Perspective

A case of pulmonary large cell neuroendocrine carcinoma treated with stereotactic body radiation therapy

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ABSTRACT

A small percentage of lung malignancies, or about, are lung large-cell neuroendocrine carcinomas (LCNEC). Recurrence following resection is frequent, even in Stage I illness, and it has a dismal five-year overall survival rate. The first report of stereotactic body radiation (SBRT) for pulmonary LCNEC is presented here. After undergoing a wedge resection and mediastinal lymph node dissection on an elderly woman with a left upper lobe pulmonary nodule, a N0 LCNEC was discovered. A fresh left upper lobe PET-avid nodule was discovered about a year later during surveillance imaging, which led to the completion of a left upper lobectomy that revealed LCNEC with associated lymph nodes and unfavorable staging results. In the end, the patient opted for observation rather than adjuvant treatment; however, months later imaging revealed an expanding nodule close to the previous resection site, despite the patient still being alive.

Key Words: Thoracic surgery; Undernutrition; *Pleural diseas;,Interventional pulmonology.*

INTRODUCTION

For Stage I non-small cell lung cancer, stereotactic body radiation (SBRT) has been shown in Phase III randomized studies to have comparable local control and overall survival to surgical resection. About of lung cancers are pulmonary large-cell neuroendocrine carcinomas (LCNEC), which are a relatively unusual condition. LCNEC varies from small-cell lung cancer (SCLC) in that SCLC has smaller cells, a distinct pattern of invasiveness, and a low nuclear/cytoplasm ratio. LCNEC is also characterized by big cells with extensive cytoplasm, strong mitoses, necrosis, and neuroendocrine characteristics. 4 Retrospective investigations have shown that even with Stage I disease, recurrence after resection is prevalent, with a poor five-year overall survival, even though the rarity of pulmonary LCNEC has prevented prospective research. We now give the initial report on SBRT for pulmonary LCNEC. A wedge resection and mediastinal lymph node dissection were performed on a year-old woman who had a left upper lobe pulmonary nodule. The procedure revealed a pT1b N0 mass that on pathology showed the hallmarks of LCNEC. A fresh left medial upper lobe PET avid pulmonary nodule was discovered about a year later, and she underwent a left upper lobectomy with implicated lymph nodes and negative staging tests. Pathology once more indicated LCNEC. Following surgery, the patient decided against adjuvant treatment and instead chose to continue with surveillance.

Sadly, despite the patient's continued good health, a nodule abutting the left upper lobectomy surgical suture line grew throughout the following months from an eight-month timespan on chest imaging. This nodule had a maximal SUV of restaging and was PET-avid. The thoracic oncology tumor board reached the conclusion that SBRT should be used as the preferable option for the presumed second recurrence of LCNEC due to the morbidity of a third procedure in this area and based on the safety of SBRT for Stage I non-small cell lung cancer. Months after the initial LCNEC diagnosis, the patient had SBRT to this new nodule shortly after. Four-dimensional CT was used for treatment planning in order to define the goal volume throughout each stage of the respiration cycle as previously

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mentioned. The patient was treated using a free-breathing technique because the tumor didn't move much during respiration on the 4DCT scan, and outlines were made from an average simulated CT scan. The PTV received the dose under a volumetric modulated arc therapy plan, and the maximum ITV dose was after receiving SBRT for four months, the patient is still in excellent clinical shape (KPS 90), and surveillance scans have shown no signs of disease spread. Following SBRT, the nodule itself showed no signs of growth. The poor five-year overall survival of pulmonary LCNEC is mostly due to its propensity to metastasis, which is also the major reason surgical excision is the standard of therapy after initial diagnosis. After the second recurrence, our patient underwent wedge resection first, then a total lobectomy. By tissue analysis, both lesions were determined to be LCNEC. This prompted imaging to rule out metastatic illness, after which our team discussed the best course of treatment for the nodule. Despite the fact that resection is technically the standard of care, the Stage I nature of this lesion and the operative morbidity of a third resection in the same anatomic region made SBRT an excellent noninvasive yet effective treatment option for her disease, especially given that retrospective data has shown the median survival of Stage I lung cancer treated with observation is about months. Due to the lesion's close proximity to the arch vasculature, SBRT was used instead of Gy across three fractions, which is our current institutional preference. The absence of metastatic disease and the patient's retention of her pre-treatment KPS are indicators so far that the choice of SBRT has been the best in treating her disease without sacrificing her quality of life, despite the relatively short period of post-SBRT follow-up (the recurrences in this patient occurred approximately one year and two years after resection).

This first report of SBRT for pulmonary LCNEC shows that SBRT is a practical treatment option for this uncommon condition. To achieve effective patient selection for SBRT, a multidisciplinary thoracic oncology strategy comprising medical oncology, thoracic surgery, radiation oncology, and pulmonology is highly advised. It is necessary to conduct additional research to ascertain whether the patient's prognosis will be better than that which was soberly presented in the retrospective literature. Calculations were made for the variables' frequencies, means, and standard deviations. Patients who passed away while hospitalized and those who were released on demand were removed from the comparison of length of hospital stay by MUST categorization. Using the Kruskal-Wallis test, continuous variables were compared. Comparing proportions among categorical variables was done using the Chi-square test. By applying unconditional logistic regression and further adjusting for sex and age, the odds ratio (OR) and its associated confidence intervals were generated to determine the strength of the relationship between the studied characteristics and the risk of undernutrition. According to research on the frequency of pulmonology patients, one in three patients admitted to this unit has a high or moderate risk of undernutrition at the time of hospital admission. The patient was a year-old male who had smoked for pack years in the past. He had a history of benign prostatic enlargement, type II diabetes mellitus, and many hospitalizations for hypoglycemia shock brought on by uncontrolled type II diabetes mellitus and pneumonia. During the Korean War, when he was, he lost his right arm. The patient provided written, explicit approval for his case information and photographs to be published. A standard medical evaluation included a chest X-ray for the patient. In the left upper lobe, a consolidative ground glass opacity was seen. A sizable lung tumor without apparent lymph node enlargement was detected on a chest computed tomography (CT) with contrast enhancement. The mass's identity as an LCNEC was verified by percutaneous needle biopsy. To ascertain the mediastinal stage, bronchoscopy with end bronchial ultrasonography biopsy was carried out. The lymph nodes in the 4R and station were negative. The only abnormal metabolic activity detected by 18F-fluorodeoxyglucose positron emission tomography-CT was in a parotid Warthin tumor and a lung malignancy in the left upper lobe (highest standardized uptake value). In both lung areas, the lung perfusion scan only revealed a few multifocal perfusion defects caused by underlying emphysema and no segmental perfusion defect. The patient was subsequently identified as having LCNEC. The patient was advised to have surgery, but he was apprehensive about it. He also provided advice on radiation therapy (RT). Due to the tumor's size, location in the lung's periphery, and the fact that the RT target excluded the local lymph nodes, SBRT was taken into consideration. The patient finally made a decision. Respiration-correlated 4D-CT was performed on the patient. In the mediastinal window setup, the gross tumor volume was contoured, and the clinical target volume was extended in its vicinity. The clinical target volumes for each of the 10 respiratory stages were added to create the internal target volume. By enlarging the internal target volume with isotropic set-up margins, the planning target volume was produced. The volume is intended for planning. The Eclipse treatment planning system with MV photons was used to build the treatment plan utilizing the volumetrically modulated arc approach. Using a Novelist system was SBRT. The therapy lasted four days, including the weekend, and the dose was Gy in five daily fractions. The patient was closely monitored at the outpatient clinic once every month, to begin with, then once every week for several months. Physical examination, a complete blood count, a liver function test, and a chest X-ray or CT were all included in the follow-up. Months after SBRT, a chest CT revealed a much diminished tiny nodule. A year after SBRT, a chest CT showed only erratic consolidation in the treated area, demonstrating a full tumor response and radiation fibrosis. The patient's only symptom during the observation period was an erratic cough. Months after treatment, the patient is still alive and shows no signs of illness. As with all lung cancers, LCNEC is extremely uncommon and does occasionally develop. With a median age of years, this tumor is typically observed in males. This tumor has a lot of effects from past smoking. The natural history, clinical course, and ideal therapy of individuals with LCNEC are all subject to a dearth of knowledge. The National Comprehensive Cancer Network advises treating LCNEC and SCLC in accordance with the NSCLC recommendations, despite the fact that the WHO classified LCNEC and SCLC as neuroendocrine neoplasms. Platinum and etoposide-based chemotherapy regimens targeted at SCLCs have been recommended by certain studies, but NSCLC-based chemotherapy regimens have been proven to be superior. According to the NSCLC treatment guidelines, surgical resection is advised for patients with no metastatic tumors. Only a few LCNEC patients have had their treatment with radiation therapy (conventionally fractionated). Some of them had preoperative radiation with Gy, concurrent chemoradiotherapy (CCRT) with Gy, final CCRT with Gy, or postoperative radiotherapy alone. Documented the use of definitive

CCRT at more advanced stages in patients who were inoperable and cases of pathologic N2 disease or inadequate resection following surgery. Also reported were stage III-IV LCNEC overall survival rates of and, respectively, for the year. Furthermore, the and -year progression-free survival in all stages were and, respectively, showing that RT effectively treats LCNEC. Reported the use of adjuvant radiotherapy without chemotherapy in all patients who underwent surgery at a stage higher than IB. Additionally, the year's overall survival rates were presented. Reported that just Gy of CCRT might reduce the tumor volume; as a result, preoperative CCRT should be taken into consideration as a therapy option to facilitate total resection. In medically inoperable patients with early-stage NSCLC, SBRT was associated with noticeably improved local control and overall survival (compared with conventional RT). SBRT is characterized by high-level irradiation with a noticeable difference in the dose gradients to the tumor and normal tissues. Additionally, SBRT is secure and practical even for patients with compromised lung health brought on by cigarette smoking or underlying pulmonary conditions. SBRT is not currently a well-established therapy option for SCLC in its early stages. SBRT has only been applied to this goal in a small number of experimental case series. Although our patient declined surgery, he wanted RT. Gy was delivered on SBRT in five parts. Without suffering any side effects, the patient finished their treatment. After SBRT, the patient has remained relapse-free for six months but continued long-term follow-up is necessary. We present a case of early-stage LCNEC treated with SBRT. SBRT may be an effective therapy option for patients with early-stage LCNEC if surgical resection is not an option.