

## Case Report

# Multiple cavitating cannon ball metastasis with primary adenocarcinoma lung: a rare case report

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## ABSTRACT

Multiple large round well circumscribed pulmonary nodules in lungs are known as cannon ball secondaries. There are malignant and non-malignant causes of cannon ball secondaries. In case of malignancy, they represent classical haematogenous dissemination to the lungs of a primary malignant tumor. Secondaries to lung from renal cell carcinoma and choriocarcinoma are necrotic. The less common primary tumors causing cannon ball secondaries to lung includes prostate carcinoma, synovial sarcoma, endometrial carcinoma and some gastrointestinal malignancies. Here we presented a very rare case, maybe first of its kind of multiple cavitating cannon ball secondaries where primary malignancy was in lung itself which was EGFR positive adenocarcinoma lung. This case was also rare as cavitation is largely a feature of squamous cell carcinoma lung both of primary and metastatic lung malignancy.

**Keywords:** EGFR positive, Multiple lung nodules, Primary lung malignancy

## INTRODUCTION

Cannon ball secondaries to lung are common from malignancies like renal cell carcinoma, seminoma, sarcoma, colon, prostate, choriocarcinoma and breast carcinoma.<sup>1</sup> Multiple cavitary lesions in primary lung cancer are rare, however, multifocal bronchoalveolar cell carcinoma can occasionally have multiple cavitary lesions. We presented a case where multiple cavitary cannon ball metastasis with primary adenocarcinoma EGFR positive in lung was seen in a non-smoker male. This was also a rare case as cavitation is largely a feature of squamous cell carcinoma.

## CASE REPORT

A 40 years old male, laborer by occupation presented with the complains of dry cough for last 6 months. It was not associated with sputum production and there were no

specific aggravating or relieving factors of cough. Patient started complaining of shortness of breath for last 1 month which was progressive in nature and also complained of significant weight loss in last 6 months. There was no history of fever or hemoptysis. There was no history of smoking. For these complains he consulted to a general physician where he was started anti tubercular drugs on the basis of history and chest X-ray findings. However patient was not relieved of his symptoms and he presented with the similar complains to our OPD after two weeks of starting antitubercular treatment. There was no radiological change during two weeks of antitubercular treatment. At the time of presentation patient was dyspneic with respiratory rate was 28 per min. Pulse rate was 110 per min. His blood pressure was 120/80 mm of Hg. He was a febrile on presentation. Patient was hypoxic with SpO<sub>2</sub> level 88% on room air. On physical examination pallor was present and there was grade II clubbing. No pedal edema or

lymphadenopathy was noted. There were bilateral crepts present on auscultation. Patient was admitted for further evaluation and management. A repeat chest X-ray was done which showed multiple rounded well defined opacities suggestive of cannon ball opacities in both the lung fields involving whole of lung (Figure 1).



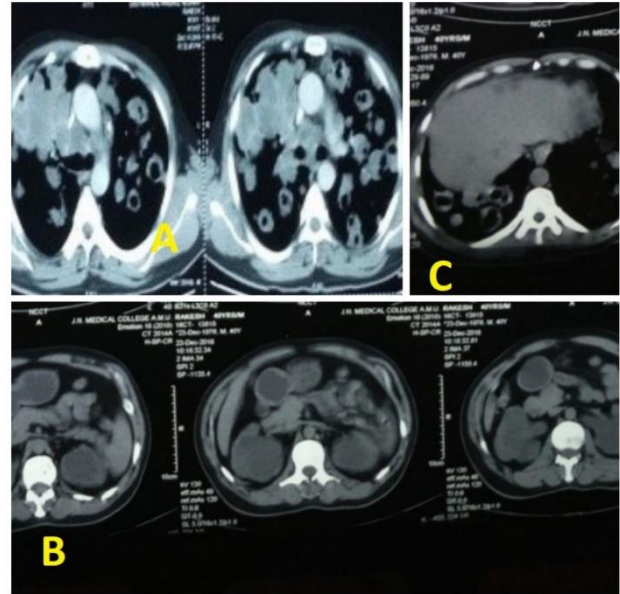
**Figure 1: Chest X-ray showing multiple cannon ball opacities in both the lungs.**

Since chest X-ray was suggestive of malignancy it was planned to do a CECT thorax. His blood investigations were apparently within normal limits with hemoglobin 9.2 mg/dl, TLC-7800 per microl, platelets count-245000 per microl, renal functions were within normal range and liver functions were normal. CECT chest showed a relatively large heterogeneous enhancing lesion with necrotic centre involving anterior segment of right upper lobe with mediastinal pleural invasion with multiple randomly distributed variable sized relatively well defined round cavitary nodules involving all the segments of bilateral lung with necrotic mediastinal lymphadenopathy causing partial compression of superior vena cava (Figure 2A).

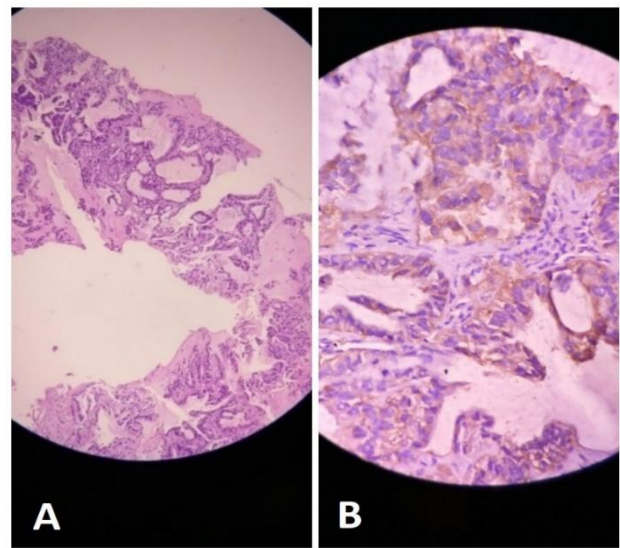
Abdominal films showed large heterogenous hypo enhancing predominantly necrotic round lesions seen in region of bilateral adrenals with possible extension in bilateral adrenal veins and multiple round hypoenhancing lesions in bilateral lobes of liver possibly metastasis (Figure 2 B and C). TNM staging was done as T4 N3 M1c stage IV B.

Image guided FNAC and biopsy was done and H and E stained section from biopsy showed invading poorly formed glands and sheets of highly atypical cells showing marked pleomorphism, high N:C ratio and prominent nucleoli suggestive of non-small cell cancer favoring adenocarcinoma (Figure 3A). Molecular analysis of biopsy sample showed moderate degree of membranous

positivity of EGFR (epidermal growth factor) gene in tumor cells which are pleomorphic hyperchromatic (Figure 3B).



**Figure 2: (A) Showing well defined rounded cavitating lesions in both lungs; (B) showing necrotic lesions in adrenal gland; (C) showing metastatic lesion in liver.**



**Figure 3: (A) Showing H and E stained sections from biopsy with features suggestive of malignancy; (B) showing membranous positivity of EGFR.**

On the basis of history, radiological findings, biopsy and molecular studies the diagnosis of stage IV B EGFR positive adenocarcinoma lung with multiple cavitating cannon ball secondaries was made.

In view of positive EGFR mutation patient was started on tablet gefitinib (EGFR and tyrosine kinase inhibitors). Patient did not show any response to the treatment and

expired due to respiratory failure after 10 days of starting treatment.

## DISCUSSION

Lung is one of the most common site of metastasis. Cannonball-like opacities in lung particularly originates from malignancies like renal cell carcinoma, seminoma, sarcoma, colon, prostate, choriocarcinoma and breast carcinoma.<sup>1</sup> The other non-malignant differential diagnosis could be various fungal infection, bacterial infections like *Klebsiella* and *Staphylococcus pneumonia*, Wegener's granulomatosis and other vascular disorders, parasitic infections, hydatid disease, rheumatoid nodules (necrobiotic nodules) and occasionally pulmonary tuberculosis.<sup>2</sup> Cavitation of primary lung cancer has been detected in 2-16% and 22% cases of primary lung cancer by plain chest X-ray and CT respectively.<sup>3</sup> Cavitation in metastatic tumor is detected by plain chest radiograph in upto 4% cases. Cavitation is largely a feature of squamous cell carcinoma both of primary and metastatic lesions followed by adenocarcinoma and large cell carcinoma. Small cell carcinoma does not cavitate. Multiple cavitary lesions in primary lung cancer are rare, however, multifocal bronchoalveolar cell carcinoma can occasionally have multiple cavitary lesions.<sup>4,5</sup> In a recent

study done by Onn et al they found that tumors with over expression of EGFR were associated with rapid growth, central necrosis and cavitation.<sup>3</sup>

Cavitation of primary lung cancer carries a poor prognosis in terms of survival and treatment outcome.<sup>6</sup> In adenocarcinoma metastatic lesions are of any shape and can occasionally have irregular shape and maybe nodular and cannon ball but underlying cavitation is very rare and most of them have extrathoracic primary, unlike the present case where primary was in lung itself and EGFR positive adenocarcinoma.<sup>7</sup>

Bristowe (1871) first described cavitations in a pulmonary metastasis from carcinoma of pharynx, following this plenty of cases being reported regarding pulmonary metastasis most of them enumerated in Table 1.

From study of mentioned case reports in the table one can conclude that bilateral nodular pulmonary metastasis can be seen in many primary malignancy but cavitations are unusual. So none of case report or case series reported till date was like present case where multiple cavitary cannon ball metastasis with primary adenocarcinoma in lung was seen.

**Table 1 : Studies done by various authors showing cannon ball secondaries to lung.**

Authors	Year	Cases reported	Primary site	Histopathology
Bristowe et al <sup>8</sup>	1871	Pulmonary metastasis	Pharynx, larynx	Squamous cell
Farrell et al <sup>9</sup>	1935	Pulmonary metastasis	Sarcoma and Hodgkins diseases in 78 case series	Sarcoma and Hodgkins lymphoma
Minor <sup>10</sup>	1950	Bilateral rounded metastasis	Urinary bladder necropsy	Medullary carcinoma
Cohen et al <sup>11</sup>	1950	Bilateral nodular	Colo-rectum	Adenocarcinoma
Wigh et al <sup>12</sup>	1951	Bilateral nodular	Uterine cervix	adenocarcinoma
Salzman et al <sup>13</sup>	1953	Bilateral nodular	Seminoma testis	seminoma
Seaman et al <sup>14</sup>	1953	Bilateral pulmonary cavitation	Uterine cervix	Squamous-cell carcinoma
Katzev et al <sup>15</sup>	1955	Bilateral nodular	Transverse colon	Adenocarcinoma
Gellman et al <sup>16</sup>	1957	Bilateral pulmonary	Tongue	Adenocarcinoma
Curran et al <sup>17</sup>	1959	Bilateral nodular	Rectum	Adenocarcinoma
Berger et al <sup>18</sup>	1967	Bilateral cavitary	Epiglottis	Squamous-cell carcinoma
Koh et al <sup>19</sup>	1994	Cavitary metastasis	Urinary bladder	Trantitional cell carcinoma
Essadki et al <sup>20</sup>	1998	Cystic metastasis	Kidney	Renal cell carcinoma
Cohen et al <sup>21</sup>	2000	Cystic metastasis	Synovium	Synovial sarcoma
Nabi et al <sup>22</sup>	2002	Cannon ball metastasis	Prostate	Carcinoma
Kurian et al <sup>23</sup>	2011	Cavitary metastasis	Urinary bladder	Urothelial carcinoma
Kumar <sup>24</sup>	2014	Cannon ball metastasis	Colon	Adenocarcinoma
Murakami et al. <sup>25</sup>	2015	Multiple cavitary metastasis	Lung	Adenocarcinoma
Agarwal et al <sup>27</sup>	2016	Cannon ball metastasis	Stomach	Adenocarcinoma

## CONCLUSION

This is a very rare case of cavitating cannon ball secondaries from primary lung malignancy in a young non-smoker male. Cannon ball secondaries almost always

indicates advanced stage of malignancy. EGFR overexpression is associated with increased incidence of cavitation and cavitation presents a poor prognosis and outcome.



This case is presented to emphasise the importance of making a diagnosis by taking into consideration various differential diagnosis for cannon ball secondary and all relevant patient related data.

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