

Successful Management of Metastatic Lymph Nodes in the Chest by Laser Ablation via Endoscopic Ultrasound: A Case Report

RUSY BHALLA¹, KEYUR SHETH², RAVI GUPTA³

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ABSTRACT

Isolated spread of metastatic breast carcinoma to mediastinal lymph nodes is not an uncommon phenomenon. The prognosis worsens with the advent of any metastases in the chest. Conventional treatment mandates chemotherapy or radiotherapy as a control measure. Laser treatment has helped many patients with inaccessible or inoperable tumours, as it works on devascularisation and can benefit both benign and malignant tumours. This is a case report of a patient who did not respond to Trastuzumab and T-DM1 (Trastuzumab with Emtansine). She developed mediastinal lymph nodes during treatment with TDM1. Additionally, she had a documented change in hormonal status from Human Epidermal growth factor Receptor-2 (HER2) positive to negative. She underwent laser ablation of mediastinal lymph nodes around the trachea. A Positron Emission Tomography (PET) scan after six months showed a total resolution of the lymph nodes with no significant uptake in the chest or any other part of the body. Laser ablation of mediastinal lymph nodes is a very skillful and demanding procedure that can be attempted in refractory and isolated cases where chemotherapy and radiation have failed. Further studies are needed to assess the long-term results of this new procedure.

Keywords: Interventional endoscopic ultrasound, Mediastinal lymph nodes, Trastuzumab

CASE REPORT

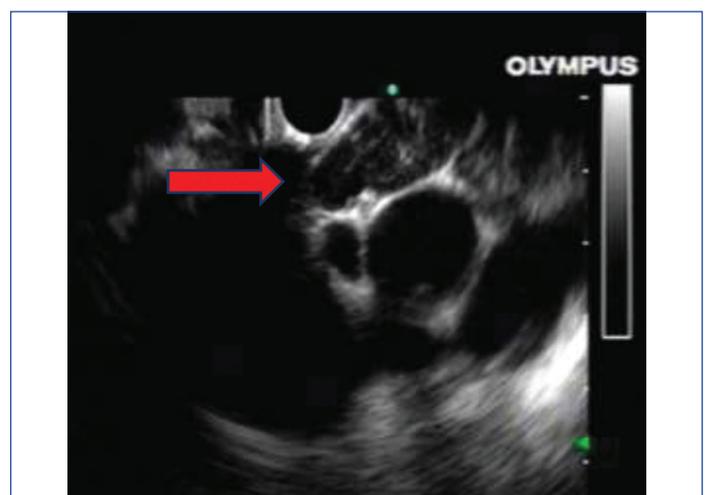
A 65-year-old lady presented with a history of left-sided infiltrating duct carcinoma of the breast, which had been present for four months. She subsequently underwent mastectomy surgery. Her hormonal status was Estrogen/Progesterone (ER/PR) negative and HER2 positive. She received chemotherapy (paclitaxel) for three months and Trastuzumab for a period of one year. Additionally, she received 60 Gy of radiation to the surgical area following the standard radiotherapy protocol. After one year, she experienced a relapse in the neck nodes. These lymph nodes were treated with a diode laser using a 400 µm laser fiber. The fiber was inserted via an 18G needle.

The patient was administered T-DM1 or Trastuzumab with Emtansine for a period of one year as per the EMILIA trial protocol. PET scans were done twice within the year, and regular Magnetic Resonance Imaging (MRI) scans were conducted at two-month intervals. She did not show any relapse in the neck nodes, but after 14 months, suspicious lymph nodes were found in the mediastinum [Table/Fig-1]. Endoscopic Bronchial Ultrasound (EBUS) confirmed the presence of precarinal and paratracheal lymph nodes [Table/Fig-2], ranging in size from 1 cm to 2.8 cm. The largest node measured 2.8 cm in the precarinal region. A biopsy using a 22G bronchoscopy needle was performed during the same session, confirming the presence of metastatic cells from breast carcinoma in the precarinal lymph node [Table/Fig-3]. There was a change in hormonal status, as the lymph node metastases were found to be HER2 negative. A decision was made to ablate the lymph nodes using laser treatment after discussion with the patient and the gastroenterology department, which had expertise in Endoscopic Ultrasound (EUS) [Table/Fig-4]. The procedure was performed under general anaesthesia with the Olympus EUS system. The procedure went smoothly, and no bleeding in the mediastinum or oesophagus was observed.

The patient was observed for any bleeding, pneumomediastinum, or mediastinitis for a week, but she did not develop any such complications. After discharge, she received six cycles of the DCF (Docetaxel, Cisplatin, and 5-fluorouracil) protocol at three-week intervals for three months, which she tolerated well. A repeat PET scan after six months showed complete resolution of all previously

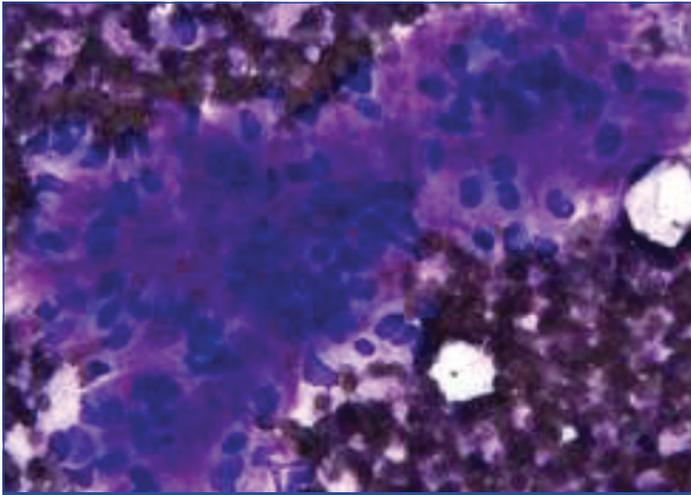


[Table/Fig-1]: Arrow pointing to mediastinal lymph nodes.

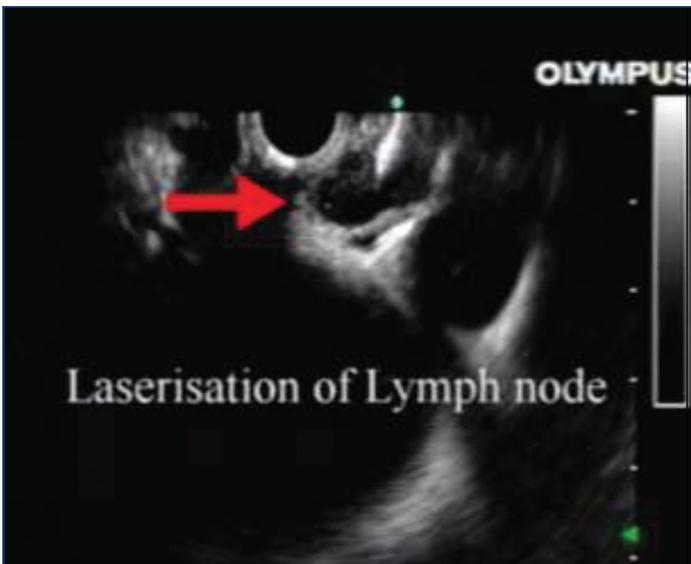


[Table/Fig-2]: Red arrow pointing to precarinal lymph node.

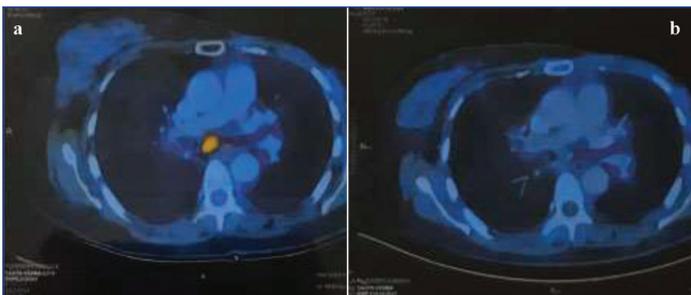
enlarged lymph nodes with no uptake [Table/Fig-5,6]. Additionally, she gained two kg during the same period.



[Table/Fig-3]: Histopathology of metastasis of lymph node (40X).



[Table/Fig-4]: Laserisation of lymph node under EUS guidance.



[Table/Fig-5]: (a) Positive lymph node mass in mediastinum; (b) No uptake in same area after six months.

DISCUSSION

Breast cancer is increasingly becoming a common cancer in developing countries, accounting for approximately 25% of all cancer cases in females [1]. The incidence of breast cancer in India varies from 25 to 40 per 100,000 females [1]. Breast cancer typically develops slowly and can eventually metastasize to various parts of the body, including the mediastinum, over time. When mediastinal lymph nodes with or without lung involvement are detected on a PET scan, the first step in their management is to obtain a biopsy. This is crucial because hormonal treatments like Trastuzumab, commonly used in breast cancer treatment, can create lesions that resemble sarcoidosis on Computed Tomography (CT) scans [2]. In the past, biopsies were performed using methods such



[Table/Fig-6]: No uptake in same area after six months.

as median sternotomy or CT scan guidance, but more recently, EBUS (endobronchial ultrasound) or endoscopic bronchoscopic ultrasound have been utilised [3-6].

EUS is a viable approach for studying and biopsying mediastinal lymph nodes for diagnosis and staging [7-9]. Since this case involves stage 4 disease, aggressive treatment should be avoided, and conventional options such as radiotherapy or stereotactic radiotherapy combined with chemotherapy are recommended. Laser ablation of lymph nodes is an established procedure for managing lymph nodes in ultrasound-accessible areas [10-12]. Laser ablation has been successfully performed in the abdominal and retroperitoneal regions. Endoscopic ultrasound is a technique that allows for traversing the mediastinal area, and gastroenterologists, who are familiar with this area, employ EUS for lymph node biopsy [7,13,14]. In this particular case, a combination of these two procedures was performed.

Transbronchial laser ablation has been reported in the literature for the treatment of both benign and malignant tumours. The principles of laser ablation are similar in any clinical setting, as it disrupts the blood supply of the lymph node, leading to necrosis of the node and any malignant cells within it. The processes involved in laser ablation include devascularisation of afferent vessels, coagulative necrosis, thermal damage to cells, and retrograde thrombosis [10,14]. Studies have consistently reported favourable responses, with necrosis of lymph nodes ranging from 60-100%. The size of the lymph nodes is an important factor, as lymph nodes larger than 3 cm may have extracapsular extensions and are more likely to have residual disease due to extranodal blood supply. Complications of the procedure can include injury to major blood vessels and surrounding vital structures [10,12,14].

Other ablative methods, such as radiofrequency and microwave, have been suggested for the treatment of central airway obstruction with minimal postoperative complications. Complications tend to be more pronounced in transthoracic ablative techniques under CT scan control [15,16]. Despite an extensive literature search over the past eight years, no mention of EUS or EBUS laser ablation of mediastinal lymph nodes was found. Discussions with various chest and gastroenterology departments in hospitals also revealed that they had no knowledge of this procedure. Therefore, this may be the first reported case of this procedure in the world. It is worth noting that the observed response in this case may also be

attributed to post procedure chemotherapy. To validate the efficacy of this procedure for isolated malignant mediastinal lymph nodes, further studies need to be conducted.

CONCLUSION(S)

This case is being reported for novel reasons. Laser ablation of lymph nodes in the mediastinum is considered safe and can be performed in centres with sufficient experience and skill sets in both laser ablation and EUS. Laser ablation may serve as an alternative to radiation therapy for lymph node metastases in the thorax. It also offers the advantage of being repeatable in cases of relapse. However, further studies are necessary to provide detailed information on factors such as lymph node position, size, energy levels, and duration of laser ablation in order to draw valid conclusions on this subject.

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PARTICULARS OF CONTRIBUTORS:

1. Consultant Laser Surgeon, Department of Oncology, Criticare Asia Hospital, Mumbai, Maharashtra, India.
2. Gastroenterologist, Department of Oncology, Criticare Asia Hospital, Mumbai, Maharashtra, India.
3. Consultant Interventional Gastroenterologist, Department of Oncology, Criticare Asia Hospital, Mumbai, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Rusy Bhalla,
Criticare Asia Hospital, Kurla (West), Mumbai-400070, Maharashtra, India.
E-mail: rusybhalla@gmail.com

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