TARGET VOLUME DELINEATION

RECTAL CANCERS



Dr Umesh Mahantshetty, MD, DNB, DMRT

Department of Radiation Oncology

Tata Memorial Hospital

Mumbai, India

ICRO 2009_ Lucknow

OBJECTIVES

Natural history and patterns of spread

- Local
- Nodal
- Systemic
- 2. Radiological Anatomy
 - Anorectum, rectum, mesorectum, pelvic organs
 - internal iliac, external iliac, presacral, inguinal/femoral vessels and nodes
 - anastomosis, perineal scars and presacral region



CT+RT (unfit for Sx)

* Highlights the Role of Radiation in Rectal Cancers

Role of RT – Rectal Cancer

- "In contrast to colon cancer, there is a significant risk of local-regional failure as the only or first site of recurrence in patients with curative resected rectal cancer."
 - Stage I 5% to 10%
 - Stage II up to 25% to 30%
 - Stage III up to 50% or higher
 - "Combined post op CT+RT improves local control and survival in stage II and III patients and is recommended"

NIH Consensus Conference on Adjuvant Therapy for Patients with Colon and Rectal Cancer, JAMA, Sept. 19, 1990 4

Carcinoma Rectum: Need for Adjuvant RT / CT?

- Curative Surgery mainstay of treatment.
- After curative resection the 5 year survival
 80% Stage I

40% Stage III

- Local recurrence a major site of failure ranging from 5% in few selected series to about 50% in most reports.
- Distant (hepatic/non-hepatic) metastasis after Sx : 15-40%
- LF associated with devastating symptoms that severely affects the QOL & difficult to salvage.

PATTERNS OF PELVIC FAILURE

Author/ref	Year	$N^\circ\text{pts}$	Pelvic subsite	Treatment
Syk [17]	2005	880	Anastomosis, presacral pelvic wall, pelvic floor	preoperative RT+surgery (528 pts); surgery alone (352 pts)
Roeder [18]	2006	243	retrovescical/retroprostatic, anastomosis, promontorium, ileocecal, perineum	Surgery +IOERT to the presacral space
Kim [19]	2008	366	tumor bed, anastomosis, anterior lateral spaces	Preoporative RT+surgery
Kusters [20]	2008	1079	presacral, lateral spaces, anterior, anastomosis, perineum	TME alone (376), preoperative RT+TME (379), Extended limphnode dissection (ELND)+ abdominoperineal excision and resection of anterior organs (324)

Ippolito, et al; Acta Oncologica,47:7,1317-1324; 2008

These recurrence sites serve as benchmark for Contouring and Treatment with Newer RT Techniques

Importance of Imaging in Radiation therapy today





Knowledge of Principles and 2 D X-ray based planning : Essential



ADVANCES IN RADIATION THERAPY

- Stereotactic radiotherapy using SBF
- Intensity Modulated Radiation Therapy (IMRT)
- IGRT etc..



IJROBP 65 (4) 1129-1142; 2006

"You treat what you mark as target and spare what you mark as OAR"

Guidelines proposal for pelvic nodes CTV drawing										
Node chains	Cranial margin	Caudal margin	Anterior margin	Lateral margin	Posterior margin	Medial margin				
External iliac nodes	Common iliac bifurcations	Femural ring: disappea- rance of lateral muscles of abdominal wall and artery gets lateral	Fat of small bowel Deferent duct or round ligament	Cranially	Cranially	Cranially				
	(about L5–S1)			Iliac muscle	External iliac vein	Ureter				
				Caudally	Caudally	Caudally				
				Ileopsoas muscle	Pubic bone (supe-	Bladder				
				Iliac bone	rior branch)					
				External iliac vein						
Internal iliac nodes	Common iliac bifurcations	Cranial sections of coc- cigeal muscle	Bladder	Cranially	Cranially	Mesocolon				
	(about L5–S1 space)		Uterus	Psoas muscle	Sacral wing	Uterus				
				Internal iliac vein	Caudally	Bladder				
				Iliac bone	Piriformis muscle					
				Sacroiliac joint						
				Caudally						
				Piriformis m.						
				Internal obturato-						
Obtimitien	Creatial as ations of abtuar	S	Enternal Ilina secia	rius m.	Internal abtenution	Diaddaa				
nodes	tor muscle	ior branch of pubic bone	External mac veni	hum Caudally	muscle	Diadee				
	tor musee			Internal obturator	musere					
				muscle						
Pudendal nodes	Cranial sections of cocci-	Inferior sections of inferior branch of pubic bone	Cranially	Cranially	Cranially	Elevator ani				
	geal muscle		Posterior portion of Sciatic n. internal obturatorius	Gluteus muscle	mesorectum					
			muscle							
			Acetabulum	Gluteus m.	Caudally	Elevator ani m.				
			Caudally	Caudally	Ischiorectal fossa					
			Angle between obtu-	Internal obturator	fat					
			rator muscle and ele-	muscle						
Deen in minul	Eamural ring, dicannea	Isobiatic tubar	Plane on the anterior	Sectorius and	Pastineus m	Subcutis and pac-				
nodes	rance of lateral muscles of	Isematic tuber	face of sartorius mus-	ileonsoas mm	Pectineus III.	tineus muscle				
	abdominal wall and artery		cle	Femoral vein	•	Spermatic cord or round ligament Bladder				
	gets lateral			i emorar vem						
	2			Rectum femoris						
				m.						
Superficial inguinal nodes	Cranial section of sartorius	Section of sartorius and adductor muscles cros- sing	Subcutis and cutis	Lateral edge of	Femural vessels	Spermatic cord or round ligament				
	muscle			sartorius muscle						
				Subcutis	Ileopsoas	Trasversus abd.				
						m.				
				Rectum femoris Anterior face of	Subcutis					
				m. pecti Ileopsoas m. Addu Sarto	pectineus m.					
					Adductor lungus m.	Rectus abd. m.				
					Sartorius m.	Obliquus m.				
Presacral	Aortic bifurcation	Cranial slices of cocci-	Posterior rectum wall	Pyriform muscle	Sacrum	Sovrapubic fat				
nodes		geal bone		-						

Table 4

M. Portaluri et al. / Cancer/Radiothérapie 8 (2004) 222-229

Contouring Guidelines : Consensus Essential

ARTICLE IN PRESS



Int. J. Radiation Oncology Biol. Phys., Vol. ■, No. ■, pp. 1–7, 2008 Copyright © 2008 Elsevier Inc. Printed in the USA. All rights reserved 0360-3016/08/\$-see front matter

doi:10.1016/j.ijrobp.2008.08.070

CLINICAL INVESTIGATION

ELECTIVE CLINICAL TARGET VOLUMES FOR CONFORMAL THERAPY IN ANORECTAL CANCER: AN RADIATION THERAPY ONCOLOGY GROUP CONSENSUS PANEL CONTOURING ATLAS

ROBERT J. MYERSON, M.D., PH.D.,* MICHAEL C. GAROFALO, M.D.,[†] ISSAM EL NAQA, PH.D.,* ROSS A. ABRAMS, M.D.,[‡] ADITYA APTE, PH.D.,* WALTER R. BOSCH, PH.D.,* PRAJNAN DAS, M.D.,[§] LEONARD L. GUNDERSON, M.D.,^{||} THEODORE S. HONG, M.D.,[¶] J. J. JOHN KIM, M.D.,[#]

RTOG CONSENSUS PANEL RECOMMENDATIONS

- Various risk volumes for pelvic failures defined as CTV's
- Local (mesorectum, anastomosis, presacrum, scar tissue)
 - Nodal (perirectal, internal & external iliac, inguinal)
 - CTV's combined due to major overlap

- CTVA: Internal iliac, pre-sacral, peri-rectal regions
 - CTVB: external iliac nodal region
 - CTVC: inguinal nodal region



CTV A : Peri-rectal, Pre-sacral, Internal iliac regions

Lower Pelvis:

Caudal extent should be a minimum of 2 cm caudal to gross disease

Mid pelvis:

Posterior and Lateral margins of CTVA should extend to lateral pelvic sidewall musculature or, where absent, the bone

Upper pelvis:

- Superior extent: Recto sigmoid junction or 2 cm proximal to the superior extent of macroscopic disease in the rectum/peri-rectal nodes
- Landmark : Cephalad aspect of CTVA should be where the common iliac vessels bifurcate into external/internal iliac, (promontory)



TD 20.00

TD 45 50



AR :CTV A (CTV Rectum + Internal Iliac Nodal Region



APR : CTV A (CTV Rectum + Internal Iliac Nodal Region

CTV B (External Iliac Nodal Region)

CTV C (Inguinal Nodal Region)

CTV B (external iliac region) and CTV C (inguinal region)

Indications:

- 1. CTV B & C : to be treated in squamous carcinoma anal cancers
- 2. CTV B to be included with CTV A : For rectal carcinomas extending into gynecologic or genitourinary structures.
- 3. CTV B & C : to be included if rectal cancers extending into anal canal and perianal region (no consensus)

CTVB and CTV C Vessel Regions

• Caudad extent of the inguinal region (CTVC) should be 2 cm caudal to the saphenous / femoral junction.

• Transition between inguinal and external iliac regions (CTVC to CTVB) is somewhat arbitrary, but the group recommended the level of the bottom of the internal obturator vessels (approximate boney landmark: upper edge of the superior pubic rami).

- Margins around blood vessels : 7-8 mm margin in soft tissue around the external iliac vessels excluding the bones / normal muscles,
- But 10+ mm margin antero-laterally—especially if small vessels or nodes are identified in this area.

IJROBP¹⁹2008

SUMMARY

- RTOG Consensus Guidelines Available
- Needs Validation : In terms of Control Rates and Toxicities
- Contouring for Pre-op RT : Relatively Easier
- Measures and Methods to define risk Areas on Imaging : Research Area
- Incorporation of Newer Imaging Modalities
- Multidisciplinary-multimodality (radiologist / Nuclear Medicine Physician)
 Approach

