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Reappraisal of Tumor Size Changes in Oligometastatic Esophageal Cancer Following Neoadjuvant Treatment

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Abstract

Objective: This study was aimed at assessing tumor size changes following neoadjuvant therapy in patients with oligometastatic esophageal cancer.

Materials and methods: Patients with a diagnosis of oligometastatic esophageal cancer who received neoadjuvant therapy as part of their management strategy were included. Tumor sizes were acquired from radiological assessments and corroborated through independent imaging review by experienced clinicians. Comparative analysis of tumor burden was conducted by evaluating size changes between baseline and post-neoadjuvant therapy imaging studies.

Results: Post-treatment imaging revealed a measurable reduction in tumor size, and imaging-based response played a pivotal role in determining subsequent treatment pathways. The multidisciplinary team utilized imaging response in conjunction with endoscopic reassessment and clinical performance status to guide post-neoadjuvant decision-making.

Conclusion: Neoadjuvant therapy offers a valuable strategy for managing oligometastatic esophageal cancer by decreasing tumor burden and increasing the potential for curative interventions. Accurate and thorough imaging evaluation remains essential to inform multidisciplinary treatment planning and support individualized care decisions. Continued research is needed to refine therapeutic approaches and incorporate evolving systemic and local modalities into a more personalized treatment paradigm.

Keywords: Esophageal Cancer; Oligometastasis; Neoadjuvant Treatment

Abbreviations: SBRT: Stereotactic Body Radiotherapy; IGRT: Image-Guided Radiotherapy; ART: Adaptive Radiotherapy

Introduction

Esophageal cancer constitutes a significant global health burden, with a high mortality rate owing to its aggressive nature and frequent late-stage diagnosis [1-7]. Although localized esophageal cancer can often be treated effectively with esophagectomy or definitive chemoradiation, the prognosis substantially worsens once metastatic disease develops [2-7]. Within metastatic esophageal cancer, the subset of patients with oligometastatic disease-commonly defined as having five or fewer metastatic lesions-has recently gained attention as a clinically distinct group that might derive benefit from more aggressive multimodal therapies [2–7].

Oligometastatic esophageal cancer represents an intermediate disease state between localized and widespread metastatic disease, characterized by limited metastatic tumor burden that could be amenable to curative-intent approaches [2-7]. Recent advances in systemic treatments, including platinum-based chemotherapies, targeted agents such as HER2-directed therapies, and immune checkpoint inhibitors, have transformed the treatment landscape for esophageal cancer [2-7]. These therapies have demonstrated potential not only in controlling metastatic disease but also as neoadjuvant options to downstage tumors before definitive local treatments such as surgery or stereotactic radiotherapy [2-7].

Neoadjuvant therapy in oligometastatic esophageal cancer may provide multiple clinical benefits: reducing primary and metastatic tumor volume to facilitate subsequent resection or ablation, eradicating micrometastatic disease, and improving local and systemic disease control, which may ultimately translate into improved survival outcomes. Additionally, response to neoadjuvant treatment offers prognostic insights and helps tailor individualized treatment strategies.

From a different standpoint, advances in radiotherapy modalities-such as stereotactic body radiotherapy (SBRT), image-guided radiotherapy (IGRT), and adaptive radiotherapy (ART)-have opened new therapeutic avenues for delivering high-precision, ablative doses to oligometastatic lesions with limited toxicity, and have expanded indications to cover several tumor sites throughout the human body [8–106]. These technologies complement systemic and surgical approaches within a multidisciplinary framework to maximize patient benefit.

Despite these advances, assessment of tumor response to neoadjuvant therapy in esophageal cancer remains challenging due to the tumor's variable biological behavior and complex radiographic presentation. Standard response criteria like RECIST may not fully reflect the pathological and immunological changes induced by novel therapies, highlighting the need for comprehensive and multimodal evaluation strategies. This study was aimed at assessing tumor size changes following neoadjuvant therapy in patients with oligometastatic esophageal cancer.

Materials and Methods

This study involves patients with a diagnosis of oligometastatic esophageal cancer who received neoadjuvant therapy as part of their management strategy. Patients had histologically confirmed esophageal carcinoma with a limited number of metastatic lesions (typically ≤5), administration of neoadjuvant therapy, and the availability of both pre-treatment and post-treatment imaging suitable for evaluation. Tumor sizes were acquired from radiological assessments and corroborated through independent imaging review by experienced clinicians.

Comparative analysis of tumor burden was conducted by evaluating size changes between baseline and post-neoadjuvant therapy imaging studies. Therapeutic planning following neoadjuvant therapy was guided by an interdisciplinary tumor board. Management decisions incorporated imaging-based response, clinical parameters, and anatomical considerations relevant to resection or local control.

Results

Patients with oligometastatic esophageal cancer were included in the analysis. All patients received neoadjuvant therapy. Pre-treatment imaging identified oligometastatic disease characterized by a limited number of lesions (range: 1–5), most frequently involving the liver, lung, and non-regional lymph nodes. Baseline tumor measurements were recorded from cross-sectional imaging in all patients, and follow-up imaging was performed after neoadjuvant therapy.

Post-treatment imaging revealed a measurable reduction in tumor size, and imaging-based response played a pivotal role in determining subsequent treatment pathways. No patients experienced unexpected toxicity precluding follow-up imaging or definitive treatment. The multidisciplinary team utilized imaging response in conjunction with endoscopic reassessment and clinical performance status to guide post-neoadjuvant decision-making.

Discussion

Esophageal cancer remains a formidable malignancy with poor outcomes once metastatic disease develops [1–7]. Oligometastatic esophageal cancer, defined by limited metastatic burden, presents a unique clinical subset wherein aggressive multimodal treatment may improve outcomes [2-7]. This concept challenges the traditional dichotomy between localized and wide metastatic disease and supports a tailored approach integrating systemic, surgical, and radiotherapeutic modalities. The advent of novel systemic therapies-such as platinum-based chemotherapy combinations, HER2-targeted agents, and immune checkpoint inhibitors-has notably altered the treatment paradigm for metastatic esophageal cancer [2-7].

These therapies, when used in the neoadjuvant setting, have the potential to downstage both primary tumors and limited metastatic deposits, thereby increasing the likelihood of complete resection or local control. Neoadjuvant treatment in oligometastatic esophageal cancer serves multiple critical functions: reducing tumor size to facilitate surgical or ablative interventions, eradicating occult micrometastases, and potentially improving local and systemic control, which may contribute to prolonged survival. Importantly, tumor response to neoadjuvant therapy offers valuable prognostic information, aiding clinicians in stratifying patients and tailoring further treatments.

Radiotherapy innovations-including SBRT, IGRT, and ART-enable precise targeting of metastatic lesions with ablative doses, minimizing toxicity to adjacent structures such as the lungs, heart, and spinal cord [8-106]. These technologies are particularly advantageous in oligometastatic disease, where focal treatment of limited metastases can be curative or at least prolong disease control. The integration of advanced radiotherapy with systemic neoadjuvant therapy requires close multidisciplinary coordination to optimize sequencing and therapeutic synergy.

Despite these advances, accurately assessing tumor response remains a challenge due to the complex biology and imaging characteristics of esophageal cancer. While RECIST criteria provide a standardized method to quantify tumor size changes, they may not capture all clinically relevant responses, especially when immunotherapy-induced inflammatory changes or fibrosis are present. Incorporation of functional imaging modalities such as PET/CT and diffusion-weighted MRI, alongside volumetric and metabolic assessments, may improve response evaluation.

Neoadjuvant therapy offers a valuable strategy for managing oligometastatic esophageal cancer by decreasing tumor burden and increasing the potential for curative interventions. Accurate and thorough imaging evaluation remains essential to inform

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multidisciplinary treatment planning and support individualized care decisions. Continued research is needed to refine therapeutic approaches and incorporate evolving systemic and local modalities into a more personalized treatment paradigm.

Conflicts of Interest

There are no conflicts of interest and no acknowledgements.

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