Role of Pulmonary Metastasectomy in Selected Cases of Solitary Lung Metastasis in Metastatic Breast Cancer Patients - Case Series and Review of Literature

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Abstract

Solitary pulmonary nodule (SPN) occurs uncommonly in treated cases of breast cancer (BC) which if treated surgically in selected patients can provide better survival to patients. However, the management of oligometastatic breast cancer having lung metastasis is still debatable. After completion of treatment of the primary BC, pulmonary metastasectomy can be offered to lesions which are completely resectable with functional operability. The prognosis depends upon factors such as disease free interval, receptor status, pattern of metastasis and most importantly, complete resection of the metastatic lesion. Here we report four cases of SPN developed in treated BC, three of them had metachronous presentation while one presented synchronously. All of them were treated surgically along with neoadjuvant or adjuvant management as indicated.

Keywords: Solitary Lung metastasis, Breast Cancer, Pulmonary metastasectomy

Introduction

Lung is the second most frequent site of metastasis in breast cancer (BC) patients accounting for 15–25%,[1] however solitary pulmonary metastasis is rare. It is usually asymptomatic with an aggressive progression if not treated. Treatment options available for pulmonary metastasis are in the form of systemic therapies like chemotherapy, targeted therapy and hormonal therapy, stereotactic body radiotherapy (SBRT) or surgical management. Treatment with systemic therapies alone provide a median survival of 18.9 to 22 months and a 10-year survival of 10%.[2] In a selected group of patients such as those with single metastasis and disease-free interval (DFI) of more than 36 months, pulmonary metastasectomy (PM) provides 5- year survival of 45%.[3]

Differentiation of the SPN into metastatic lesion from BC, primary lung disease or a benign condition based only on radiological diagnosis or DFI cannot be done,[4] hence mandating the need of pathological confirmation. However, in small sized lesions, preoperative biopsy may be very difficult based on size and location.

Video assisted Thoracoscopic Surgery (VATS) is a good available option in pulmonary lesions located in peripheral locations but in approximately 20% open procedure is required for deep locations to aid complete resection.[5] Complete resection of isolated pulmonary metastasis in the absence of other distant metastatic lesion can render the patient disease free and provide a survival benefit. Here we are sharing our experience of PM for SPN in BC patients by presenting four case scenarios, who were managed based upon the discussion done by the multidisciplinary team of our hospital.

Case Reports

Patient 1:

A 72-year-old lady with history of left BC treated with modified radical mastectomy (MRM) and adjuvant systemic therapy and radiation therapy (RT) 20 years back, presented to us in 2019 with a lump in right breast with PET CT showing an FDG avid lesion in upper inner and inner central quadrant of right breast and a soft tissue opacity (STO) in posterior segment of right upper lobe (RUL) of lung suggestive of metastasis (Figure 1). The diagnosis of BC was confirmed with histopathological examination (HPE) of the breast lump and the lung lesion. She then

Figure 1: CT thorax showing 12 x 11 mm STO lesion in posterior segment of RUL

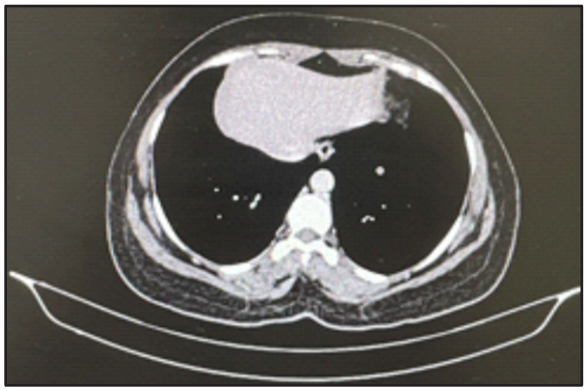

Figure 2: CECT thorax showing a soft tissue nodule in LLL

underwent right mastectomy + sentinel lymph node biopsy (SLNB) + Right VATS guided PM. Final HPE of the breast lesion was reported as DCIS, pTisN0(sn), hormone receptor (HR) negative. Histology of the lung lesion showed metastatic ductal carcinoma (MDC), Estrogen receptor (ER) positive, Progesterone receptor (PR) positive, Her 2 neu negative. She was then started on Hormonal therapy with tamoxifen. Patient is presently disease free (4 years) and is following up in our outpatient department (OPD) regularly.

Patient 2:

A 44-year-old lady, a known case of left BC diagnosed in October 2014 post left MRM (done outside), presented to us in November 2021 with a recurrent nodule over left chest wall. CECT thorax (Figure 2) done showed a 7x6 mm STO lesion in left lateral chest wall and another small sized lesion of 9x8 mm STO in antero-basal segment in left lower lobe (LLL). Biopsy of chest wall lesion confirmed recurrent invasive BC with ER+/ PR+/ Her 2 neu -, for which wide local excision (WLE) was done. She was re-evaluated after 3 months with PET CT which displayed STO lesion in LLL of size approximately 1 x 1 cm, highly suspicious of metastasis, for which VATS metastasectomy was performed. Final histology report suggested pulmonary hamartoma with no evidence of malignancy. She was then started on Hormonal therapy (Tab Tamoxifen) and is under our regular follow up for 10 months.

Patient 3:

A 50-year-old lady, a known case of left BC post left MRM done outside in the year 2016, presented to us in 2018 with CECT Thorax showing a 10x14x5 mm lesion in posterior segment of RUL. Biopsy of this lesion showed a poorly differentiated metastatic carcinoma; ER, PR and Her2 neu were negative. RUL PM was performed for the lung lesion. On final histology MDC was reported; ER-/ PR -/ Her 2 neu –. After 3 years of follow up, CECT Thorax showed a 13x13 mm STO lesion in posterior segment RUL with a possibility of metastasis, which was confirmed as MDC on biopsy. She received palliative chemotherapy and RT for this recurrence but unfortunately after 1 year succumbed to the progressive lung metastasis.

Patient 4:

A 49-year-old lady, presented to us with a diagnosis of right BC (T2N1M1), with whole body PET CT scan showing a 1 x 0.9 cm subpleural nodule in the lingual segment of left lung, suspicious for metastasis. Review biopsy at our center reported the breast nodule as IDC grade III, ER-/PR-/Her2 neu+ and lung nodule as metastatic carcinoma. She received systemic chemotherapy followed by a PET CT scan which showed a reduction in breast lesion size but the subpleural nodule of left lung increased to 1.5 x 1.2 cm size. She then underwent right MRM and VATS guided PM. The final histology was IDC grade III with DCIS, ypT2N1 in the MRM specimen and MDC in lung nodule. She received adjuvant RT and targeted therapy. She is regularly following up in OPD and is disease free for the last 1 year.

Discussion

There is a very low incidence of SPN, approximately 0.4% in treated cases of primary BC.[6] According to Sascha et.al criteria for PM with curative intent are a) controlled primary disease b) no extra thoracic, synchronous metastasis c) operable disease d) good operative risk e) feasibility of all lung lesion resection.[7] Staren et. al have shown an improved 5-year overall survival (OS) (36% versus 11%), median survival of 32 to 96.6 months in surgically treated BC patients with pulmonary metastasis compared with medically treated individuals.[6] Table 1 demonstrates the literature supporting the role of PM in improving

Table 1: Literature supporting the role of PM in improving survival outcomes in metastatic BC (mBC)

Study	No. of Patients	Median Disease free interval	Median Survival	5-year Survival rate
Staren et al.[6]	33	48 months	55 months	36 %
G. Friedel et al.[3]	467	43 months	37 months	38 %
Tanaka F et al.[4]	52	66.8 months	32 months	30.8 %
Meimarakis et al.[8]	81	-	82.4 months	59.6 %
Chan et al.[9]	13	22.1 months	30.57 months	-
Planchard et al.[10]	125	36 months	50.4 months	45 %

survival outcomes in metastatic BC (mBC). Most important prognostic factor for post metastasectomy survival is complete resection of all metastasis. PM is associated with a mortality rate of 0 to 3%.[7] Post-operative complications occur in 5.8% to 23.8% cases, with pneumonia and arrythmia in majority of cases followed by atelectasis, pneumothorax and hemothorax.[7] Fortunately, none of our patients developed any of these postoperative complications.

Conclusion

Management of SPN in case of mBC is a surgical challenge. With this experience, we would like to emphasise on the need of multidisciplinary team approach for adequate management in such cases and also to consider histological confirmation of the lung lesion before surgery wherever feasible.

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