

Correlation between morphological parameters and dosimetric parameters of the heart and spinal cord in the middle- and advanced-stage esophageal cancer

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Abstract

Purpose This study aimed to explore the correlation between morphological parameters and dosimetric parameters of the heart and spinal cord in advanced-stage esophagus cancer (EPC) to provide a reference for clinical treatment. **Methods** A total of 105 patients with middle- and advanced-stage EPC, who received treatment in our hospital from 2019 to 2021, were included. The morphological parameters were calculated by imaging. Intensity-modulated radiation therapy plan was executed at Raystation4.7. The prescription dose of PTV-G and PTV-C was set as 60Gy/30F and 54Gy/30F, respectively. The linear regression model was used to analyze the correlation between morphologic parameters of EPC and dosimetric parameters of the heart and spinal cord. **Results** In 105 cases, the total lung length was correlated with the spinal cord D2. The heart Dmean and heart V40 was correlated with PTV-G volume, PTV-G length; In middle- and upper-segment EPC cases, only the total lung volume was correlated with the spinal cord Dmean, spinal cord D2, heart Dmean, and heart V40; In middle-stage EPC cases, the heart Dmean was correlated with the PTV-G volume, PTV-G length. the total lung length was correlated with the spinal cord D2; In middle- and lower-segment EPC, only the PTV-G volume and PTV-G length were correlated with the heart Dmean. All the aforementioned values were statistically significant. **Conclusions** Combined with the non-segmented tumor and different locations, the organ at risk dose was comprehensively considered.

Manuscript full title:Correlation between morphological parameters and dosimetric parameters of the heart and spinal cord in the middle- and advanced-stage esophageal cancer**Running Title:**Dosimetry research of radiotherapy**Keywords:** Esophageal cancer, IMRT, dosimetric parameters, OAR, correlation
Authors' lists :Wenjuan Zhao¹, Linzhen Lan², Bichun Xu³, Di Chen³, Yusha Zeng⁴, Feibao Guo^{2,5*}, Huojun Zhang^{1,3*} (**Both Feibao Guo andHuojun Zhang are correspondingauthor.**) ¹University of Shanghai for Science and Technology, Shanghai 200093, China ²Department of Radiation Therapy, Cancer Center, The First Affiliated Hospital of Fujian Medical University, Fuzhou 350005, China ³The Navy Medical University, Shanghai 200433, China ⁴Fujian Provincial Hospital, Fuzhou 350005, China ⁵Key Laboratory of Radiation Biology of Fujian higher education institutions, the First Affiliated Hospital, Fujian Medical University, Fuzhou 350005, China ***Corresponding author: (Feibao Guo,Huojun Zhang)** Feibao Guo Department of Radiation Therapy, Cancer Center, The First Affiliated Hospital of Fujian Medical University, Fuzhou 350005, China Huojun Zhang The Navy Medical University, Shanghai 200433, China E-mail: huojunzh@163.com**Authors' contributions**Author contributions Conception and design: Huojun Zhang, Feibao Guo, Wenjuan zhao; Collection and assembly of data:, Linzhen Lan, Yusha Zeng; Data analysis and

interpretation: Wenjuan Zhao, Bichun Xu, Di Chen; Manuscript writing: Wenjuan Zhao, Bichun Xu; Final approval of manuscript: All authors. **Ethics approval** This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. This study was approved by Department of Radiation Therapy, Cancer Center, The First Affiliated Hospital of Fujian Medical University. This article is a retrospective study. Therefore the Institutional waived the requirement to obtain distinct written informed consent from the patients. **Data availability statement** The data that support the findings of this study are available from the corresponding author upon reasonable request. **Unblinded statement** Our trial is a open trial, A total of 105 patients with middle-and advanced-stage EPC, who received treatment in our hospital from 2019 to 2021, were included. Intensity-modulated radiation therapy plan was executed at Raystation4.7. The prescription dose of PTV-G and PTV-C was set as 60 Gy/30 F and 54 Gy/30 F, respectively. We collectet the parameter record such as the morphological parameters, such as PTV-G length, PTV-G volume, total lung volume, and total lung length, were measured on CT images by clinicians. The spinal cord D2, spinal cord Dmean, heart Dmean, heart V40, and other dosimetric parameters were calculated according to the dose volume histograms. The linear regression model was used to analyze the correlation between morphologic parameters of EPC and dosimetric parameters of the heart and spinal cord. **Funding statement:** not applicable **Conflict of Interest Statement:** not applicable

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