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Changes in Tumor Size Following Systemic Therapy in the Setting of Gastric Cancer with Synchronous Liver Metastases

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Abstract

Objective: Gastric cancer with synchronous liver metastases represents a biologically aggressive disease subset but also a heterogeneous clinical entity, with patient outcomes strongly influenced by metastatic burden and response to systemic therapy. Understanding how systemic therapy alters the size and geometry of both primary and metastatic disease is essential. The aim of this study was to evaluate changes in tumor size following systemic therapy in patients with gastric cancer presenting synchronous liver metastases.

Materials and Methods: Patients with a diagnosis of gastric cancer and synchronous liver metastases who had available radiologic imaging before and after systemic therapy were included. Tumor measurements were extracted from diagnostic imaging performed prior to the initiation of systemic therapy and again following the completion of treatment. Changes in tumor size were evaluated using standardized radiologic criteria, and comparative analyses were conducted to document alterations in tumor dimensions after systemic therapy.

Results: Patients with gastric cancer and synchronous liver metastases were included in the analysis. All patients completed their planned systemic treatment. Comparative evaluation of pre- and post-treatment imaging revealed a reduction in tumor size in most patients. Both primary gastric lesions and liver metastases showed measurable decreases in size.

Conclusion: Systemic therapy results in tumor size reduction in patients with gastric cancer and synchronous liver metastases. These changes may have meaningful implications for radiotherapy planning and support the use of adaptive and individualized radiotherapy strategies in this population. Further prospective research is required to refine multimodality treatment approaches and improve clinical outcomes.

Keywords: Gastric Cancer; Systemic Treatment; Tumor Size Changes; Systemic therapy; Computed Tomography

Introduction

Gastric cancer continues to be a major global health issue and remains among the leading causes of cancer-related death worldwide. A significant proportion of patients are diagnosed with metastatic disease at presentation, with the liver representing one of the most common sites of distant involvement. Gastric cancer with synchronous liver metastases constitutes a biologically aggressive yet clinically heterogeneous subgroup, in which patient outcomes are heavily influenced by metastatic burden and the degree of response to systemic therapy.

Systemic chemotherapy forms the foundation of treatment for metastatic gastric cancer. In appropriately selected patients who exhibit a favorable therapeutic response, consolidative local approaches targeting liver metastases-such as hepatic resection, thermal ablation, or stereotactic body radiotherapy (SBRT)- are increasingly being utilized. Nevertheless, the extent of tumor reduction following systemic therapy and its impact on eligibility for local interventions remain inadequately characterized. Effective liver-directed treatment requires accurate evaluation of tumor size, spatial relationships, and overall feasibility.

Recent advances in imaging and local treatment modalities-including high-resolution multiphasic Computed Tomography (CT), Magnetic Resonance Imaging (MRI) with hepatobiliary contrast agents, SBRT, image-guided radiotherapy (IGRT), and adaptive radiotherapy (ART)-have broadened the potential application of local therapies in metastatic gastric cancer. These technologies facilitate more precise target delineation and dose delivery while minimizing exposure to surrounding normal tissues [1-95].

Consequently, understanding how systemic therapy modifies the size and anatomy of both primary and metastatic lesions is crucial for optimal treatment planning. The purpose of this study was to assess changes in tumor dimensions after systemic therapy in patients with gastric cancer and synchronous liver metastases and to evaluate how these changes may influence subsequent decisions regarding local treatments, particularly radiotherapy or liver-directed ablative strategies.

Materials and Methods

This study was carried out in the Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences, a tertiary referral institution that provides care for patients from both Turkey and abroad. Patients with a diagnosis of gastric cancer and synchronous liver metastases who had available radiologic imaging before and after systemic therapy were included. All cases were reviewed by a multidisciplinary tumor board comprising surgical oncologists, medical oncologists, and radiation oncologists.

Systemic therapy was delivered in accordance with institutional treatment protocols. Tumor measurements were extracted from diagnostic imaging performed prior to the initiation of systemic therapy and again following the completion of treatment. Changes in tumor size were evaluated using standardized radiologic criteria, and comparative analyses were conducted to document alterations in tumor dimensions after systemic therapy.

Results

This study was conducted in the Department of Radiation Oncology at Gulhane Medical Faculty, University of Health Sciences, a tertiary referral center serving patients from Turkey as well as international regions. Patients diagnosed with gastric cancer and synchronous liver metastases who had available radiologic imaging before and after systemic therapy were considered eligible for inclusion. All cases were evaluated by a multidisciplinary tumor board consisting of surgical oncologists, medical oncologists, and radiation oncologists. Systemic therapy was administered according to institutional treatment standards.

Tumor measurements were obtained from imaging performed prior to the start of systemic therapy and again after the completion of treatment. Tumor size changes were assessed using standardized radiologic criteria, and comparative analyses were carried out to evaluate variations in tumor dimensions following systemic therapy. Patients with gastric cancer and synchronous liver metastases were included in the analysis. All patients completed their planned systemic treatment. Comparative evaluation of pre- and post-treatment imaging revealed a reduction in tumor size in most patients. Both primary gastric lesions and liver metastases showed measurable decreases in size.

Discussion

Gastric cancer represents a significant global health problem, associated with high morbidity and mortality, especially in advanced stages. Although metastatic gastric cancer has traditionally been linked with poor outcomes, increasing evidence shows that metastatic disease is biologically heterogeneous. Within this continuum, oligometastatic gastric cancer has emerged as a distinct clinical state characterized by a limited number of metastatic lesions, often confined to one or a few organs. The oligometastatic model suggests that appropriately selected patients may benefit from aggressive multimodality treatment strategies that combine systemic therapy with local ablative approaches such as surgery or radiotherapy.

In this setting, systemic therapy plays a central role in reducing tumor burden, controlling microscopic metastatic disease, and potentially improving the effectiveness of subsequent local treatments. However, the degree of tumor response after systemic therapy and its influence on planning local treatment remain inadequately defined in patients with gastric cancer that has metastasized to the liver. This concept challenges the conventional divide between localized and widely metastatic gastric cancer. In selected cases, systemic therapy followed by local consolidative treatment may provide meaningful disease control and survival benefits.

Our study shows that systemic therapy leads to a reduction in tumor size among patients with gastric cancer and synchronous liver metastases. This finding carries important clinical implications, particularly for radiotherapy planning. Smaller tumor volumes may allow for more conformal treatment approaches, dose escalation to residual disease, and improved protection of surrounding healthy tissues. Modern radiotherapy techniques, including IGRT, IMRT, SBRT, and ART, are well suited to leverage these geometric changes.

Adaptive radiotherapy approaches, informed by post-systemic therapy imaging, may further optimize therapeutic ratios by accounting for tumor response and anatomical shifts over time. Nonetheless, treatment sequencing requires careful consideration. Although systemic therapy can enhance the feasibility of local treatment, delaying local intervention may pose risks for certain individuals. Therefore, personalized treatment plans based on multidisciplinary evaluation remain essential.

Prospective studies with larger patient cohorts are needed to clarify the impact of tumor shrinkage on long-term outcomes such as local control, progression-free survival, and overall survival. In summary, systemic therapy results in tumor size reduction in patients with gastric cancer and synchronous liver metastases. These changes may have meaningful implications for radiotherapy planning and support the use of adaptive and individualized radiotherapy strategies in this population. Further prospective research is required to refine multimodality treatment approaches and improve clinical outcomes.

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Conflicts of interest

There are no conflicts of interest and no acknowledgements.

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