



Radiotherapy Dose and Treatment Strategy in Locally Advanced Oesophageal Carcinoma: Dosimetry, Pathological Response, Toxicity, and Survival in a Retrospective Cohort

Muhammad Anas Tahseen Asar¹, Fajar Rafi Ranjha¹, **Muhammad Kashif^{*1}**, Abdullah Adnan¹, Asma Rashid¹, Sadia Anjum¹, Muhammad Haad Arif¹, Tabind Sadaf¹

¹Department of Clinical and Radiation Oncology, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan. *Corresponding author: fajarrafi@skm.org.pk

OBJECTIVE

The optimal radiotherapy (RT) dose for locally advanced oesophageal carcinoma remains uncertain. We compared 41.4, 45 and 50 Gy for dosimetry, pathological response, toxicity and survival, with secondary analyses by treatment strategy and histology.

METHODS

- Retrospective single-centre cohort, 2017–2023
- 335 patients, curative-intent chemoradiotherapy (3DCRT or RapidArc)
- Dose: 41.4 Gy (n = 52), 45 Gy (n = 176), 50 Gy (n = 107)
- Trimodality (CRT + oesophagectomy): 208; definitive CRT: 127
- Endpoints: dosimetry, ypT0, toxicity, OS, TTP
- Kaplan–Meier, log-rank test, Cox regression

TABLE 1. BASELINE (%)				
Dose, Gy	41.4	45	50	p
ECOG 1	82.7	60.2	63.6	0.027
Grade I	21.2	6.8	6.5	0.024
N0	42.3	23.9	29.0	0.033
SCC	96.2	94.3	92.5	0.785
Surgery	55.8	65.9	58.9	0.295

LIMITATIONS

- Retrospective, non-randomised: confounding and selection bias
- Reasons for dose and surgery choice, and chemotherapy regimens, not available
- Fatigue, nausea, vomiting not recorded

DOSIMETRY & TOXICITY

- PTV coverage achieved in all plans
- Spinal cord PRV D0.1cc higher at 50 Gy (30.1 vs 24.2–25.4 Gy)
- Heart V30 comparable (p = 0.617)
- Acute mucositis more frequent at 50 Gy; no grade > 2 events

TABLE 2. TOXICITY (%)				
Dose, Gy	41.4	45	50	p
Mucositis	26.9	26.1	43.0	0.022
Oesophagitis	55.8	57.4	57.9	0.415
Stricture	7.7	9.7	12.1	0.650
Fistula	0	4.0	6.5	0.168

PATHOLOGY

Of 208 resected patients, 133 (63.9%) achieved ypT0 and 164 (78.8%) were ypN0, with no significant dose gradient.

TABLE 3. RESPONSE (%)				
Dose, Gy	41.4	45	50	p
Resected, n	29	116	63	
ypT0	75.9	59.5	66.7	0.224
ypN0	69.0	79.3	82.5	0.162

TABLE 4. STRATEGY		
	Def. CRT	Trimodal
Patients	127	208
Deaths, %	67.7	34.6
Median OS, mo	17.9	48.8
Median TTP, mo	21.2	NR
Log-rank p < 0.001 for OS and TTP. Adenocarcinoma (n = 18): not significant.		

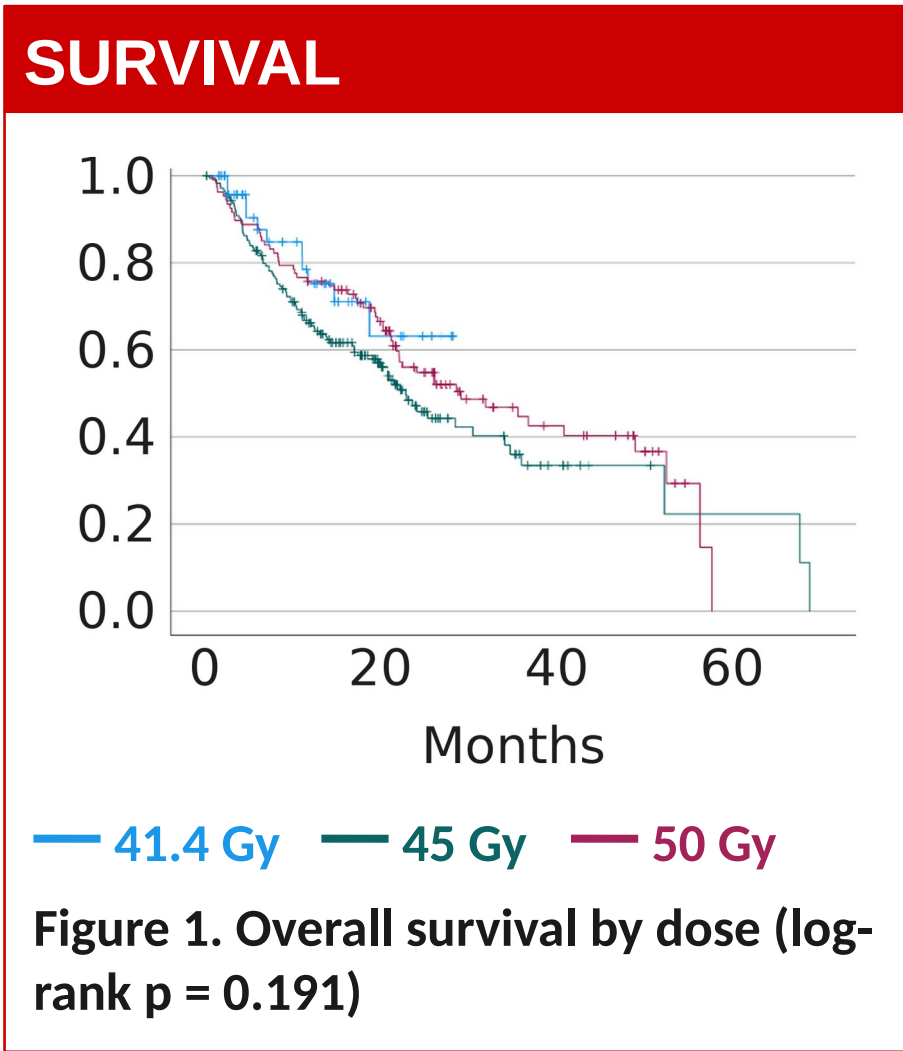


TABLE 5. SURVIVAL			
Dose, Gy	41.4	45	50
Deaths, %	21.2	51.1	53.3
Median OS, mo	NR	22.8	29.0
Median TTP	NR	NR	NR
aHR vs 50 Gy	0.72	1.48	ref
Cohort median OS 25.3 mo. aHR 45 Gy: 1.48 (95% CI 1.03–2.12; p = 0.033). No surgery: aHR 3.04 (2.14–4.33; p < 0.001).			

CONCLUSION

- 41.4, 45 and 50 Gy gave comparable ypT0, unadjusted survival and late toxicity
- Adjusted OS favoured 50 Gy over 45 Gy: hypothesis-generating only
- Trimodality had longer OS and TTP, but selection and immortal-time bias apply
- Dose should be studied prospectively by intent and histology

References: 1. van Hagen, NEJM 2012;366:2074. 2. Yang, JCO 2018;36:2796. 3. Obermannová, Ann Oncol 2022;33:992.