoid junction to the left iliac fossa
Bowel	Outer contour of bowel loops including the peritoneum. Colon_Sigmoid may be included in Bowel if not reported separately
FemurHeadNeck_L and FemurHeadNeck_R	Both femoral head and neck to the level of the trochanter min
For para-aortic irradiation also include:	
Kidney_L and Kidney_R Kidneys	Outer contour excluding renal pelvis
SpinalCord	Outer contour
Optional (if para-aortic RT above L1 is applied):	
Duodenum	Whole organ
Ovary_L and Ovary_R (in cases of ovarian transposition)	Outer contour

5.1.1 Planning structures

In the setting of an inoperable cancer (intact uterus) where the patient will have brachytherapy boost the CTV_HR should be drawn.

CTV_HR - High Risk Clinical Target Volume of the primary tumour which will be boosted with HDR brachytherapy.

Additionally, where there are LN boosts the following planning structures should be used.

CTV_HR_Eval – CTV_HR + 10mm cropped back 10-15mm from PTVn.

OAR_Eval – OARs cropped back 10-15mm from PTVn.

PTV_4500_Eval - PTV_4500 cropped back 10mm from PTVn.

5.1.2 Constraints

45Gy/ 25# without LN boost

	Structure Name	Mandatory	Optimal
Targets	PTV_4500	V42.75Gy >95% D0.1cc <107%	V42.75Gy = 95%
Help contour	CTV_HR_10mm_Eval		D0.1cc <103%

	Structure Name	Mandatory	Optimal
OARs	Bowel	D0.1cc <105%	When no lymph node boosts: • V40Gy<250cm^3 • V30Gy<500cm^3
	Colon_Sigmoid	D0.1cc <105%	
	Bladder	D0.1cc <105%	V40Gy <60% V30Gy <85%
	Rectum	D0.1cc <105%	V40Gy <75% V30Gy <95%
	SpinalCord	D0.1cc <48Gy	
	FemurHeadNeck_L and FemurHeadNeck_R	D0.1cc <50Gy	
	Kidney	Dmean <15Gy	Dmean <10Gy
	Body	D0.1cc <107%	
Optional	Ovary_L or Ovary_R (in cases of ovarian transposition)	<5-8 Gy	
	Duodenum	V55<15cm^3	

Dmin = D99.9%, Dmax=D0.1cc

*Optimal constraints which can be used in the treatment plan optimisation. Values are based on the clinical data of EMBRACEII patients entered in the study before June 2017. The constraints are not supposed to be fulfilled by all patients, but rather by ~70-80% of the patients.

45Gy/ 25# with LN boost

	Structure Name	Mandatory	Optimal
Targets	PTV_4500_Eval	V42.75Gy>95%	V42.75Gy = 95% Dmax >107%
	PTVn_XXXX	D98% >90% of prescribed LN dose D0.1cc <107% of prescribed LN dose	D98%=90% of prescribed LN dose
	CTVn_XXXX	D98% >100% Of prescribed LN dose	D50% >102%
Help contour	CTV_HR_Eval		Dmax <103%
OARs	Bowel_Eval	D0.1cc <105% (47.3Gy) *	When lymph node boost or para-aortic irradiation: • V40Gy<300cm^3 • V30Gy<650cm^3 D0.1cc <57.5Gy
	Colon_Sigmoid_Eval	D0.1cc <105% (47.3Gy) *	D0.1cc <57.5Gy
	Bladder_Eval	D0.1cc <105% (47.3Gy) *	V40Gy <60% V30Gy <85% D0.1cc <57.5Gy
	Rectum_Eval	D0.1cc <105% (47.3Gy) *	V40Gy <75% V30Gy <95% D0.1cc <57.5Gy
	SpinalCord	D0.1cc <48Gy	
	FemurHeadNeck_L and FemurHeadNeck_R	D0.1cc <50Gy	
	Kidney_L and Kidney_R	Dmean <15Gy	Dmean <10Gy
	Body_Eval	D0.1cc <107%*	
Optional	Ovary_L or Ovary_R (in cases of ovarian transposition)	<5-8 Gy	
	Duodenum	V55<15cm^3	

Dmin = D99.9%, Dmax=D0.1cc
* Percentages of 45Gy unless otherwise stated for nodes.

Optimal constraints can be used in the treatment plan optimisation. Values are based on the clinical data of EMBRACEII patients entered in the study before June 2017. The constraints are not supposed to be fulfilled by all patients, but rather by ~70-80% of the patients.

5.2 Brachytherapy

4.2.1 Radical treatments using ovoids and IU tube

For complex planned treatments using ovoids and IU tube the brachytherapy guidelines from the Cervix protocol should be followed in terms of target and OAR doses.

4.2.2 Vaginal Vault Treatments

Structure name	Planning aim (Brachytherapy EQD2 + External beam EQD2)	Dose Limit (Brachytherapy EQD2 + External beam EQD2)
Rectum	<65Gy	75Gy

However, it should be noted that in most cases vaginal vault treatments are carried out on standard library plans designed to give the prescribed dose a set distance from the vault surface and OAR doses are not measured on a per patient basis – they are assumed to be significantly lower than those achieved with cervix brachytherapy treatments due to the nature of the application.

6 Planning process/ technique

6.1 EBRT

- All EBRT treatment is IMRT/ VMAT/ Tomotherapy with inverse plan optimisation.
- Conformal or simple field arrangements can be used for palliative treatments.

For patients who were intending to have brachytherapy, but brachytherapy was subsequently not been possible e.g. due to failed/unsuitable insertion or due to limited capacity of brachytherapy service:

- A 'replanning' CT scan must be performed expeditiously (after any applicators have been removed, if inserted) to minimise any gap from conclusion of delivered EBRT.
- It is expected that the planning CT will be done with intravenous contrast and follow all protocols defined in the initial PH1 planning scan.

6.2 Brachytherapy

Due to the variation in brachytherapy modalities delivered across the network, implant and planning techniques are inherently varied. Recent guidance does not recommend

superiority in one implant and planning technique. Consideration of the fact that implant and planning techniques may be dependent on service capability should be taken.

7 Peer Review/ Contour QA

7.1 EBRT

- All curative volumes should aim to be prospectively peer reviewed.
- A description of the contouring (planning note) and of the peer review process including changes made should be saved in the patient record.
- The peer review process and outcomes should be audited.

7.2 Brachytherapy

Cross network peer review poses the following challenges:

- Time factor: Cross site peer review may hinder timely treatment and thus reduce treatment effectiveness.
- Across the ODN there may be sites with limited numbers of Brachytherapy trained consultants/ARSAC licence holders.

The following has been agreed by the members of the ODN to mitigate these challenges:

- On site peer review for contouring should be in place If possible
- Cross site routine plan review to be done via an annual audit*

*Cross site QA contouring may be required if large discrepancies in practice are found

- Possible Comparison of volumes via ProKnow

8. Target verification during treatment

8.1 EBRT

Daily 3D CBCT and action for adaptive measures.

3D Soft tissue verification (daily if 3D CBCT) **

Modality	Frequency	Match point	Additional information
CBCT	Daily CBCT	Bony match using ROI/clipbox placed around the pelvis. Radiographers should perform a visual match of the structures within the PTVs and OAR check. Manual adjustments or subsequent soft tissue match to be made if required but ensuring nodal targets still sufficiently covered. The match should be verified on all planes.	Check external contour and report to physics if changes greater than 1cm. If all CTVs cannot be achieved within PTVs then plan must be referred for CBCT review and adaptive action may be taken if persists.

8.2 Brachytherapy

For complex brachytherapy using ovoids and IU tube daily imaging with the applicator in situ is required. Where MRI is not feasible planning CT or ultrasound may be used.

For standard treatments using vaginal vaults, clinical examination and direct visualisation may be utilised. If reporting of the doses to organs at risk is required or there is unusual anatomy then CT localisation with the applicator in situ may be considered, this is

particularly the case if there is concern that the anatomy may prevent close apposition of the applicator to the vaginal surface or there is uncertainty over vault sizing/placement.

9 Side effects

9.1 EBRT

9.1.1 Possible early or short-term side-effects	
Expected (50-100%)	**Initial Management (if appropriate)**
Tiredness	Rest when required Light exercise
Mild Pelvic Pain	Appropriate pain medication (paracetamol/ibuprofen)
Urinary Frequency	Decrease caffeine
Bowel Frequency	Low Fibre diet
Vaginal Itching, discharge, or light bleeding (spotting)	Emollient
Discomfort from prolonged bed rest	
Common (10-50%)	**Management (if appropriate)**
Cystitis/pain when you urinate	Drink plenty of fluids Paracetamol MSU
Urinary incontinence	Incontinence pads
Rectal Pain/discomfort	Instilagel Paracetamol
Less common (Less than 10%)	**Management (if appropriate)**
Looser Stools	Low fibre diet Loperamide Codeine phosphate
Skin Soreness, itching and redness	Moisturising Emollient
Bleeding from your Bladder or bowel	
Moderate pelvic pain	Appropriate pain medication (paracetamol/ibuprofen)
Rare (Less than 1%)	**Management (if appropriate)**
Heavy Bleeding	Tranexamic acid
Infection	Antibiotics
Risk of developing symptomatic blood clot	Completion of TRA
Risk of pressure sore	Appropriate dressings

9.2.1 Possible late or long-term side-effects	
Definite 100%	**Initial Management (if appropriate)**
Early menopause	
Infertility	
Expected 50%-100%	**Initial Management (if appropriate)**
Vaginal narrowing, shortening or dryness	Use of vaginal dilators
Common (10-50%)	**Initial Management (if appropriate)**
Urinary frequency	Pelvic floor exercises
Urinary incontinence	Incontinence pad Pelvic floor exercises
Bowel frequency	Low fibre diet
Looser Stools	Low fibre diet Loperamide Codeine phosphate
Less common (Less than 10%)	**Management (if appropriate)**
Cystitis/pain when you urinate	Drink plenty of fluids Paracetamol MSU
Rectal pain/discomfort	Instilagel Paracetamol
Bleeding from your bladder, bowel, or vagina	
Bowel/bladder damage which may require surgery	
Rare (Less than 1%)	**Management (if appropriate)**
A different cancer in the treatment area	

9.2 Brachytherapy

9.2.1 Possible early or short-term side-effects	
Expected (50-100%)	**Initial Management (if appropriate)**
Tiredness	Rest when required. Light exercise
Common (10-50%)	**Management (if appropriate)**
Mild pelvic pain	Appropriate pain medication (paracetamol/ibuprofen)

9.2.1 Possible early or short-term side-effects	
Less common (Less than 10%)	**Management (if appropriate)**
Urinary frequency	
Cystitis/pain on urination	Drink plenty of fluids Paracetamol MSU
Bowel Urgency	
Bowel frequency	
Rectal pain/discomfort	Instilagel Paracetamol
Looser Stools	Low fibre diet Loperamide Codeine phosphate
Vaginal itching, discharge, or bleeding (spotting)	topical emollients
Moderate pelvic pain	Appropriate pain medication (paracetamol/ibuprofen)
Rare (Less than 1%)	**Management (if appropriate)**
Bleeding from your bladder or bowels	

9.2.2 Possible late or long-term side-effects	
Definite 100%	**Initial Management (if appropriate)**
Vaginal narrowing, shortening or dryness	Use of vaginal dilators
Expected 50%-100%	**Initial Management (if appropriate)**
Bleeding from the vagina after using dilators or intercourse	
Common (10-50%)	**Initial Management (if appropriate)**
Urinary frequency	
Bowel Urgency	
Looser Stools	Low fibre diet Loperamide Codeine phosphate
Less common (Less than 10%)	**Management (if appropriate)**
Cystitis/pain when you urinate	Drink plenty of fluids Paracetamol MSU
Urinary incontinence	Incontinence pads
Bowel frequency	
Rectal pain/discomfort	Instilagel

9.2.2 Possible late or long-term side-effects	
	Paracetamol
Bleeding from your bladder, bowel	
Bowel/bladder damage which may require surgery	
Rare (Less than 1%)	**Management (if appropriate)**
A different cancer in the treatment area	

10 References

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12 Amendment History

A record of changes in this document

Date	Updated version number	Previous version number	Page Number/ Section (updated version)	Details
4.11.2025	V1.0	N/A	N/A	New Document
				Combined EBRT and BT to one document