West Midlands Radiotherapy Clinical Protocol

Anal Radiotherapy Protocol

Revision History

Version	Date	Summary of changes
1.0	06.11.2020	Approved by EAG
1.1	29.06.2023	Review / re-draft of Protocol – EB/IG/GH
2.0	22.11.23	Acceptance of amendments by IG
2.1	24.11.23	Acceptance of comments by PB
3.0	08.12.23	Approved by EAG
3.1	07.08.24	Draft changes in response to change request regarding supine position (for planning technique section)
3.2	14.1.25	Draft changes for consultation
3.3	5.2.25	Deletion of duplicate references/evidence base section (i.e. purely administrative change)
4.0	14.02.25	Ratified by EAG
4.1	9.7.26	Peer review wording amended
Review Date:	February 2027	

Ratified by

This document was ratified by the following people:

Name	Trust	Role	Date
Melissa Cowell/Douglas Northover	RWT	Head of radiotherapy/Clinical scientist	14.2.25
Lou Killey/Rick Sims	SaTH	Head of radiotherapy/Head of physics	14.2.25
Rosemary Simmons/Charles Fong	UHB	Head of radiotherapy/Clinical oncologist	14.2.25
Stephen West/Gareth Baugh	UHCW	Head of radiotherapy/Head of physics	14.2.25
Rajanee Bhana	UHNM	WM RT Network clinical lead	14.2.25
Gareth Webster/Bart Kurec	WAH	Head of physics/Clinical oncologist	14.2.25

Related Documents

Title	Owner	Location
Anal Cancer Guidelines (2017)	Association of Coloproctology	Guidelines for the Management of Cancer of the Colon, Rectum and Anus (2017) | ACPGBI

	of GB & Ireland (ACPGBI)	
National guidance for VMAT or IMRT in anal cancer	RCR published 30/05/24.	https://www.rcr.ac.uk/media/tahena34/rcr-guidance-for-vmat-or-imrt-in-anal-cancer.pdf
PLATO trial protocol	NCRI	PLATO - Personalising Anal cancer radiotherapy dose - Health Research Authority (hra.nhs.uk) PLATO | BSGAR ISRCTN - ISRCTN88455282: PLATO - Personalising anal cancer radiotherapy dose

Contents

West Midlands Radiotherapy Clinical Protocol 1
Anal Radiotherapy Protocol 1
Revision History 1
Ratified by 1
Related Documents 1
Purpose 4
Baseline Assessment and Investigations 4
Radical Intent - IMRT 5
Chemotherapy 5
Clinical Trials 5
Information and Consent for Patients 5
Planning Technique 6
Target Delineation 6
Dose and Fractionation 7
Critical Organs 9
Peer review 9
IMRT planning sheet 9
Treatment Verification 9
Palliative Intent 10
On Treatment Review 10
Acute Skin Toxicity Management 10
Significant Late Toxicities 10
Treatment Letter 11

Follow Up 11

Purpose

To provide a standardised departmental protocol for planning and delivery of IMRT for anal cancers within the West Midlands. This protocol is based on the Royal College of Radiologists (RCR) National rectal cancer intensity-modulated radiotherapy (IMRT) guidance 2021 document. Association of Coloproctology of GB & Ireland (ACPGBI) Anal Cancer Guidelines (2017) and NCRI PLATO trial protocol.

Definitive chemoradiotherapy (CRT) can result in excellent local control and overall survival for anal cancer. It is used instead of abdominoperineal excision (APER) in surgically respectable cases and can offer an opportunity for cure in surgically unresectable cases. Several published case series of patients treated with intensity-modulated radiotherapy (IMRT), report less acute toxicity than conformal techniques but similar disease control and survival.

Patients who are unfit for full definitive CRT or have metastatic disease may be considered for palliative radiotherapy (with or without chemotherapy) for symptom control. An appropriate treatment technique and dose fractionation regime should be chosen after considering the patient's prognosis, disease burden, symptoms and performance status.

Baseline Assessment and Investigations

- The regional Anal Cancer MDT should review histology and imaging of all cases. Attempt to define whether tumour is arising from the anal canal or the anal margin.

- Biopsy proven SCC (including keratinising, non-keratinising and basaloid/cloacogenic sub-types). Stromal invasion can occasionally be very difficult to demonstrate in extremely well differentiated SCCs and thus reported as AIN3. In this situation, the clinical appearance on EUA and imaging should guide management.

- History and clinical examination:
    - Detailed clinical examination by Clinical Oncologist to assess size, location and extent of anal canal involvement of tumour. Assess sphincter function.
    - Assess performance status and HIV/Hepatitis B status.
    - If known to be HIV +ve, assess up to date immune status (viral load, CD4 count). Liaise with HIV team, ensure on cART and consider opportunistic infection prophylaxis.
    - Smoking status - advise to stop, as associated with worse outcome.
    - Female patients:
        - PV exam by the Clinical Oncologist and/or Gynaecologist.
        - Ensure cervical screening is up to date.
    - EUA with referring surgeon to assess local disease can be useful if patient is unable to tolerate an adequate digital rectal examination.
    - Fertility - consider sperm storage in males, and referral to fertility team for females.
- Imaging:
    - MRI pelvis
    - CT chest, abdomen, pelvis
    - Whole body FDG PET/CT in ≥T2 tumours is highly recommended
    - Where management will be affected, consider USS ± FNA of any suspicious inguinal lymph nodes

- Document TNM stage based on imaging and clinical examination findings. Ideally use both TNM versions 7 and 8, which will allow comparisons with historical data.
- Other investigations
    - Baseline bloods (FBC, renal, liver and bone function)
    - DPYD variant status

A defunctioning stoma should be considered in the following circumstances:

- Tumour invasion into posterior vaginal mucosa.
- Significant faecal soiling due to sphincter dysfunction by tumour.
- Severe perineal destruction/infection.
- Patients with significant pain/tenesmus, minor incontinence or tumours at risk of mechanical obstruction may be managed with a defunctioning stoma, at the discretion of the local clinicians.
- Fistulation.
- Rarely required in tumours measuring ≤5 cm.

❖ Note ACT II and other published data describe a low reversal rate once a stoma has been formed. Therefore a colostomy (end or loop) is the preferred option over ileostomy in the majority of cases.

Radical Intent - IMRT

- SCC Anal Cancer
- Primary treatment

Chemotherapy

Use of synchronous chemotherapy is recommended and the infusion should start at least 1 hour prior to radiotherapy:

- Mitomycin C 12 mg/m^2 (max. 20 mg) day 1 with Capecitabine 825 mg/m^2 BD on days of radiotherapy.

  OR
- Mitomycin C 12 mg/m^2 (max. 20 mg) day 1 with 5FU 1000 mg/m^2 days 1-4 and day 29-32 given either as an outpatient pump or as an inpatient.
- Indications to consider 5-FU over Capecitabine:
    - Cardiac disease/dysfunction
    - Renal/liver disease/dysfunction
    - PS 2-3 (see section on locally advanced disease, non-metastatic, PS 2-3 below)
    - Drug interactions with Capecitabine
    - Concerns about patient compliance with Capecitabine

Clinical Trials

- Details of clinical trials is included in WM Trial Doc.

Information and Consent for Patients

- Each patient should be consented with individualised information of planned treatment, individualised risk / benefits and toxicities.
- Patients should also receive a local patient information sheet or MacMillan information booklet.

- Booking form and consent completed by IR(ME)R practitioner.

Planning Technique

- Local CT scanning protocols to include scanning levels and patient immobilisation.
- Patients should be supine with a full bladder approx. 200-400 ml (as per local protocol).
- Standard position is supine. If there is not 5mm of tissue around the whole GTV, consider a tailored wax bolus or sheet bolus. Avoid treating the patients prone unless they are unable to lie in a supine position. If the dosimetry with the bolus when supine cannot be guaranteed then treat prone
- Inguinal lymph nodes: 1.5 cm of bolus should be used if there is visible skin infiltration or insufficient soft tissue covering involved or uninvolved lymph nodes.
- The distal point of macroscopic disease or anal verge, whichever is more inferior, should be delineated with a radio-opaque marker prior to imaging. For tumours which extensively infiltrate the buttocks, a radio-opaque marker should delineate the most lateral extent of disease or erythema.
- Following local excision, a radio-opaque marker must be placed on the excision scar or anal verge.
- Use of IV contrast to aid delineation of pelvic vessels is strongly recommended unless contraindicated.
- Use of oral contrast is discretionary but may aid delineation of small bowel.

Inverse planned volume IMRT (VMAT or Tomotherapy) is the preferred treatment modality, using a simultaneous integrated boost technique.

If patient has bilateral metal hip replacements consider referral to a centre with access to Tomotherapy.

Target Delineation

- For the purposes of this guideline, lymph node status is based on TNM 7.

T1 N0 Tumours without high-risk features (poorly-differentiated tumour, LVI/PNI +ve)

In small, good prognosis tumours CRT to the primary tumour plus a margin only may be considered, avoiding elective LN irradiation. In these cases:

- **GTV (anal)** gross primary anal tumour volume OR
  site of primary tumour and local excision scar
- **CTV (anal)** GTV (anal) + 10 mm, then manually enlarge to cover entire anal canal (including outer border of external sphincter, from anorectal junction (approximately 4 cm superiorly from anal verge) to anal verge). Edit to exclude bone and muscle.
- **PTV (anal)** CTV (anal) + 10 mm

T1 N0 with high-risk features needing prophylactic nodal irradiation, T2 N0 or T1-2 N1 (mesorectal LNs) at clinician discretion

- **GTV (anal)** gross primary anal tumour volume (not whole lumen)

- **GTV (LNs)** all suspected involved nodes

- **CTV (anal)** GTV (anal) + 10 mm, then manually enlarge to cover entire anal canal (including outer border of external sphincter, from anorectal junction (approximately 4 cm superiorly from anal verge) to anal verge). Edit to exclude bone and muscle.
- **CTV (LNs)** GTV (LNs) + 5-10 mm, edited off bone, unless bone involved.
- **CTV (elective)** elective nodal regions (see UK IMRT guidelines).

- **PTV (anal)** CTV (anal) + 10 mm
- **PTV (LNs)** CTV (LNs) + 10 mm
- **PTV (elective)** CTV (elective) + 5-10 mm*
  *clinician's discretion and local departmental audits on setup/motion margins

Locally advanced tumours: T3-4 N(any) or T(any) N2-3 or T1-2 N1 at clinician discretion

- **GTV (anal)** gross primary anal tumour volume (not whole lumen)
- **GTV (LNs)** all suspected involved LNs

- **CTV (anal)** GTV (anal) + 15 mm, then manually enlarge to cover entire anal canal (including outer border of external sphincter, from anorectal junction (approximately 4 cm superiorly from anal verge) to anal verge). Edit to exclude bone and muscle only if not involved.
- **CTV (LNs)** GTV (LNs) + 5-10 mm
- **CTV (elective)** Elective nodal regions (see UK IMRT guidelines).

- **PTV (anal)** CTV (anal) + 10 mm
- **PTV (LNs)** CTV (LNs) + 10 mm
- **PTV (elective)** CTV (elective) + 5-10 mm*
  *clinician discretion and local departmental audits on setup/motion margins

Dose and Fractionation

Locally Excised T1-2 N0

Anal margin

- Lateral or deep margin -ve (>1 mm) observe
- Lateral or deep margin +ve (≤1 mm) observe or CRT (dose below)

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction (Gy)*	*Duration (wks)*
Scar (PTV-Anal)	41.4	23	1.8	4.5

Anal Canal

- Margin -ve (>1 mm) observe (no data)
- Margin +ve (≤1 mm) CRT (dose options below).
  Include lower 5 cm of mesorectum.

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction (Gy)*	*Duration (wks)*
Scar (PTV-Anal)	41.4	23	1.8	4.5
Scar (PTV-Anal)	45	25	1.8	5

OR

For definitive CRT, dose prescription

T1-2 N0

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction (Gy)*	*Duration (wks)*
Elective (PTV-Elec)	40	28	1.43	5.5
Gross anal disease (PTV-Anal)	50.4	28	1.8	5.5

T1-2 N1

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction (Gy)*	*Duration (wks)*
Elective (PTV-Elec)	40	28	1.43	5.5
Gross LN disease (PTV-LNs)	50.4	28	1.8	5.5
Gross anal disease (PTV-Anal)	50.4 or 53.2 Gy (clinician discretion)	28	1.8 or 1.9	5.5

T3-4 N0 or T(any) N2-3

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction (Gy)*	*Duration (wks)*
Elective (PTV-Elec)	40	28	1.43	5.5
Gross LN disease (PTV-LNs)	50.4	28	1.8	5.5
Gross LN disease >3cm(PTV-N3)	53.2	28	1.9	5.5
Gross anal disease (PTV-Anal)	53.2	28	1.9	5.5

Locally advanced disease, non-metastatic, PS 2-3

Volume	*Total Dose (Gy)*	*Total Fractions*	*Dose/fraction(Gy)*	*Duration (wks)*
Elective (PTV-Elec)	32	20	1.6	4
Gross LN disease (PTV-LNs)	40	20	2	4
Gross anal disease (PTV-Anal)	40	20	2	4

Critical Organs

OAR contouring and doses as per national and international guidelines:

- **Small bowel** all individual small bowel loops to >2 cm above superior extent of both PTVs
- **Genitals** penis and scrotum in males, vulva up to mons pubis in females
- **Bladder** entire bladder including outer bladder wall
- **Femoral heads** outline both sides to the mid-lesser trochanters

Peer review

Peer review should be undertaken in line with the West Midlands regional guidance agreed in December 2025 which identifies which cases should be subject (as a minimum) to peer review. Please refer to the West Midlands Peer Review guidance (December 2025).

IMRT planning sheet

Organ	OAR / Target	Objective	Mandatory Constraints
PTV	D99%	>90%	>90%
	D95%	>95%	>95%
	D50%	Between 99% - 101%	Between 97% - 101%
	D5%	<105%	<107%
	D2%	<107%	<110%
Lower dose-level PTV's	D99%	>90% of prescribed dose	>90% of prescribed dose
	D95%	>95% of prescribed dose	>95% of prescribed dose
	D50%	<110%	<125%
Small Bowel	D200cc	<30Gy	<35Gy
	D150cc	<35Gy	<40Gy
	D20cc	<45Gy	<50Gy
	D5cc	<50Gy	<55Gy
Femoral Heads	D50%	<30Gy	<45Gy
	D35%	<40Gy	<50Gy
	D5%	<50Gy	<55Gy~~Y~~
Genitalia	D50%	<20Gy	<35Gy
	D35%	<30Gy	<40Gy
	D5%	<40Gy	<55Gy
Bladder	D50%	<35Gy	<45Gy
	D35%	<40Gy	<50Gy
	D5%	<50Gy	<58Gy

Treatment Verification

- Daily on-line imaging performed using 3D cone beam CT or Tomotherapy MVCT as available.

- Local protocols must be available describing action levels and concomitant patient imaging doses.
- Delta4 measurements taken prior to RT delivery
- Where in-vivo dosimetry (as defined by local protocols) is undertaken, this should be completed within first 3 fractions

Palliative Intent

Patients with limited distant metastatic disease and good PS may be considered for definitive CRT to maximise locoregional disease control. There may be options to treat extra-pelvic disease e.g. resection of liver or lung metastases, SABR.

Patients with locally advanced disease, but are unfit for CRT, or metastatic disease may be considered for palliative radiotherapy.

- 30 Gy in 10 fractions over 2 weeks
- 20 - 25 Gy in 5 fractions over 1 week
- 8 Gy in single fraction

On Treatment Review

- Patients reviewed weekly for radiotherapy toxicities, bloods (FBC & biochemistry) and ensure taking correct Capecitabine dose.
- Patients with vaginas who wish to remain sexually active should be referred to the Gynaecology CNS for advice and provision of vaginal dilators
- After completion of treatment patients should have a routine follow up appointment at 6-8 weeks.
- Consider post treatment baseline MRI at 3-6 months.

Acute Skin Toxicity Management

Consider the following options to manage common skin toxicity:

- Analgesia – Paracetamol, NSAIDs, Oramorph
- Topical lidocaine ointment particularly around anal opening
- Polymem dressings
- Silver sulfadiazine or antibacterial enzyme cream/gel e.g. Flamazine or Flaminal for skin breakdown (can be used during radiotherapy but advise to apply after each treatment and not before)

Significant Late Toxicities

- Bladder/bowel habit change – increased frequency and urgency, longer-term diarrhoea
- Anal leakage/incontinence
- PR bleeding
- Fistula or bowel narrowing/blockage/anorectal stricture – may require stoma formation
- Pelvic bone thinning and increased risk of sacral insufficiency fractures or avascular necrosis of the hips
- Lymphoedema
- Infertility

- Erectile dysfunction in males
- Early menopause in females
- Vaginal narrowing, shortening and dryness, dyspareunia in females
- Radiation-induced secondary cancer in treatment field (<1% risk)

Treatment Letter

- On completion of treatment a summary of the radiotherapy dose and toxicities experienced are documented.
- In addition, expected acute and late side effects are detailed with recommended treatments.

Follow Up

Follow up should be based on the ACPGBI 2017 anal cancer guidelines:

- Initial clinical assessment at 6-8 weeks, then 4-8 weekly until clinical and radiological complete response.
- Continue clinical assessment at 3-4 monthly intervals until 24 months, then 6-9 monthly until 60 months.
- Consider initial MRI pelvis at 3-6 months and repeat 3 months later if complete radiological response not yet achieved.
- Consider CT chest, abdomen and pelvis at 12-18 months and at 24-36 months (as per colorectal cancer guidelines).
- In the event of suspected residual or recurrent disease, restage with MRI and CT and re-discuss in Anal Cancer MDT. For management of treatment failure, refer to ACPGBI 2017 anal cancer guidelines.