

Misericordia University

Misericordia Digital Commons

Medical Imaging Senior Posters

Medical Imaging Department

2024

Detection and Treatment of Bronchogenic Carcinoma Using Computed Tomography

Carol Keefer
Misericordia University

Follow this and additional works at: https://digitalcommons.misericordia.edu/medimg_seniorposters



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Keefer, Carol, "Detection and Treatment of Bronchogenic Carcinoma Using Computed Tomography" (2024). *Medical Imaging Senior Posters*. 49.

https://digitalcommons.misericordia.edu/medimg_seniorposters/49

This Poster is brought to you for free and open access by the Medical Imaging Department at Misericordia Digital Commons. It has been accepted for inclusion in Medical Imaging Senior Posters by an authorized administrator of Misericordia Digital Commons. For more information, please contact mcech@misericordia.edu.



Bronchogenic Carcinoma

- Bronchogenic carcinoma is one of many different types of lung cancer impacting individuals globally and is a “leading cause of cancer related deaths, accounting for 32% in males and 25% in females between the ages of 40-70 years” (Sanam et al., 2022, p. 181).

Symptoms

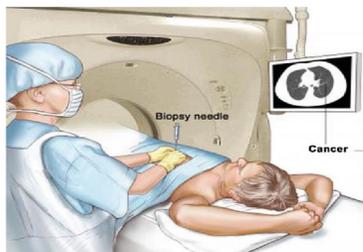
- It is essential to understand the signs of bronchogenic carcinoma to diagnose it early and take appropriate action. Some of these symptoms include:
 - Persistent cough: for several weeks, or even months; could discharge rust-colored phlegm.
 - Shortness of breath: frequently gets worse with physical activity or worsening illness.
 - Chest aches and pains: mild, aching, or severe and often worsens over time.
 - Unexplained weight loss: happens suddenly and is frequently accompanied by weakness. (Walker, 2023, p. 10)

Detection

- One of the ways to detect bronchogenic carcinoma is through a contrast enhanced computed tomography (CT) scan.
- Computed tomography is the use of axial scanning of the ordered body part(s) to assess the function and potential abnormalities of the body part(s) by looking at the examined area in slices.
- “A chest CT-scan is the most frequently used modality and procedure for early detection due to its adequate spacial resolution and widespread availability” (Sanam et al., 2022, p. 182).

Steps to Obtain Diagnosis

- The first step following the contrast-enhanced chest CT is a lung biopsy performed by an interventional radiologist.



Fine needle aspiration lung biopsy (Rizqie et al., 2015, p. 52)

- The CT images taken during the biopsy act as a guide for the interventional radiologist to see the angle and placement of the needle in relation to the lung lesion.
- The radiologist takes lung tissue through the needle and gives it to a laboratory specialist to examine it and determine what type of cancer is present.

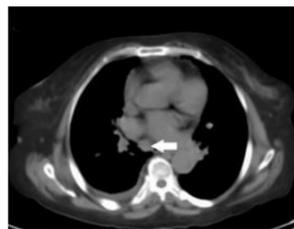


CT guided fine-needle aspiration of left sided lung lesion in prone position

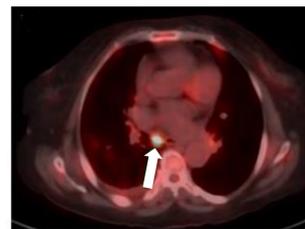
(Bargotra & Sharma, 2022, p. 66)

- Following a lung biopsy and in addition to a CT scan, a positron emission tomography (PET) scan is performed using a glucose-based radioisotope to detect cancer cells.
- Cancer cells tend to have higher metabolic activity than regular cells, so these cells appear brighter on a PET/CT scan than normal cells do, allowing physicians to establish malignant growth.
- “This scan may be done to determine staging of the lesion, which is essential for determining things such as prognosis, prediction, and treatment planning” (Salem et al., 2024, p. 2509).

Lung lesion (left) discovered in CT scan vs. metabolic activity (right) of same lesion during PET/CT scan



Arrow pointing to lung lesion (Salem et al., 2024, p. 2515)



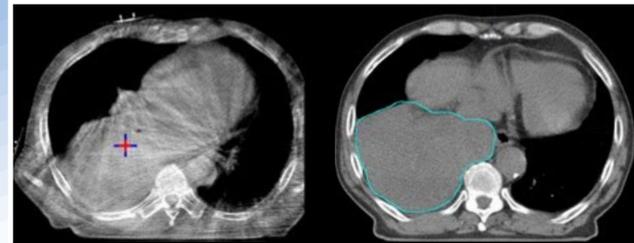
Arrow pointing to metabolic activity of lung lesion

- Chemo and/or radiation therapy are common treatment options for lung cancer following the results of the cancer staging from the PET/CT scan.
- Although not often discussed, computed tomography plays an important role in this part of treatment as well.
- “Cone-beam computed tomography (CBCT) is a tool that is utilized during image-guided radiation therapy (IGRT) treatments” (Michienzi et al., 2016, p. 263).

- Gross tumor volume (GTV) and location are subject to change, whether it be from patient positioning, organ movement during respiration, tumor regression or progression, or lung deformation due to collapse or re-expansion.
 - CBCT is the most optimal and readily-available quality assurance procedure to verify tumor location and ensure equipment is aligned properly before beginning the radiation therapy treatment. (Michienzi et al., 2016, p. 263)

Without CBCT, it is possible that healthy tissue could become irradiated during treatment because the radiation therapists would not be able to confirm tumor location or size prior to each treatment.

Comparison of cone-beam CT (left) and standard CT (right). Either one can be used during radiation therapy treatment.



GTV measured as 866.29 mL (+) (Michienzi et al., 2016, p. 267)

GTV measured as 996.72 mL (blue outline)

Staging of Bronchogenic Carcinoma

- Staging involves assessing how far the cancer has spread within the lung and other parts of the body.
- Staging determines potential treatments options for patients. These options are as follows:
 - Stage I: patients can undergo pneumonectomy or lobectomy.
 - Stage II: surgery required; followed immediately by adjuvant treatment.
 - Stage IIIA: undergo chemotherapy and radiation therapy, followed by surgery after downstaging occurs.
 - * Stage IIIA involves potential spread to other tissues local to the original tumor location
 - Stages IIIB or IV: no benefit from surgery.
 - * Stage IIIB involves potential spread to tissues on opposite side of the body. (Salem et al., 2024, p. 2509)
- Doctors use the staging process to determine which treatment is best for each patient.

- A patient’s prognosis may change depending on which stage the cancer is in when bronchogenic carcinoma is discovered, as well as whether the type of cancer is small cell or non-small cell.

Overview

- Types of non-small cell lung cancer include adenocarcinoma, squamous cell carcinoma, and large cell carcinoma, which are all more common than small cell.
- Types of small cell lung cancer include sarcomatoid carcinoma and adenosquamous carcinoma and are far less common. (Walker, 2023, p. 8)
- Regardless of cancer type, the initial steps to obtain diagnosis, staging, and proper treatment remain the same.



Example of potential lung cancer found on CT scan, outlined in white

(Tas & Yavuz, 2024, p. 11)

Conclusion

- Bronchogenic carcinoma can be a very serious, life-threatening form of cancer.
- Lung cancer is the leading causes of cancer-related deaths worldwide.
- As with all cancers, early detection is key for a more positive prognosis.
- A major component throughout the entire process of lung cancer, from detection through final treatment, is computed tomography.
- Computed tomography allows for small nodules and lesions to be detected within the lungs that may not be visible in a traditional chest x-ray.
- CT is also used alongside interventional radiology and radiation therapy to ensure that the patient is receiving the proper care that is needed throughout the journey.
- The steps a patient takes while enduring lung cancer are long, with imaging studies, lab tests, biopsies, and radiation therapy treatments occurring throughout the process.