



Case Report

Jasper-Stone Like Skull: Massive Skull Metastasis With Invasion of Leptomeninges-A Rare Case Report

Murat Şakir EKŞİ¹, Teyyub HASANOV², Yaşar BAYRI², Mustafa İbrahim ZİYAL², Aşkın ŞEKER²

¹University of California, San Francisco, Orthopedic Surgery-Spine Center, CA, USA

²Marmara University Medical School, Neurosurgery, Istanbul, Türkiye

Summary

Skull metastases are common; lung cancer composes 14% of them. Destructive, whole calvarial infiltration of lung cancer has not been reported before. A 63-year-old male patient was admitted to our clinic with multiple palpable masses all over his head. Plain skull radiography depicted diffuse bony thickening. On MRI, whole calvarium enhanced on T1-weighted scans. PET-CT showed increased uptake in lung which was proved to be non-small cell lung cancer after bronchoscopic biopsy. En bloc resection for the biggest calvarial lesion was done with success. Pathology was consistent with metastasis. Destructive skull metastasis with full bone involvement can be the first presenting sign of primary lung cancer as presented in this case report.

Key words: Lung cancer, metastasis, PET-CT, biopsy

Benekli Taşa Benzeyen Kafa Kemiği: Leptomeninkleri Tutan Tüm Kafa Kemiği Metastazı-Nadir Bir Olgu Sunumu

Özet

Kafa kemiği metastazları oldukça sıktır; akciğer kanseri bunların %14'ünü oluşturur. Tahrip edici şekilde kalvaryumun tümünü tutan akciğer metastazı literatürde henüz bildirilmemiştir. Altmış üç yaşında erkek hasta, kafasının üzerinde ele gelen çoklu kitleler ile kliniğimize başvurdu. Kafa grafisinde, kafa kemiklerinin yaygın kalınlaştığı gözlemlendi. T1-ağırlıklı beyin MR incelemesinde, kontrast madde sonrası tüm kalvaryumun intensitesi arttı. Primer odak taraması amacıyla yapılan PET-CT görüntülemesinde, akciğerde odak tespit edildi. Bronkoskopik biyopsi sonrası tanı küçük hücreli dışı akciğer kanseri olarak geldi. En büyük kalvaryal kitleye cerrahi müdahale ile en blok rezeksiyon uygulandı. Patolojik tanı metastazla uyumlu geldi. Bu olguda sunulduğu gibi, primer akciğer kanserinin ilk klinik prezentasyonu tüm kalvaryumu tutan ve tahrip edici nitelikte lezyonlar olabileceği akılda bulundurulmalıdır.

Anahtar Kelimeler: Akciğer kanseri, metastaz, PET-CT, biyopsi

INTRODUCTION

Metastases of lung cancer to brain are usual and lung cancer composes nearly 50% of all brain metastases⁽²⁾. Skull metastases from any type of tumor source are also common; but lung cancer metastasis to skull is very rare (14% of all skull metastases). Early diagnosis is crucial

for handling the problem in time. Computed tomography (CT) is very useful for demonstrating bone lesions; but MR is also beneficial to show the brain beside the skull which can occur simultaneously⁽³⁾.

Herein, we presented a rare case of massive skull metastasis from lung cancer (non-small cell type) including invasion of

leptomeninges. To our knowledge, this is the first ever case with such a huge infiltrative nature in skull bone.

CASE PRESENTATION

A 63-year-old man was admitted to our clinic with multiple palpable masses over his head. There was no headache or tenderness over the lesions. Neurological examination was normal and laboratory work-up was intact. He had smoked 2 packets of cigarette during 40 years. A skull plain radiography showed diffuse thickening in the calvarium after which MR was ordered. On MRI, diploic area was infiltrated homogenously with tumor cells. Destructive masses infiltrated the dura and protruded out of skull. The biggest lesion on right parietal bone was 39.99 x 47.79 x 45.95 mm (Fig 1A-C, E). For searching a possible primary origin, PET-CT was performed and the right upper pulmonary lobe became highlighted with increased uptake.

Bronchoscopic biopsy result was non-small cell lung cancer (Figure 1D).

Although he had no active symptoms but local bone swellings, we decided to excise the biggest one on the right parietal bone because of local mass effect over the motor strip area. In the surgery, the mass was en bloc resected with underlying infiltrated dura. Duraplasty with pericranium and cranioplasty with hydroxyapatite bone cement (Mimix, Walter Lorenz Surgical, Jacksonville, Florida) were done. Post-operative immediate brain MR showed total resection of the intended mass with well replacement of artificial bone materials (Figure 1F). Post-operative course was uneventful and he was discharged on post-operative 4th day. Pathology result was non-small cell lung cancer, and he was put on radiotherapy for primary disease and follow-up for calvarial metastasis.

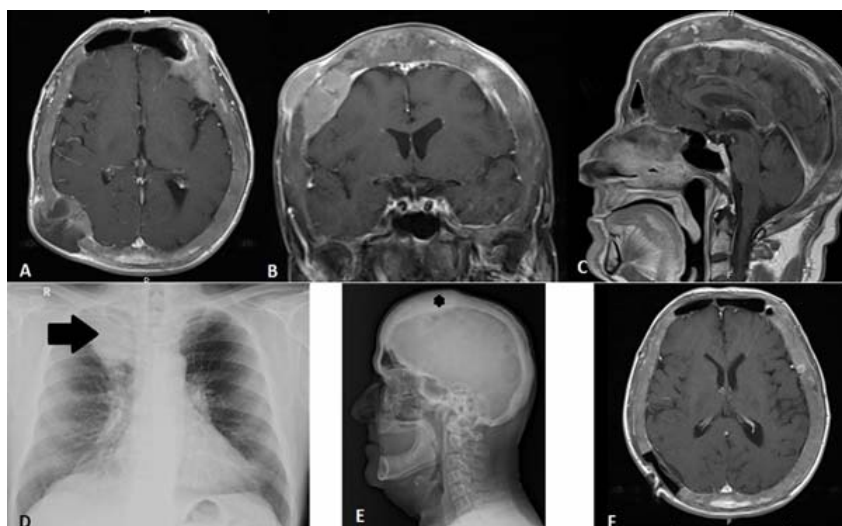


Figure 1: Both inner and outer tables of calvarium are invaded with tumor cells. The skull bone enhances homogenously after I.V. contrast material on T1-weighted MR images. There is a destructive mass lesion on the right parietal bone. The dura is also invaded. (A-C). On P-A chest radiography, a mass lesion (black arrow) in the right upper lobe of lung is seen (D). Skull plain x-ray shows diffuse thickening (asterisk) (E). Post-operative MRI showing excision of the right parietal bone mass replaced with hydroxyapatite bone cement (F).

DISCUSSION

Skull metastasis occurs by hematological ways in breast, lung, thyroid, kidney neoplasms, malign melanomas and neuroblastomas. There is preponderance for female gender (male/female ratio: 3/7). Breast (55%) is the leading and lung (14%) is the second most common source of metastasis to skull. Non-small cell lung cancer (NSCLC) is the main pathology detected in metastases to skull (74%)⁽³⁾.

The most important presenting symptom is bone pain. Palpable swellings, headache and nausea are other signs and symptoms⁽³⁾. Our patient presented only with painless multiple swellings over head, even though dural invasion had already occurred before diagnosis of primary source of cancer.

Average time from primary lung disease to detection of skull metastasis is 9 months. The most common presentation is circumscribed intraosseous calvarial lesion (27%). They usually progress without any symptoms; but sometimes they are detected with pain and cranial nerve palsies⁽³⁾. Although skull metastases are common, destructive invasion of skull bone is very rare. Destructive skull lesions have been previously reported with breast, thyroid, prostate cancers, Ewing's sarcoma, neuroblastoma⁽²⁾. The first ever case of destructive skull metastasis from a lung adenocarcinoma was reported by Foco et al. in 2011⁽¹⁾. There has not been even a single case of destructive skull metastatic disease with infiltration of whole cranium with partly invasion of leptomeninges from NSCLC. Although exact nature of destructive invasion of bone is not known, there are some theories such as periosteal injury or interleukin cascade⁽²⁾. Whole calvarial intraosseous tumor invasion is seen in only 6% of all skull metastases⁽³⁾. Lung cancer metastases have circumscribed intraosseous or invasive

nature which are different from current case status.

Radiological diagnosis is well established with fat suppressed, enhanced MR sequences. Magnetic resonance imaging shows heterogenous images ranging from hypo- to isointensity on both T1- and T2-weighted sequences. Homogenous enhancement after I.V. contrast material is a usual pattern. But rarely, rim enhancement is detected in some areas (Figure 1)⁽³⁾. Diploic space may have asymmetric appearance on both pre- and post-contrast MR images. Our case demonstrated whole calvarial diploic metastasis; but the situation is not always straightforward every time like this. So in doubtful conditions, careful inspection on both enhanced and non-enhanced T1- and T2-weighted MR images should be conducted carefully. Lytic bone lesions are well depicted on CT, although dural invasions cannot be evaluated. It should also be kept in mind that bone scintigraphy may be negative, despite positive MR results⁽³⁾.

Patients with asymptomatic skull metastases without brain lesion can be followed up regularly or treated with radiation therapy with or without chemotherapies (biophosphonates, denosumab, ⁸⁹Sr, antibody for receptor activator of NF-kappa B. But, in case of mass effect over brain parenchyma or symptomatic cases, surgery is the first line treatment in resectable lesions. Average survival time is 5 months from lung cancer metastasis to skull bone⁽³⁾. Treatment experience for destructive skull metastases with parenchymal invasions is scanty. Surgery, conventional radiotherapy and in some instances, stereotactic radiosurgery are options⁽²⁻³⁾.

CONCLUSION

Destructive skull metastasis with full cranial bone involvement can be the first presenting sign of primary lung cancer as

presented in this case report. Surgery and accompanying radio-chemotherapies are treatment options in symptomatic cases. More clinical series and pathological studies are necessary for understanding the nature of and planning treatment for this kind of disease entity.

Correspondence to:

Murat Şakir Ekşi

E-mail: muratsakireksi@gmail.com

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