

Non-small cell lung cancer presenting as a bilateral metastatic brachial plexopathy

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Abstract

Squamous cell carcinoma may present with atypical peripheric nerve symptoms. Lung cancers are the second most common cancer which metastasize to the brachial plexus. Metastatic brachial plexopathy (BP) is almost always unilateral. We document MR images of a case with squamous cell lung cancer presenting as bilateral metastatic BP. Although very rare, bilateral plexopathy may be the presenting situation of lung cancer.

Key words: plexopathy, bilateral, metastasis, lung cancer

Introduction

Brachial plexopathies (BP) develop when lesions occur anywhere along the course of the brachial plexus which provides motor and sensory innervation of the upper extremity. These lesions are often due to trauma, radiation, and primary or secondary tumors. Secondary tumors of brachial plexus are more common than primary tumors and all are malignant [1]. Breast and lung cancers are the most common malignancies which metastasize to the brachial plexus and usually invade the brachial plexus by contiguous spread from the lung [2]. Brachial plexopathy due to metastasis is almost always unilateral [3, 4].

Herein, we demonstrate a case of a non-small cell lung cancer presenting as bilateral BP.

Case Report

A 54-year-old man with severe pain and weakness in his neck, shoulders and arms was referred to our institution for a detailed evaluation. He had a mild pain started 3 months prior to admission in the left side of his neck and left shoulder, radiating to the medial side of the left arm. In two weeks, the pain had increased in severity and a mild weakness had developed in the left forearm and hand muscles. At the time of admission, with further increase in intensity of the pain on left side, a severe pain had developed in the same region on the right with accompanying weakness in proximal arm muscles. Cervical spine MRI performed prior to admission was normal. The patient had a 60 pack-month (1200 cigarettes/month) smoking history for nearly 40 years.

On examination, left hand intrinsic, triceps, and wrist flexor and extensor muscles were severely atrophic. Right deltoid and trapezius muscles were severely, biceps was mildly atrophic. The weakness of the muscles were variable in a range between 1/5 and 3/5 on examination. Sensation was decreased in the left C8 and right C6 dermatomes. Deep tendon reflexes were normal.

The first electromyography (EMG) showed mildly reduced right ulnar sensory amplitude. Needle EMG revealed chronic neurogenic motor unit potentials in right C4-8 innervated muscles. Reduction in the recruitment was significant in right C4 and C5 myotomes, concluding that these were the most severely affected ones. In left arm C6-8 and T1 muscles were affected and C7-8 were the most severe ones. Consequently an electrodiagnosis of bilateral plexopathy was made.

Lumbar puncture revealed no abnormality. Brachial plexus MRI revealed a solitary mass measuring 4x4x4.5 cms in diameter in the left brachial plexus, located posterolaterally, involving the middle and lower trunks on coronal images. The uncapsulated mass was hypointense on T1-weighted spin echo (T1W SE) and hyperintense on T2W TSE images relative to the brain parenchyme and had irregular border. The mass showed marked enhancement (Figs. 1a, b, c). Extension of the mass into the spinal canal, invasion of the C6-7 ventral roots and destruction of C6 and C7 vertebrae were observed. There was another mass, 1,5x2,5x3 cms in size with similar imaging features on the right upper cervical plexus at the level of C4-5 vertebrae and ventral cervical roots (Figs. 3a, b).

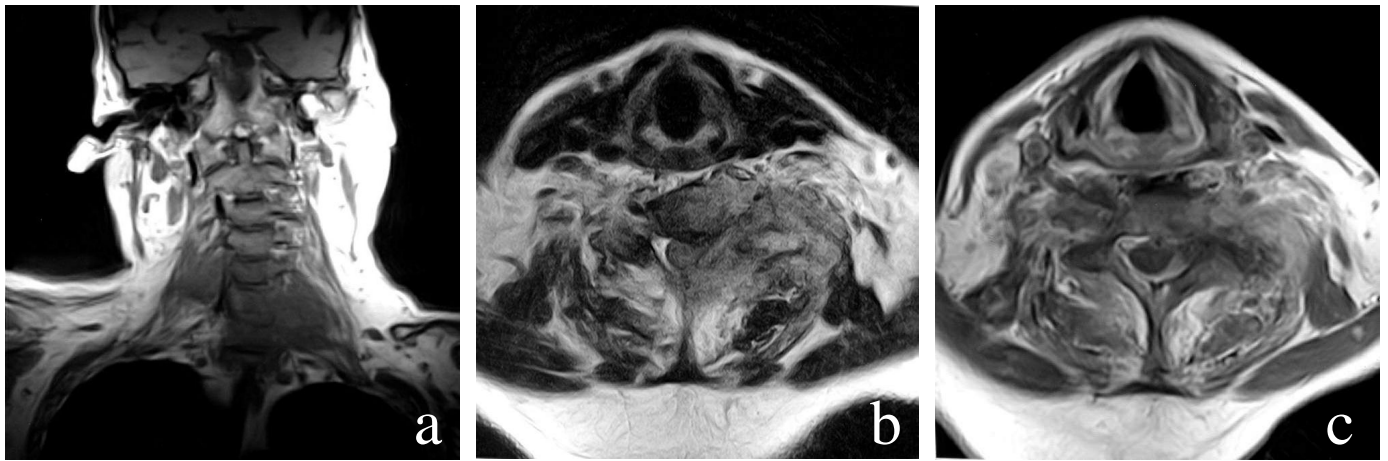


Figure 1 T1-weighted SE (TR/TE, 650/15) coronal (a) and T2-weighted TSE (TR/TE, 3590/100) axial (b) images show bilateral metastatic masses on the brachial plexus which invades the C5-C7 vertebrae. The neural foramina, and marked heterogeneous enhancement is seen on postcontrast T1-weighted SE (TR/TE, 650/15) axial image (c).

A lung CT disclosed a mass lesion in the upper lobe of the right lung (Fig. 2). The pathological examination yielded poorly differentiated squamous cell carcinoma.

The patient underwent radiotherapy for the primary and secondary tumor sites with pain control measures. The strength of the left arm muscles increased about 20%. He mentioned almost complete pain relief.

Three weeks later, second EMG showed a 30% and 70% decrease in right first digit median and ulnar sensory amplitudes, and 50% and 30% decrease in left median and ulnar motor amplitudes respectively. Needle examination revealed an additional involvement of right C4 and left C5 muscles. Right C8 and left C7-8 muscles were worse when compared to the previous EMG.

One month after his admission to our hospital, he complained about weakness in his left leg. A repeat cervical MRI showed progression of the left brachial plexus mass.

Collaps of the C6 and C7 vertebrae as well as compression of the spinal cord by the tumor at the corresponding levels of C6 and C7 vertebrae was observed on sagittal T2W TSE images (Figs. 3a, b)

The patient failed to respond additional chemotherapy and muscle power decreased in all limbs. Six months after diagnosis he died.

Discussion

In a study of 104 patients with non-traumatic BP, radiation fibrosis was demonstrated as most common cause followed by primary and metastatic cancers [4]. Secondary tumors of brachial plexus are more common than primary tumors and all are malignant [1]. It was reported that breast and lung cancers were the most common metastatic cancers to the brachial plexus. Seventy percent of the tumors were of breast or lung origin and usually invaded the brachial plexus by contiguous spread from the lung [2]. Brachial plexus involvement by a metastatic disease is almost always unilateral. We are aware of another report by Thyagarajan et al., in which a bilateral BP due to breast cancer was presented [3].

Our patient presented with unilateral symptoms mimicking cervical radiculopathy. EMG and the repeat MR examination of the brachial plexus after an unremarkable cervical spine MR performed at the time of relatively mild symptoms established the diagnosis of bilateral involvement of the brachial plexus by metastases in our case. Brachial

plexopathy due to any cause is rare. A literature search discloses a few reports of a few causes [5, 6]. Tzur et al reported a case due to e. coli sepsis, which presented with pain in neck and shoulder, weakness of shoulder girdle and proximal arm muscles and worsened in a few days [7]. Bilateral brachial neuritis can mimic metastatic plexopathy [6]. Usually, brachial neuritis is more acute and follows a history of viral illness or immunization [7].

Radiation therapy may cause bilateral BP [2, 8]. But history of a tumor and radiotherapy, nature of the pain, myokymia in the EMG, and findings in radiologic examinations usually help to differentiate radiation plexopathy from metastatic plexopathy.

Patient's history of 60-pack-month smoking increased the possibility of a metastatic lesion. Brachial plexus MRI revealed mass lesions in both brachial plexuses. MRI provides the best anatomical detail and can identify tumor infiltration of the brachial plexus [7]. Thyagarajan et al. stated that the masses were usually adjacent to the brachial plexus rather than in it [3]. This may explain normal sensory amplitudes (except ulnar nerve) in the first EMG in this case.

Lung cancer is the most common primary tumor invading the brachial plexus after breast cancer [1, 3, 4, 9]. Non-small cell lung cancers are the most common lung cancers which metastasize to the brachial plexus. Only two bilateral cases out of a total 175 BP patients have been reported in



Figure 2 On CT scan, mass of upper lobe bronchus which was proven to be non-small cell lung carcinoma is demonstrated.

two large series by Thyagarajan [3] and Wittenberg [4]. Breast cancer and radiation therapy were the causes in those two cases [3, 4]. In Thyagarajan's study, all 4 metastatic BP cases out of 71 patients were unilateral [3].

Vargo et al. [10] reported a patient with pancoast tumor presenting as a left C8 cervical radiculopathy. Their case was poorly differentiated carcinoma most likely of squamous type similar to our case. This report together with our case emphasize that lung cancers, especially squamous cell carcinomas may present with atypical neurologic complications.

Tumors, predominantly lung cancers, usually invade medial and lower trunks [6]. In the present case, metastatic mass on the same side with the primary tumor, involved the right upper brachial plexus. On the contralateral side, involvement of the middle and lower trunks was present. The distribution pattern suggests that metastases to the brachial plexus in this case was either lymphatic or hematogenous rather than contiguous spreading.

As patients who have squamous cell carcinomas may present with unusual peripheral nerve symptoms, an MR examination for brachial plexuses and further radiologic examinations to document primary tumor should be performed in selected cases.

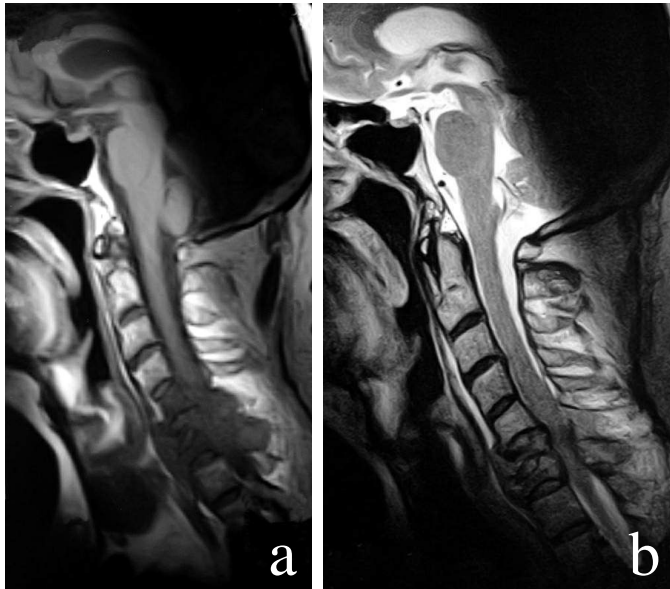


Figure 3 Sagittal T1-weighted SE (TR/TE, 650/15) (a) and T2-weighted TSE (TR/TE, 3590/100) (b) images show involvement of the vertebrae and compression of the spinal cord.

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