Thames Valley and Wessex Radiotherapy Network

Radiotherapy Protocols

Vulval Cancer

This document is the standardised Thames Valley and Wessex Radiotherapy Network **Vulval Cancer** treatment protocol developed collaboratively by the Vulval Cancer Protocol Working Group:

Trust	Clinician	Physicist	Radiographer
Oxford University Hospitals NHS Foundation Trust	Dr Amanda Horne Dr Sally Trent	Helen Winter David Polley	Loryn Caulfield
Portsmouth Hospitals University NHS Trust	Dr Maja Uherek Dr Radwa Ahmed	Wojciech Polak	Alison Ormerod
Royal Berkshire Hospitals NHS Foundation Trust	Dr Helen O'Donnell	Joanne Jones	Lisa Revans
University Hospitals Dorset NHS Foundation Trust	Dr Matthew Roberts Dr Joanne Parkinson Dr Rachel Wilkinson	Emma Wesley Sreelish Kariyarambeth	Gillian Thomas
University Hospitals Southampton NHS Foundation Trust	Dr Vicky McFarlane Dr Cristiana Alzamora Dr Hannah Beckett Dr Luke Bennett	Aaron Huckle	Julie Calvert

Document History

Date of Issue	Version Number	Date Approved	Responsible for Change	Nature of Change	Ratification/ Approval
18.12.2024	1.0	28.01.2025	Network Gynae Group	New protocol	Network Oversight Group (NOG)

Contents

1. Primary Objective and Scope

To summarise the planning and treatment of patients receiving IMRT / VMAT radiotherapy for vulval cancer for use in Radiotherapy Centres in the Thames Valley and Wessex Radiotherapy Network.

Cancers of the lower vagina are treated as per vulval cancer (cancers of the upper vagina are treated as per cervical cancers).

2. Indications

Inclusion Criteria

Radical treatment:

- To preserve organ function or for patients not medically fit for an anaesthetic but fit for radical treatment.

Adjuvant treatment of vulval cancer:

Primary site:

- Positive / close margins (≤ 3mm) and further excision not feasible.
- Other risk factors for local recurrence include LVSI, PNI, depth of invasion >5mm.

Regional lymph nodes:

- > 1 involved lymph nodes is a definitive indication for chemoradiation.
- 1 involved lymph node has evidence for survival advantage with adjuvant RT, but evidence for concurrent chemotherapy is not proven.
- Sentinel lymph node (SLN)
    - micrometastases (≤ 2mm) is indication for adjuvant RT rather than nodal disection.
    - macrometastases (>2mm) in SLN, nodal dissection should be performed consider chemoradiotherapy if 1 or more additional LN and/or ECS.
- 1 lymph node with micrometastases in the setting of full nodal dissection is a relative indication for adjuvant radiotherapy.
- Extracapsular spread lymph node is indication for chemoradiotherapy

Exclusion Criteria

For radiotherapy:

- Local disease too extensive for inclusion within a radical radiation field
- FIGO Stage IVB [metastatic]
- Nodal metastases extending above the renal hilar on CT

- Severe co-existing medical conditions

For additional concomitant cisplatin chemotherapy:

- ECOG PS ≤ 2
- Renal impairment [GFR < 60 mls/min]
- Hearing impairment
- Other severe co-existing medical conditions

3. Pre-Radiotherapy Investigations

All patients should be discussed at the gynaecological MDT.

Staging investigations:

- Clinical examination +/- EUA with a particular reference to local extent of disease, presence of extra-pelvic spread, regional lymph nodes and distant metastases.
- Biopsy for histological confirmation
- MRI pelvis for further definition of local disease
- CT scan chest abdomen and pelvis for staging of lymph nodes and metastatic disease
- PET scan for patient proceeding straight to radical radiotherapy or those with radiologically positive lymph nodes.
- Possible biopsy /FNA of suspicious inguinal lymph nodes
- Some patients may require defunctioning stoma

Further investigations for radiotherapy:

- Bloods (renal function for CT contrast, Hb in case blood transfusion needed to maintain Hb above 120, baseline bloods, iron studies)
- Planning CT scan of inguinal region/pelvis/abdomen.

Further investigations for concomitant chemotherapy:

- GFR: Calculated via the Cockcroft or Wright formula, EDTA clearance if renal impairment suspected.

4. Therapeutic Schema

Stage IA:

- If the tumour is operable, surgery is the initial treatment of choice with a wide local excision of the vulval cancer.

Stage IB / II:

- If the tumour is operable, surgery is the initial treatment of choice with a wide local excision of the vulval cancer +/- sentinel lymph node dissection or groin node

dissection.
    - Adjuvant radiotherapy post-surgery (for criteria see Indications).
- Primary radiotherapy +/- concurrent weekly chemotherapy if unable to have surgery.

Stage III and IVA:

- Surgery +/- groin node dissection (1 small node - surgery and lymph node dissection, >1 node or node fixed - surgery to primary (best pain relief), external beam radiotherapy.
    - Adjuvant radiotherapy post-surgery (for criteria see below).
- Primary concurrent chemoradiation or radiotherapy alone if not fit for concurrent chemotherapy.
- Neoadjuvant chemotherapy can be considered.

.

Stage IVB:

- Palliative chemotherapy
- Palliative radiotherapy to pelvis (eg 30 Gy/10# conformally or IMRT/VMAT).

FIGO 2021 Staging

Stage	Description	
I	**Tumour confined to the vulva**	
	IA	Tumour size ≤2cm and stromal invasion ≤1mm
	IB	Tumour size >2cm and stromal invasion >1mm
II	**Tumour of any size with extension to lower one-third of the urethra, lower one-third of the vagina, lower one-third of the anus with negative nodes**	
III	**Tumour of any size with extension to upper part of adjacent perineal structures, or with any number of non-fixed, non-ulcerated LN**	
	IIIA	Tumour of any size with disease extension to upper two-thirds of the urethra, upper two-thirds of the vagina, bladder mucosa, rectal mucosa, or regional lymph node metastases ≤5 mm
	IIIB	Regional lymph node metastases >5 mm (inguinal and femoral)
	IIIC	Regional lymph node metastases with extracapsular spread
IV	**Tumour of any size fixed to bone, or fixed, ulcerated lymph node metastases, or distant metastases**	
	IVA	Disease fixed to pelvic bone, or fixed or ulcerated regional lymph node metastases
	IVB	Distant metastases

5.Treatment Planning

Patient Position

- Prior to pre-treatment scan, the clinician will assess the diagnostic imaging and clinical assessment to decide on patient positioning.
- The majority of patients will be in a straight leg position,
- Consider wiring the primary tumour to mark the inferior/anterior/posterior extent.

- Consider wiring the vulval and groin scar.
- Bolus can be used to cover the entire extent of the primary lesion.

Simulation / CT Localisation

- Standard bladder filling protocol should be used, aiming for a comfortably full bladder.
- An initial CT is performed to check on the fullness of the bladder and rectal filling prior to administering contrast.
- IV contrast should be used where not contraindicated to aid in volume delineation.
- Patients are scanned in the supine position with indexed ankle immobilisation and knee support.
- If the rectum is distended by > 4cm, it is recommended that CT is repeated after bowel emptying (naturally or with suppository).
- Scan thickness: 2-3 mm.
- CT planning scan will be performed as per local protocol.
- Fusion of diagnostic MRI, T2-weighted images.
- For adjuvant treatment of the vulva only, electrons can be considered in frog leg position. However, photons can be used according to the outlining method above (e.g. if patient unable to abduct hips).

Volume Definition

- GTV Gross tumour volume (at diagnosis)
- CTV Clinical target volume = GTV + suspected microscopic tumour extension
- PTV Planning target volume = CTV + set-up margin (mainly due to change in bladder filling)

5. Volume Outlining

- Volumes are drawn on contrast enhanced CT images by clinician (see below) to comply with ICRU50 and ICRU62 and ICRU 83 recommendations.

- Volumes requiring contouring:

  Tumour volumes
  - GTV-V Vulval tumour
  - CTV-VB Vulval tumour CTV (vulva boost)
  - CTV-V Area around vulval tumour at risk of microscopic spread
  - CTV-TB Tumour bed CTV

  Nodal volumes
  - GTV-N Involved nodes
  - CTV-NB Involved nodes CTV (node boost)
  - CTV-EN Nodal areas at risk of microscopic spread

  Organs at risk
  - Bladder
  - Rectum
  - Bowel
  - Femoral heads
  - (Kidneys)
  - (Spinal canal)

- Documents required for outlining include the histopathology report, EUA and operation findings, MRI Pelvis (T2 weighted images), PET-CT.

STEP 1 - Outlining vulval tumour volumes

Using the CT planning scan the following volumes are outlined:

Radical vulva

SIB
- **GTV-V (GTVp_6000):**
  - Vulval tumour or area of positive margin.
- **CTV-VB (CTVp_6000):**
  - Add a margin of 5mm to the GTV-V. Edit out muscle and bone if not involved.
- **PTV-VB** (60Gy/25#; **PTVp_6000**):
  - Add a margin of 5mm to the CTV-VB.

Elective Volume
- **CTV-V (CTVp_4500):**
  - Copy CTV-VB volume and extend this volume to include the whole vulva. Extending the volume further to include the vagina/ anus and urethra may be necessary as described below.
  - Vaginal Involvement:
    - It is recommended that if the primary vulvar lesion involves the vagina (ie. tumour proximal to the hymenal ring), gross disease (i.e. GTV) plus at

least 3cm into the vagina with consideration of including the entire vaginal length in the CTV-V.
    - Anal Involvement:
        - It is recommended that if the primary vulvar lesion involves the anus or anal canal, gross disease (i.e. GTV) plus at least 2cm of ano-rectum is included in the CTV-V.
        - If the primary vulvar lesion involves the rectum and/or mesorectal LN, gross disease (i.e. GTV) plus anus and whole mesorectum are included in the CTV-V.
    - Urethral Involvement:
        - It is recommended that if the primary vulvar lesion is peri-urethral (ie. involving the urethral meatus, gross disease (i.e. GTV) plus at least two centimetres of urethra is included in the CTV-V. If disease extends into the mid or proximal urethra, the entire urethra and bladder neck should be included in the CTV-V.
    - Periclitoral Involvement:
        - If the primary vulvar lesion involves the clitoris, gross disease (i.e. GTV) extend to pubic bone is included in the CTV-V.

- **PTV-V** (45Gy/25#, **PTVp_4500**):
    - Add a margin of 5-10mm to the CTV-V.

Adjuvant vulva

- **CTV-TB (CTVp_dose**):
    - Individualised target based on the tumour bed with a margin of at least 5mm. If there is perineural invasion or lympho-vascular invasion it is recommended to treat the whole vulva and mons (RCR expert panel recomendations).

- **PTV-TB (PTVp_dose**):
    - Add a margin of 5-10mm to CTV-TB.
    - The dose to PTV tumour bed is defined by the resection margin:
        - Margin >> 3mm: 45Gy/25#
        - Margin 1-3mm: 55Gy/25#
        - Margin ≤ 1mm: 60Gy/25#
    - Sequential boost maybe considered in individuals where acute toxicity is of concern. Consider 8-10# at 1.8Gy/#.

STEP 2 - Outlining nodal Volumes

Involved lymph nodes:

- **GTV-N (GTVn_6000):**
    - Outline any involved lymph nodes (based on planning CT and diagnostic MRI, PET-CT).
    - Multiple lesions to be numbered 1 to n in cranio-caudal direction, based on TV extent. If at same level, use right to left.

- **CTV-NB (CTVn_6000)**:
    - GTV-N with a 0-5 mm margin, edited around bone (can be labelled individually e.g CTV-N1)

- **PTV-N (**60Gy/25#, **PTVn_6000):**
    - Add a margin of 5mm to the CTV-N.

Extra-capsular disease in lymph node dissection:

Treat extra-capsular spread as residual disease, receiving a boost of up to 60Gy/25#.

- **CTV-NB (CTVn_6000):**
    - Outline the nodal area corresponding to the involved node based on the diagnostic images (CT, MRI and PET) and operation note, taking care to include the area with ECS with generous margin.

- **PTV-NB** (60Gy/25#, **PTVn_6000**):
    - Add a margin of 5mm to the CTV-N.

No extra-capsular disease in lymph node dissection:

Treat the involved nodal bed, receiving a boost of at least 56Gy EQD2 (55Gy/25# - EQD2 55.92Gy), though 50Gy/25# may be sufficient (RCR expert panel recomendations).

- **CTV-NB (CTVn_dose):**
    - Outline the nodal area corresponding to the involved node based on the diagnostic images (CT, MRI and PET) and operation note.

- **PTV-NB** (**PTVn_dose**):
    - Add a margin of 5mm to the CTV-N.

Potential microscopic spread in the setting of micrometastasis in SLN

- **CTV-NB (CTVn_5000):**
    - According to the GROINS V II, the radiotherapy target volume receiving 50Gy/25# included the inguinofermoral region and the distal part of the external iliac lymph nodes - to the level of the inferior border of the sacroiliac joints (see images in RCR expert panel recomendations).

Potential microscopic spread in elective nodal areas

- **CTV-EN (CTVe_4500):**
    - Bilateral internal and external iliac lymph ndoes: Outline from the bifurcation of the common iliac vessels superiorly to the top of the femoral heads inferiorly. Add a margin of 7mm to the vessels and edit it to remove muscle and bone. As the volumes separate, connect the ipsilateral internal and external iliacs along the pelvic sidewalls with a 17mm rollerball.
        - If treating positive external iliac lymph nodes, use a 15mm rollerball anterior to the external iliac artery as lymph nodes may be found more distally.
    - Obturators: Below the level of the internal and external iliac vessels, continue to employ a 17mm rollerball along the pelvic sidewall. Ensure muscle is excluded.

Continue the volume inferiorly until the obturator vessels exit the obturator foramina.

- Inguinal lymph nodes: Inguinal nodes should be drawn as a compartment. The volumes must cover superficial and deep inguinal lymph nodes of the femoral triangle. All visible nodes and lymphoceles should be included.
    - The superior extent is where the external iliac vessels leave the pelvis. The inferior extent is at the bottom of the lesser trochanter. The lateral aspect is the ventral fascia of the ileopsoas and sartorius muscles. The posterior border is ventral fascia of the pectineus muscle. The anterior border is 5mm below the skin surface. The medial border should be at least 20-25mm medial to the inguinal vessels.
- If one groin (inguino-femoral region) is involved, treat the other groin (due to potential changes in lymphatic flow).
- Pre-sacral: If pre-sacral nodes are included, contour anterior to the sacrum and connect the bilateral pelvic nodal groups using a 10mm rollerball. Do not include the sacral foramina. Continue this down to the bottom of S2 or until the pyriformis muscle becomes visible. LN from S1-inferior margin of S2.
- Para-aortic: If para-aortic lymph nodes are included, continue to outline vessels (aorta and medial half of inferior vena cava) up to the renal hilum. Add a margin of 7mm and edit by extending it posterolaterally along the vertebral body to cover the left para-aortic area and remove muscle and bone.
- Treat the 'echelon above' the highest involved LN.
- In general, LN coverage for the CTV should include the same LN regions on each side.
- In highly selected cases, the upper level of the CTV may be at a different level on the left and right sides. However, this is not recommended outside of a clinical trial, as there is no evidence that it is safe to treat asymmetrically.
- Include CTV-N in volume.
- See pelvic lymph node atlas Melanie Powell and A Taylor for details of lymph node outlining.

Nodal CTV volumes to include by position of primary tumour

Anatomical involvement of primary tumour	Inguino-femoral LN	External iliac LN	Internal iliac LN	Obturator LN	Common iliac/ presacral LN	Mesorectal LN
Vulva only	Yes	Yes	Yes	Yes		
Lower 1/3 vagina	Yes	Yes	Yes	Yes		
Upper 2/3 vagina	Yes	Yes	Yes	Yes	Yes	
Anus	Yes	Yes	Yes	Yes		Yes
Periurethral	Yes	Yes	Yes	Yes		
Periclitoral	Yes	Yes	Yes	Yes		

- **PTV-EN (45Gy/25#; PTVe_4500):**
    - Add a margin of 5mm to the CTV-EN

<u>STEP 3 – Adding a skin bridge</u>

- The skin Bridge between the vulvar and lymph node region should be included bilaterally where primary and nodal areas are treated. Include this by extending the CTV-EN volume to join to the CTV-V volume (see images in RCR expert panel recomendations).

STEP 4 - Combining tumour and nodal volumes and creating PTVs

Once the CTVs above have been outlined, add a margin to create the PTVs as described below:

- **PTV60** (PTVpn_6000)
    - Add a margin of 5mm to the CTV-VB and label it PTV-VB.
    - Add a margin of 5mm to the CTV-NB and label it PTV-NB.
    - Adjuvant – add a margin of 5mm to CTV-TB, if resection margin ≤ 1mm, to create PTV-TB.
    - Combine these volumes (PTV-VB / PTV-TB and PTV-NB) to create a PTV60.

- **PTV45** (PTVpn_4500)
    - Add a margin of 5-10mm to the CTV-V and label it PTV-V.
    - Add a margin of 5mm to the CTV-EN and label it PTV-EN.
    - Adjuvant – add a margin of 10mm to CTV-TB, if resection margin >3mm, to create PTV45.
    - Combine these volumes (PTV-V / PTV-TB and PTV-EN) to create a PTV45.

- **PTV55** (PTVp_5500, PTVn_5500)
    - Adjuvant – add a margin of 5-10mm to CTV-TB, if resection margin 1-3mm, to create PTV55.
    - Add a margin of 5-10mm to the CTV-NB and label it PTV-NB.
- **PTV50** (PTVn_5000)
    - Add a margin of 5-10mm to the CTV-NB to create PTV50.

STEP 5 - Outlining organs at risk

Labelling of OARS to reflect PROKNOW.

- Bladder: The whole organ including bladder neck
- Rectum: From the anorectal junction inferiorly to the rectosigmoid junction superiorly
- Bowel: Outer contour of bowel loops including mesentery (all bowel including sigmoid), extending a few slices above the PTV up to the lowest isodose.
- Femoral heads: Femoral head and neck to the lesser trochanter bilaterally
- For para-aortic fields also include:
    - Bilateral kidneys: Outer contour excluding renal pelvis
    - Cord Canal: From L1-L2 extending it 2cm above the PTV
    - Duodenum

Naming and colour convention for ROIs

ROI	Naming convention (ProKnow)	Colour Convention
GTV, CTV, PTV	• Dose in cGy to be used as a suffix. • Structure type to be denoted: p- primary tumour n- nodal disease e- elective disease m- metastatic disease • Boost will be identified through prescription. • If CTVp & CTVn are summed to generate a single PTV as receiving the same dose, use PTVpn. • If CTVn & CTVe are summed to generate a single PTV as receiving the same dose, use PTVne • Multiple lesions to be numbered 1 to n in cranio-caudal direction, based on the PTV extent. If at same level, use right to left (e.g. PTVn1_6000 or PTVm2_5000) • Use "Eval" to designate the final evaluated PTV. This term should be applied when any cropping from the skin or PTVs has been performed, (PTVp_Eval_6000)	**As per local protocol**
Bladder	**Bladder**	**Yellow**
Rectum	**Rectum**	**Brown**
cord canal	**SpinalCanal**	**Green**
Femoral heads	**FemoralHead_R; FemoralHead_L**	
Kidneys	**Kidney_R; Kidney_L**	

6. Dose Calculation and Plan Evaluation

Beam Energy / Modality

- EBRT Linear accelerator operating at 6MV or 10MV.

Beam Arrangement

- Combination of 2-3 full and partial arcs.

Dose Prescription

- Radiotherapy dose prescription is to the median PTV dose, D50%, in accordance with ICRU 83.
- The dose to the PTV 45 should be homogenous, with at least 95% of the PTV covered by the 95% prescription isodose and dose maximum less than 107% of the prescribed dose.
- Dose prescription for microscopic disease is 45Gy in 25# to pelvis/para-aortic area.
- Dose prescription for macroscopic disease or high risk areas such as positive margins/ extra-capsular spread is 60Gy in 25#.
- Dose prescription for close margin (1-3mm) is 55Gy/25#.
- Prescription for nodal boost is 60Gy/25#.

- Prescription for nodal boost is 55Gy/25# if no extra-capsular disease in lymph node dissection.
- Nodal doses may be reduced due to location or size of node, at the discretion of the clinician.
- In the setting of SNL with micrometastasis, dose prescription for the PTV elective node is 50Gy/25#.
- A simple VMAT or IMRT plan may be used to treat with palliative radiotherapy as an alternative to ant/post Prosoma fields, depending on the volume to be treated, the prognosis of the patient and the urgency to start treatment.
    - 8Gy in 1#
    - 20 Gray in 5#
    - 30 Gray in 10#
    - 24-36Gy 4-6# over 4-6 weeks
    - 36-40Gy 15# over 3 weeks

Dose Objectives

- Clip PTV 3mm from skin in vulva
- Clip PTV 5mm from skin in inguinal nodes
- If using 5mm bolus clip PTVs to skin

Targets	Primary Goal	Secondary Goal**
PTVp_6000	D98% >95% (57Gy)	D95 >95% (57Gy)
PTVn_6000	D99% >90% (54Gy)	D95 >90% (54Gy)
(boost - vulva and nodes)	D50% = ±1%	
	D5%<105% (63Gy)	
	D2%<107% (64.2Gy)	
PTVp_5500	D98% >95% (52.25Gy)	D95 >95% (52.25Gy)
PTVn_5500	D99% >90% (49.5Gy)	D95 >90% (49.5Gy)
(boost - tumour bed and nodes)	*D5%<105% (57.75Gy)	D5%<105% (57.75Gy)
	*D2%<107% (58.85Gy)	D2%<107% (58.85Gy)
PTVn_5000	D98% >95% (47.5Gy)	D95 >95% (47.5Gy)
(boost- sentinel lymph node)	D99% >90% (45Gy)	D95 >90% (45Gy)
	*D5%<105% (52.5Gy)	D5%<105% (52.5Gy)
	*D2%<107% (53.5Gy)	D2%<107% (53.5Gy)
PTVp_4500	D98% >95% (42.75Gy)	D95% >95% (42.75Gy)
PTVe_4500	D99% >90% (40.5Gy)	
(vulva and elective nodes)	*D5% <105% (47.25Gy)	D5% <105% (47.25Gy)
	*D2% <107% (48.15Gy)	D2% <107% (48.15Gy)

**V105% and V107% for low-dose PTV may not be achievable when the high-dose PTV is relatively large and the low-dose PTV is small.*

*****Secondary goals may be compromised when prioritizing organ-at-risk (OAR) constraints.***

Organs at Risk (OARs) Limits

(Updated dose constraints of EMBRACE II study protocol version 1.0.)

P	**No lymph node involvement**		**Involved lymph nodes**	
	Hard dose constraints	Soft dose constraints	Hard dose constraints	Soft dose constraints
Bowel	Dmax < 105% (47.3Gy)	V40Gy < 250 cm3* V30Gy < 500 cm3*	Dmax < 105% in regions outside 10–15mm from PTV-N	When no para-aortic irradiation: V40Gy < 250 cm3* V30Gy < 500 cm3* For para-aortic irradiation: V40Gy < 300 cm3* V30Gy < 650 cm3* Dmax < 57.5Gy**
Sigmoid	Dmax< 105% (47.3Gy)		Dmax< 105% (47.3Gy)*	Dmax < 57.5Gy**
Bladder	Dmax < 105% (47.3Gy)	V40Gy < 60* V30Gy < 80*	Dmax < 105% in regions outside 10–15 mm from PTV-N	V40Gy < 60%* V30Gy < 80%*
Rectum	Dmax < 105% (47.3Gy)	V40Gy < 75%* V30Gy < 95%*	Dmax < 105% in regions outside 10–15 mm from PTV-N	V40Gy < 75%* V30Gy < 95%* Dmax < 57.5Gy**
Spinal Cord Canal	Dmax < 48Gy		Dmax < 48Gy	
Femoral Heads	Dmax < 50Gy		Dmax < 50Gy	
Body	Dmax < 107%		Dmax < 107%	
Kidney	Dmean < 15Gy	Dmean < 10Gy	Dmean < 15Gy	Dmean < 10Gy
Transposed Ovaries	Dmean<8 Gy	Dmean < 5 Gy	Dmean<8 Gy	Dmean < 5 Gy
Duodenum	V55<15cm3		V55<15cm3	
Anus ***			No defined constraint D50% <45 Gy may be appropriate	

References:

The EMBRACE II study: The outcome and prospect of two decades of evolution within the GEC-ESTRO GYN working group and the EMBRACE studies (https://pmc.ncbi.nlm.nih.gov/articles/PMC5862686/)	*Soft constraints which can be used as optimisation constraints as they are not based on clinical evidence. The constraints are not supposed to be fulfilled by all patients, but rather by ~70-80% of the patients.
ICRU report83	Dmax /Dmin can be replaced with D0.1cc /D0.1% and D99.9%
Retained from local protocols	** OAR Max dose Planning constraint

*** The RCR expert panel recommendations for radiotherapy treatment for vulval cancer" Feb2024

7. Treatment Delivery

Chemotherapy

- Concurrent chemotherapy should be prescribed in all patients that are considered fit for standard treatment.

- Acceptable regimens are:
    - Weekly Cisplatin 40mgs /m2 (max70mgs) x 5 cycles should be the standard treatment but where fit for chemotherapy but if cisplatin is contraindicated alternatives would include:
    - Weekly carboplatin AUC2 x 5 cycles

Treatment Verification

- Patient-specific IMRT/VMAT QA as per separate work instructions
- Cone beam CT image guidance is performed daily for every fraction and couch correction is based on bony fusion.

8. Supportive care

- Patient's weight should be measured weekly.
- Patients will receive the Departmental pelvic radiotherapy information leaflets.
- For patients having concurrent chemoradiation, EBRT must start on a Monday. If Monday is a bank holiday, EBRT must start Tuesday. Patients who are not receiving concurrent weekly cisplatin chemotherapy should ideally start on a Monday but this is not as critical.
- Patients receiving chemoradiation will have blood tests on Mondays and be seen in chemotherapy clinic every week in order to assess fitness for chemotherapy prior to their radiotherapy treatment.
- Patients should have that day's fraction of radiotherapy immediately after chemotherapy has been given and if possible, during the post-hydration.
- Patients receiving radiotherapy only will be assessed in the radiotherapy department on a weekly basis, together with weekly blood tests.
- For radical treatment Hb must be maintained above 120 with blood transfusions in order to maximise the treatment effect. For adjuvant treatment with no macroscopic /microscopic disease this is not necessary.
- As per Category 1, all treatment gaps must be compensated as per RCR guidelines. If interstitial brachytherapy is taking place on the Tuesday after treatment finishes, the additional fraction can occur on the Monday before the brachytherapy.
- Management of side effects is as follows:
    - Diarrhoea - treat with low fibre diet initially (all patients to receive written dietary advice) and loperamide if diarrhoea persists.
    - Skin reaction - departmental skin care policy. Topical morphine can be used for pain.
    - Cystitis - exclude UTI (or treat with antibiotics if UTI confirmed). Advise high fluid intake +/- cranberry juice.

- Vaginal dilators – all patients will be seen by the Gynae Site specialist Radiographer or Gynae CNS during their Radiotherapy to discuss vaginal dilators unless deemed inappropriate by the Consultant.

13. Follow-up after treatment

- Patients will be seen and examined in clinic 6 weeks after completion of treatment.
- Follow-up is then 3 monthly for 2 years, 4 monthly for a year and six monthly for 2 years. Patients are discharged 5 years after treatment.
- All patients should have access to local late effects service.

Appendix 1:

Volume Nomeclature

Indication	Target volumes	Abbreviation*	ProKnow** consensus (Recommended naming convention for planning and dose reporting. xxxx=dose in cGy)
Primary Radical	GTV_Vulva	GTV_V	GTVp_6000
	CTV_Vulva boost	CTV_VB	CTVp_6000
	PTV_Vulva boost	PTV_VB	PTVp_6000
	CTV_Vulva	CTV_V	CTVp_4500
	PTV_Vulva	PTV_V	PTVp_4500
Primary Adjuvant	CTV_Tumour bed	CTV_TB	CTVp_6000 (≤1mm margin) CTVp_5500 (1-3mm margin) CTVp_4500 (>3mm margin)
	PTV_Tumour bed	PTV_TB	CTVp_6000 CTVp_5500 CTVp_4500
	CTV_Vulva	CTV_V	CTVp_4500
	PTV_Vulva	PTV_V	PTVp_4500
Involved Lymph Node	GTV_Node	GTV_N	GTVn_6000
	CTV_Node boost	CTV_NB	CTVn_6000
	PTV_Node boost	PTV_NB	PTVn_6000
Lymph Node Dissection	CTV_Node boost	CTV_NB	CTVn_6000 (ECS) CTVn_5500 (no ECS) CTVn_5000 (micrometastasis in SLN dissection)
	PTV_Node boost	PTV_NB	PTVn_6000 PTVn_5500 PTVn_5000
Elective Lymph Node	CTV_Elective	CTV_EN	CTVe_4500
	PTV_Elective	PTV_EN	PTVe_4500

*The abbreviation column uses terminology which is consistent with RCR expert panel recommendations for radiotherapy treatment for vulval cancer.
** ProKnow Consensus categorises volumes as: p (primary tumour), n (nodal disease), e (elective disease), and m (metastatic disease) or pn (combining tumour and nodal volumes). Boosts are determined by the prescribed dose. The dose is expressed in cGy. Where any type of cropping from skin or PTVs has been made, "Eval" is included in the name (e.g., PTVp_Eval_6000). Multiple nodes are differentiated by cranio-caudal position of PTV (e.g. PTVn1_6000, PTVn2_5500). If at same level use right to lef.

OAR		ProKnow consensus
Bladder	The whole organ including bladder neck	Bladder
Rectum	From the anorectal junction inferiorly to the rectosigmoid junction superiorly	Rectum

Femoral heads	Femoral head and neck to the lesser trochanter bilaterally	FemoralHead_R FemoralHead_L
Kidneys	Bilateral kidneys: Outer contour excluding renal pelvis	Kidney_R Kidney_L
Spinal canal	From L1-L2 extending it 2cm above the PTV	SpinalCanal

Appendix 2: References

Consensus Recommendations for Radiation Therapy Contouring and Treatment of Vulvar Carcinoma. Gaffney et al. International Journal of Radiation Oncology. Vol 95, number 4.

An Atlas of the Pelvic Lymph Node Regions to Aid Radiotherapy Target Volume Definition. A Taylor et al, Clinical Oncology (2007) 19:542-550.

Consensus Guidelines for Delineation of Clinical Target Volume for Intensity-Modulated Pelvic radiotherapy in Post-operative Treatment of Endometrial and Cervical cancer.

Royal College of Radiologists Expert Panel Recommendations for Radiotherapy treatment for Vulvar Cancer 2024. Alexandra J Stewart et al. February 2024.

Radiotherapy Versus Inguinofemoral Lymphadenectomy as Treatment for Vulvar Cancer Patients With Micrometastases in the Sentinel Node: Results of GROINSS-V II. Oonk et al. Journal of Clinical Oncology (2021) 39:3623-3632.

ACR Appropriateness Criteria Staging and Follow-up of Vulvar Cancer. Lakhman et al. J Am Coll Radiol (2021)18:S212-S228.

ProKnow TFG7: PTV nomenclature update

British Gynaecological Cancer Society (BGCS) vulval cancer guidelines: An update on recommendations for practice 2023 (ejog.org)