THE INJECTOR 2022;1(2):80-83

Original Article

Assessment of tumor size changes following neoadjuvant chemotherapy for patients with N3 nasopharyngeal carcinoma

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Received: 3 May 2022
Revised: 25 May 2022
Accepted: 30 August 2022

Abstract

Objective: Nasopharyngeal cancers are among the most frequent head and neck cancers. Advanced disease at initial presentation is not uncommon partly due to the relatively deep and hidden location of the nasopharyngeal cavity. The most common practice for the management of locally advanced disease includes the administration of concurrent chemoradiotherapy followed by adjuvant chemotherapy, however, the utility of neoadjuvant chemotherapy particularly in the presence of high-risk, advanced nasopharyngeal cancers has also been suggested. Herein, tumor size changes following neoadjuvant chemotherapy for patients with N3 nasopharyngeal cancer is assessed with consideration of clinical implications.

Methods: A total of 15 patients with N3 nasopharyngeal carcinoma were assessed. All patients received upfront neoadjuvant chemotherapy and were then referred for definitive chemoradiotherapy at the Department of Radiation Oncology at Balıkesir Atatürk City Hospital, Turkey. For comparative evaluation, tumor sizes were calculated from the diagnostic imaging of the patients at initial presentation and from the CT-simulation images which have been acquired for radiation treatment planning after neoadjuvant chemotherapy. Tumor sizes before and after neoadjuvant chemotherapy were documented.

Results: A comparative analysis was performed for tumor sizes at diagnostic imaging at initial presentation and at CT simulation for radiation treatment planning after neoadjuvant chemotherapy, and the mean reduction in tumor size after neoadjuvant chemotherapy was found to be 33%.

Conclusion: The result of this study may have clinical implications and the utilized therapeutic strategy including upfront neoadjuvant chemotherapy may be suitable for the management of selected patients with N3 nasopharyngeal cancer despite the need for further supporting evidence.

Keywords: N3 nasopharyngeal carcinoma, neoadjuvant chemotherapy, radiation therapy.

 DOI: https://doi.org/10.5281/zenodo.7038924

INTRODUCTION

In Asia, nasopharyngeal carcinoma is one of the most common head and neck cancers, with Southern China having the highest prevalence (1,2). Depending on the size, location, and interaction of the lesion with important structures, affected patients may experience a variety of symptoms. There are numerous significant elements in the head and neck area that are linked to vital bodily processes. In this setting, the invasion of nasopharyngeal malignancies to close-by critical structures and the harm caused to these adjacent critical structures by therapeutic interventions may lead to excessive morbidity and a decline in quality of life. Given the challenges in detecting early-stage malignancies, which may be partly attributed to the nasopharyngeal cavity's unusually deep and concealed location, nasopharyngeal tumors may sometimes only be detected at advanced stages. Thus, it is likely that a significant proportion of patients with nasopharyngeal cancer suffer from the advanced disease at initial presentation (3). The possibility of unfavorable treatment effects can sometimes make aggressive disease management difficult, so it is crucial to sequence treatment modalities in the best possible order. The administration of concurrent chemoradiotherapy followed by adjuvant chemotherapy is the most common practice for the management of the locally advanced disease; however, the value of neoadjuvant chemotherapy, particularly in the presence of high-risk, advanced nasopharyngeal cancers, has also been addressed in several trials (4-5). Neoadjuvant chemotherapy may be administered in order to, among other things, stage the tumor (6). The therapeutic outcomes described in the aforementioned trials may undoubtedly be influenced by such an effect. Additionally, certain patients with tumor shrinkage may benefit from additional radiation therapy in terms of a better toxicity profile from less exposure to the surrounding normal tissues. Herein, tumor size changes following neoadjuvant chemotherapy for patients with N3 nasopharyngeal cancer is assessed with consideration of clinical implications.

MATERIALS AND METHODS

In this study with the primary outcome measure of tumor downsizing after neoadjuvant chemotherapy, a total of 15 patients with N3 nasopharyngeal carcinoma were assessed. All patients received upfront neoadjuvant chemotherapy and were then referred for definitive chemoradiotherapy at the Department of Radiation Oncology at Balıkesir Atatürk City Hospital, Turkey. Written informed consent of all patients was acquired prior to treatment, and this retrospective study was performed in compliance with the Declaration of Helsinki principles and its later amendments. For comparative evaluation, tumor sizes were calculated from the diagnostic imaging of the patients at initial presentation and from the CT-simulation images which have been acquired for radiation treatment planning after neoadjuvant chemotherapy. CT-simulation procedures were performed at the CT-simulator (Siemens Somatom Emotion, Siemens Healthcare, Germany) available at our institution for all patients to be utilized in radiation treatment planning. Tumor sizes before and after neoadjuvant chemotherapy were documented and comparatively assessed. VersaHD (Elekta, UK) linear accelerator (LINAC) was used for radiotherapeutic management of patients with routine incorporation of Image Guided Radiation Therapy (IGRT) techniques for treatment verification.

RESULTS

A total of 15 patients with N3 nasopharyngeal cancer referred to the Department of Radiation Oncology at Balıkesir Atatürk City Hospital for concurrent chemoradiation following neoadjuvant chemotherapy have been evaluated for tumor size changes. A comparative analysis has been performed for tumor size at diagnostic imaging at initial presentation and at CT simulation for radiation treatment planning after neoadjuvant chemotherapy. Written informed consent of all patients were acquired prior to treatment, and this retrospective study was performed in compliance with the Declaration of Helsinki principles and its later

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amendments. The mean reduction in tumor size after neoadjuvant chemotherapy was found to be 33%. Radiation treatment planning has been performed by sophisticated RT treatment planning systems at our referral institution. Optimal normal tissue sparing has been prioritized in radiation treatment planning without jeopardizing optimal target volume coverage. Treatment delivery was performed by use of VersaHD (Elekta, UK) LINAC with routine incorporation of IGRT techniques.

DISCUSSION

Nasopharyngeal carcinoma is one of the most prevalent head and neck cancers in Asia, with Southern China having the highest prevalence (1,2). Patients with nasopharyngeal cancer may exhibit a range of symptoms depending on the size, location, and relationship of the lesion to important tissues. The invasion of nasopharyngeal malignancies to near surrounding structures and harm due to therapies may lead to adverse morbidity and degradation of quality of life since the head and neck region includes several crucial elements that play a role in vital bodily functions. The somewhat deeper and concealed location of the nasopharyngeal cavity makes it harder to detect early-stage malignancies, which results in a significant majority of nasopharyngeal tumors being detected at advanced stages. In this situation, it's possible that a sizable fraction of nasopharyngeal cancer patients present with an advanced stage of the disease (3). The danger of unfavorable treatment-related consequences may limit rigorous treatment for advanced disease, and it is crucial to sequence medicines in the best possible order. The most common treatment has been concurrent chemoradiotherapy followed by adjuvant chemotherapy; however, some trials have also examined the use of neoadjuvant chemotherapy, particularly for high-risk and advanced nasopharyngeal malignancies (4-5). Tumor downstaging before to decisive therapy may be the justification for administering neoadjuvant chemotherapy. It is obvious that a decreased tumor burden following neoadjuvant chemotherapy should have clinical consequences for bettering therapeutic results, which have been backed by mounting evidence. Lower RT target volumes in a few patients due to tumor shrinkage may be another benefit of employing neoadjuvant chemotherapy. This may result in an improved toxicity profile because to the reduced exposure of nearby vital structures.

This study evaluated tumor size changes after neoadjuvant treatment for patients with N3 nasopharyngeal carcinoma while taking clinical consequences into account. The mean reduction in tumor size following neoadjuvant chemotherapy was determined to be 33% when a comparison of tumor sizes at diagnostic imaging at initial presentation and at CT-simulation for radiation treatment planning was made. Clinical ramifications could follow from this finding. First, the impact of the administered neoadjuvant chemotherapy is noted, which may be crucial for further care with the best systemic therapeutic drugs. From the perspective of radiation oncology, certain patients may profit from the use of smaller RT target volumes since the risks associated with radiation exposure will be lessened. To eliminate geographic misses, treatment failures, and radiation-induced side effects, modern RT systems must define the treatment volume accurately and precisely. The definition of greater than actual target volumes may result in increased toxicity and exposure to nearby vital structures. On the other hand, choosing target volumes that are fewer than what is actually needed could lead to treatment failures and decreased therapeutic results. From this angle, it is clear that treatment volume definition optimization is necessary. With the introduction of advanced treatment tools and adaptive irradiation strategies like intensity-modulated radiation therapy (IMRT), intensity-guided radiation therapy (IGRT), adaptive radiation therapy (ART), breathing-adapted radiation therapy (BART), molecular imaging methods, automatic segmentation techniques, and stereotactic irradiation, there have been a number of significant advancements and notable improvements in the radiation oncology field in recent years (7-9). The combination of advanced and modern procedures has unquestionably improved the radiotherapeutic therapy of the patients with nasopharyngeal malignancies.

 DOI:https://doi.org/10.5281/zenodo.7038924

CONCLUSION

This study demonstrated a 33% reduction in tumor size for patients receiving neoadjuvant chemotherapy before definitive chemoradiotherapy. This result may have clinical implications and this therapeutic strategy may be suitable for the management of selected patients with N3 nasopharyngeal cancer despite the need for further supporting evidence.

Conflict of interest: The authors declare no conflict of interest.

Financial disclosure: None

Peer-review: Externally peer-reviewed

Authorship Contributions: Concept; MD, MA -Design; MD, MA -Supervision; MD, MA - Funding; MA, MD -Materials; MD, MA -Data collection &/or processing; MA, MD - Analysis and/ or interpretation; MA - Literature search; MD -Writing; MA- Critical review; MD.

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