BAINES IMAGING

Impacts of PTV Prescription Coverage on Clinical Outcomes of Oropharyngeal Cancer

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Introduction

- More than **50%** of oropharyngeal cancer patients receive **definitive radiotherapy**[1]
- Significant debate exists regarding the optimal radiation dose to balance **disease cure** and **toxicities**[2]
- Both international and institutional protocols **vary** in the planning target volume (PTV) **prescription definition**

Protocols may require either:

1. A minimum **95%** prescription dose to 95% of the PTV ($D95\%_{PTV} \geq 95\%$)
2. A minimum **100%** prescription dose to 95% of the PTV ($D95\%_{PTV} \geq 100\%$)

Prescription Dose: 70.0 Gy
($D95\%_{PTV} \geq 95\%$) = **66.5 Gy**
($D95\%_{PTV} \geq 100\%$) = **70.0 Gy**

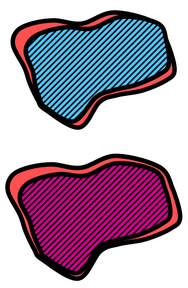

Figure 1: Visualization of PTV coverage definition using 95% (top) and 100% (bottom) of the prescribed dose.

Objectives

To determine the long-term differences in **oncologic outcomes** and **toxicity profiles** of the two approaches

Materials and Methods

- The data from **404** oropharyngeal cancer patients were analyzed
- Endpoints included:
  1. **Overall survival** (OS)
  2. **Progression-free survival** (PFS)
  3. **Mean dose** (D_{mean}) to OARs
  4. **Swallowing function** via Functional Oral Intake Scale (FOIS)[3]
- OS and PFS **Kaplan-Meier curves**
- **Multivariate analysis** to identify significant predictors

References

[1] Dohopolski, J.M., et al. JAMA Otolaryngol – Head Neck Surg., 2023. (149);(8): 697-707.
[2] *Dose Obj. for H&N IMRT*. Cancer Care Ontario, 2014
[3] Crary, A.M., et al. Arch Phys Med Rehabil, 2005. (86): 1516-20.

Patient Demographics

Table 1: Patient baseline characteristic between the two prescription groups, significance was assessed via Chi-Squared Contingency test.

Characteristic	D95%PTV ≥ 95%	D95%PTV ≥ 100%	p value
Age (median, IQR) (years)	62 (13)	62 (13)	p > 0.05
Sex (M / F)	82% / 18%	86% / 14%	p > 0.05
Site of Primary (Tongue, Tonsils, Other)	40% / 51% / 9%	42% / 50% / 8%	p > 0.05
Concurrent Chemotherapy (Y / N)	83% / 17%	85% / 15%	p > 0.05
p16 Status (+ / - / x)	68% / 16% / 16%	78% / 15% / 7%	p > 0.05
T Stage (T1 / T2 / T3 / T4)	13% / 48% / 19% / 21%	16% / 42% / 16% / 26%	p > 0.05
N Stage (N0 / N1 / N2 / N3)	8% / 43% / 42% / 8%	8% / 50% / 35% / 6%	p > 0.05

Results

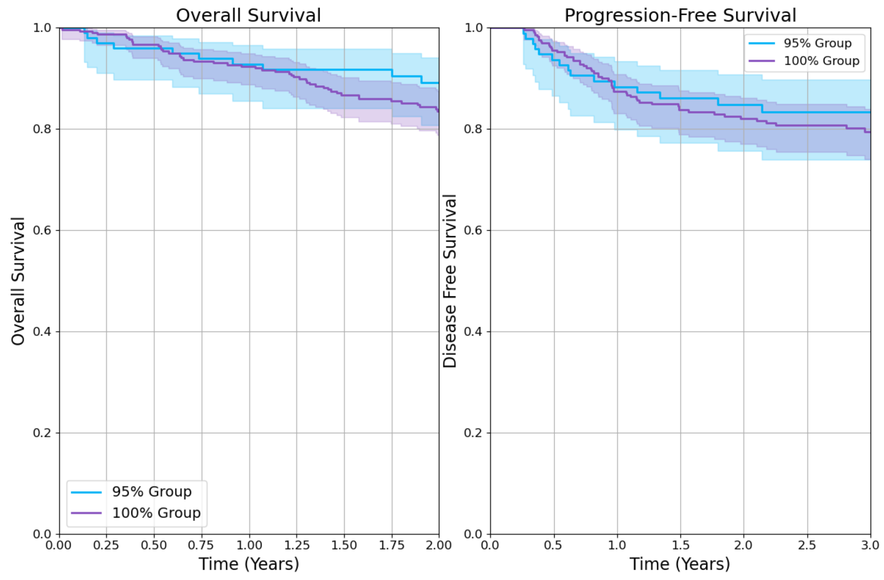

Figure 2: Kaplan-Meier plots depicting overall survival, p = 0.35 (a) and disease-free survival, p = 0.39 (b) for patients treated with D95% ≥ 95% and 100% prescription dose.

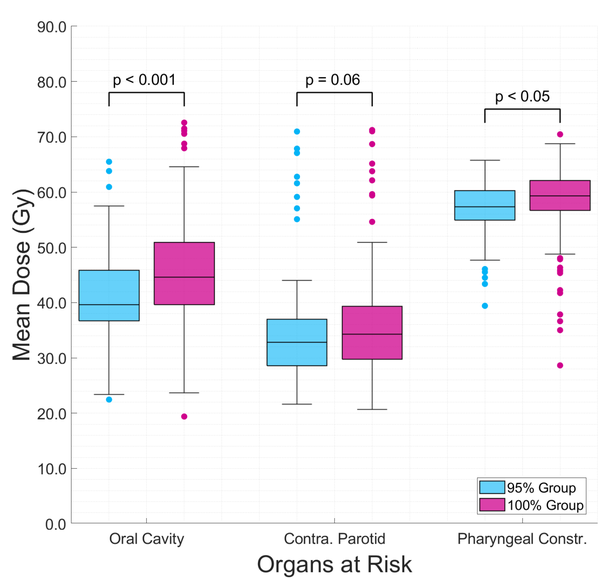

Figure 3: Box and whisker plot depicting the mean dose received to OARs.

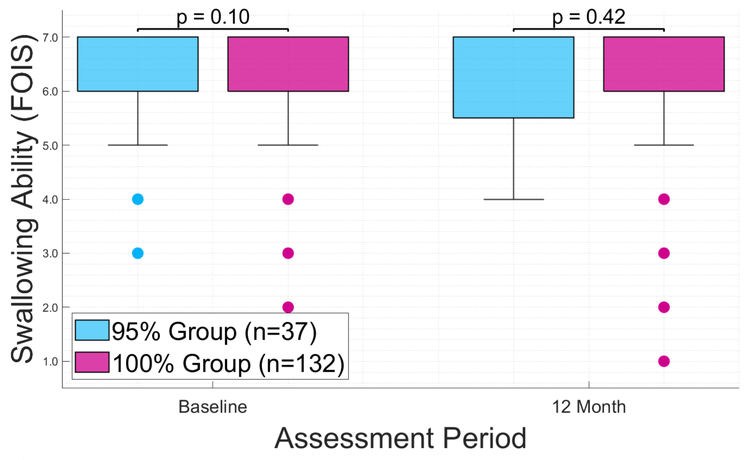

Figure 3: Box and whisker plot depicting the FOIS score at baseline and 12-months for 169 (42%) patients .

Discussion

- No difference in **oncologic outcomes**, both OS and PFS
- An **increase** in D_{mean} to the oral cavity and pharyngeal constrictor muscles with $D95\%_{PTV} \geq 100\%$
- Swallowing function was **not-different** between groups
- PTV dose coverage was **not a significant** predictor for OS or PFS

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Discussion

- A less strict ($D95\%_{PTV} \geq 95\%$) should be preferred to **maintain** disease control and **minimize** excessive dose to OARs

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