Medeniyet Medical Journal 2019;34(1):107-112
doi:10.5222/MMJ.2019.78095

Fatal Tinnitus; An Unusual Initial Presentation for Non-Small Cell Lung Carcinoma

Fatal Tinnitüs; Küçük Hücreli Akciğer Kanserinin Sıradışı İlk Belirtisi

Su Ying Tan, Masaany Mansor, Jennifer Peak Hui Lee, Zainal Azmi Zainal Abidin

Conflict of Interest: None

Cite as: Tan SY, Mansor M, Lee JPH, Abidin ZAZ. Fatal tinnitus; An unusual initial presentation for non-small cell lung carcinoma. Med Med J. 2019;34(1):107-112.

ABSTRACT

Metastatic skull base tumors are seen in 4% of the patients with a systemic malignancy and they usually present with cranial neuropathies. In this case report, a 57-year-old male patient who had otological and jugular fossa syndrome symptoms as the initial presentation for non-small cell lung carcinoma was presented. According to our knowledge, only one similar case had been reported in the literature.

Keywords: *Skull base; lung neoplasms; tinnitus*

ÖZ

Metastatik kafa tabanı tümörleri, sistemik malignitesi olan hastaların %4'ünde görülmekte olup, genellikle kranyal nöropatiler ile prezente olurlar. Bu olgu sunumunda, küçük hücreli dışı akciğer kanserinin ilk prezentasyonu olarak otolojik ve juguler fossa semptomları olan 57 yaşında bir erkek hasta takdim edilmiştir. Bildiğimiz kadarıyla literatürde yalnızca bir benzer olgu bildirilmiştir.

Anahtar kelimeler: *Kafa tabanı, akciğer tümörleri, tinnitus*

Received: 24.06.2018
Accepted: 29.09.2018
Publication date: 30.03.2019

Su Ying Tan
Selayang Hospital, Department of Otorhinolaryngology, Selangor, Malaysia
suyingtan@icloud.com
ORCİD: 0000-0003-0468-9530

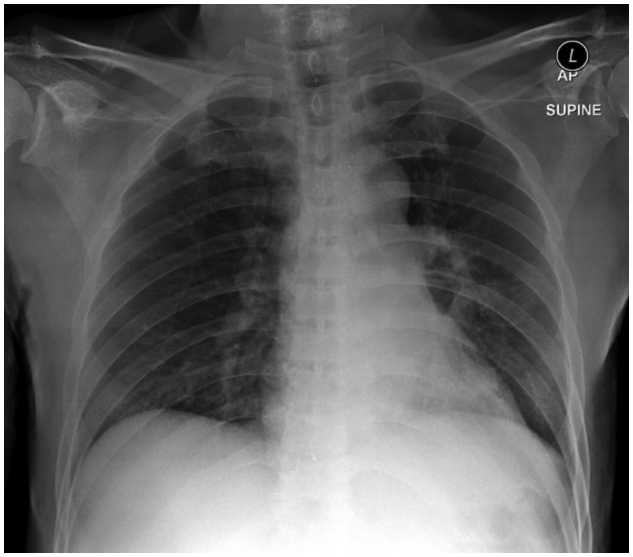
M. Mansor 0000-0003-0435-8985
J.P.H. Lee 0000-0001-6276-8902
Z.A.Z. Abidin 0000-0001-8393-3946
Selayang Hospital, Department of Otorhinolaryngology, Selangor, Malaysia

INTRODUCTION

Metastatic skull base tumors occur in 4% of the patients with a systemic malignancy[1], which can be (most commonly) prostate (38%), breast (cancer) (20.5%), and lung cancer (6%) and they usually present with cranial neuropathies. Other less common malignancies that can metastasize to skull base include malignancies of colon, kidneys, and thyroid, and also melanoma and neuroblastoma[2]. We discuss a case that came with otological and jugular fossa syndrome symptoms as the initial presentation for non-small cell lung carcinoma. So far, only one similar case had been reported[3].

CASE PRESENTATION

A 57-year-old man who was a chronic smoker presented with left-sided reduced hearing, intermittent tinnitus, dizziness and temporal headache for five months, associated with symptoms of progressively worsening dysphagia and aspiration symptoms for three months, hoarseness for two weeks with significant weight loss but no respiratory complaints. Examination revealed left IX, X, XI, XII cranial nerve palsies that were manifested demonstrated by absence of gag reflex, left vocal fold adductor palsy and left trapezius muscle wasting. Other examinations including the ear, neck and lungs were unremarkable with normal chest X ray



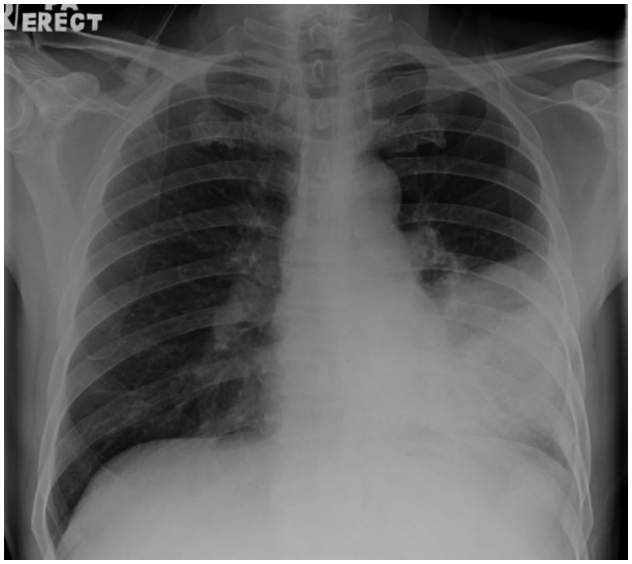


Figure 1. (a) Initial chest x-ray was normal. (b) Chest x ray showing progressive consolidation and effusion up to mid zone of left lung over two weeks duration.

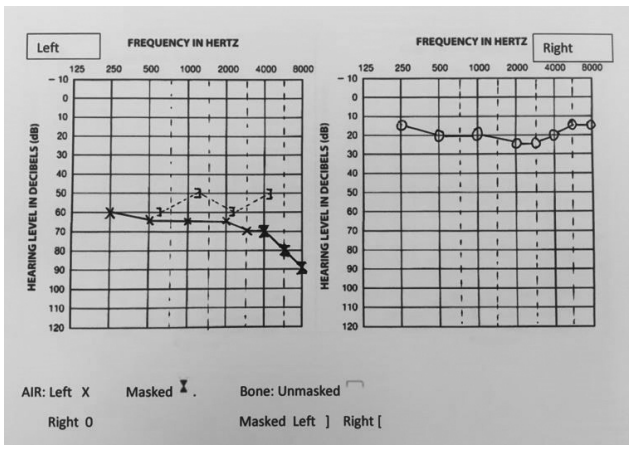


Figure 2. Pure tone audiometry showing moderate to profound mixed hearing loss on the left and normal hearing on the right ear.

(Figure 1a). Pure tone audiometry showed a moderate to profound mixed hearing loss on the left and normal hearing on the right ear (Figure 2).

High resolution computed tomography (CT) scans of brain and neck revealed an ill-defined heterogeneously enhancing mass of 2.5 x 1.8 x 1.2 cm occupying the left jugular fossa eroding the jugular foramen, mastoid air cells, petrous temporal bone, occipital condyle and clivus with no clear demarcation between this lesion and the cerebellum. There was left

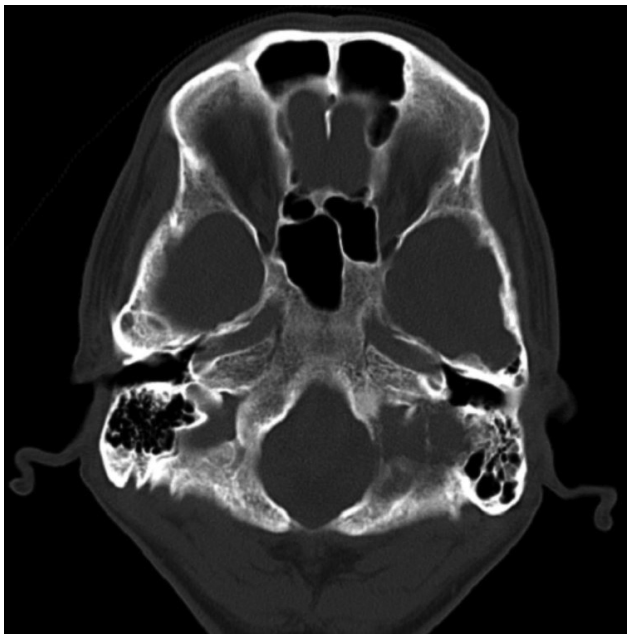


Figure 3. High resolution computed tomography of brain and skull base (axial view, bone window) demonstrating ill-defined heterogenous enhancing mass measuring 2.5x1.8x 1.2 cm at the left jugular fossa with erosion of the left jugular foramen, mastoid air cells, petrous temporal bone, occipital condyle and left side of clivus. There is fluid in the left mastoid air cells.

internal jugular vein (IJV) thrombosis on CT but no upper lung pathology was seen (Figure 3). The differential diagnosis then was either a glomus jugulare tumor or a schwannoma.

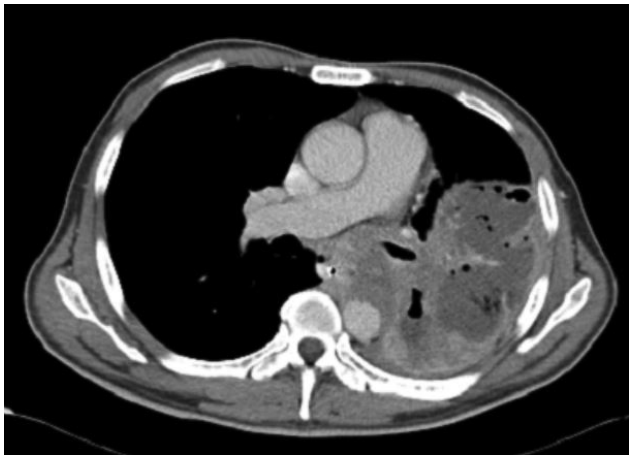


Figure 4. Contrast enhanced computed tomography of thorax (axial view) showing ill-defined heterogenous minimally enhancing mass in the left hilar region encasing the left main bronchus, measuring 5.6x5.5x6.4 cm with no clear fat plane seen between the mass and the adjacent left heart border, oesophagus, left pulmonary artery and thoracic aorta. Enlarged rim enhancing cystic lesion with air locules within in the left mid to lower zone is suggestive of secondary infection.

He was referred to a skull base surgeon in another center, however two weeks later he developed persistent hiccups followed by hemoptysis, fever and left lung lower lobe consolidation. He was diagnosed by an internal medicine specialist as having hospital-acquired pneumonia. Unfortunately, despite receiving intravenous antibiotics for 2 weeks, his chest-X ray showed progressive consolidation and effusion at the left lower lobe zone (Figure 1b). CT thorax suggested malignant lung tumor with metastases to C3 and L1 vertebrae (Figure 4). Throughout the course of admission and follow-up, his left-sided hearing impairment and temporal headache remained at the same intensity, however the tinnitus persisted with a high pitch ringing character.

Magnetic resonance imaging (MRI) of brain and skull base was suggestive of bony metastasis at the left jugular foramen with an expansile soft tissue component. There was no intracranial extension (Figure 5). Rigid bronchoscopy showed an exophytic friable mass inside the left main bronchus, whose biopsy result revealed as non-small cell carcinoma, favoring squamous cell carcinoma. Hence, he was diagnosed as diagnosed with stage 4 non-small cell lung carcinoma with metastases to skull base and spine. Due to his being at the terminal stage and rapid progression of disease, patient and family had opted for palliative care and patient unfortunately expired soon after.

DISCUSSION

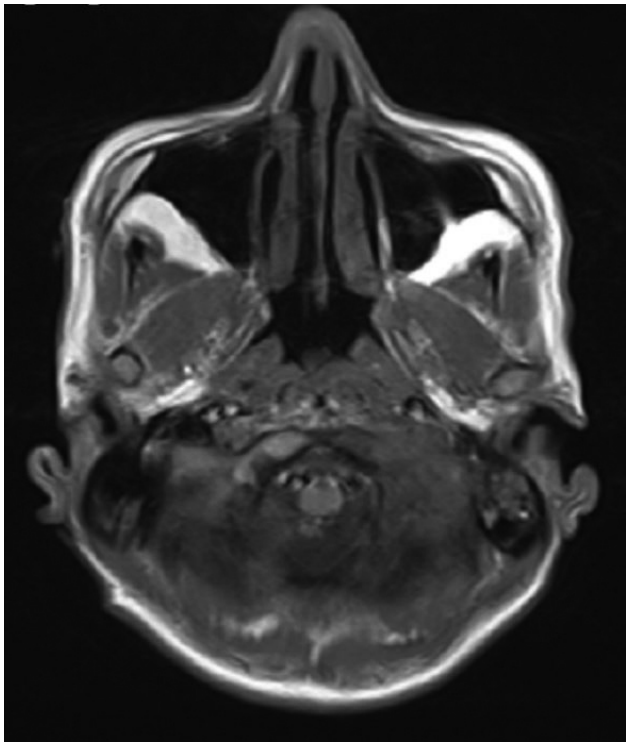
Jugular foramen syndrome is characterized by unilateral paresis of 9th to 12th cranial nerves and it is most commonly caused by jugular foramen tumours[3]. Common differential diagnoses for jugular foramen tumors are glomus jugulare tumors, schwannomas, meningiomas and metastatic tumors[4].

Glomus jugulare tumors commonly present with conductive hearing loss, pulsatile tinnitus, lower cranial nerve deficits and may cause symptoms from release of vasoactive substances. Schwannomas are usually asymptomatic, but it can occasionally present with lower cranial nerve deficits, and can be in association with neurofibromatosis type II[4].

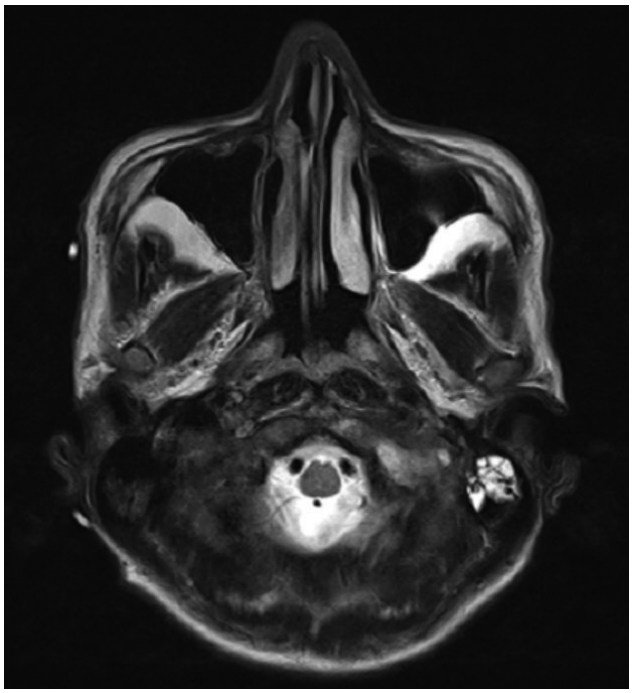
On the other hand, metastatic skull base tumors also present with lower cranial nerve palsies but they are characterized with a more rapid onset. Metastatic skull base tumor is an uncommon late presentation in systemic malignancies and usually the primary malignancy is evident at the time of diagnosis or the patient already has disease disseminated to other sites, especially bony metastases are seen[1,2,4]. However Laigle-Donadey et al. also reported skull base lesions up to 28% of the cases to be the first sign of cancer[2].

Prostate carcinoma is the most common cause of metastatic skull base tumors in males, whereas breast carcinoma being the most common primary malignancy in females[2]. Amongst the primary lung carcinomas, the histological types that tends to metastasize to skull base were adenocarcinoma (58%), small cell carcinoma (18%), squamous cell carcinoma (8%), large cell carcinoma (8%), and unknown types of cancer (8%)[5].

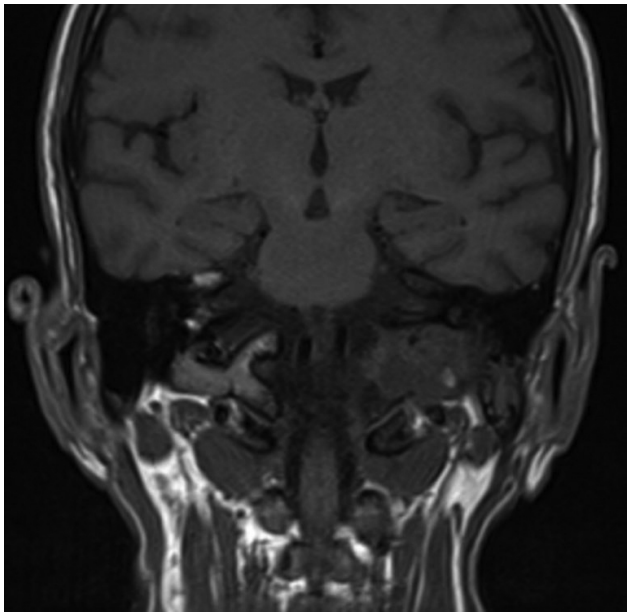
The unilateral tinnitus reported in this case is due to



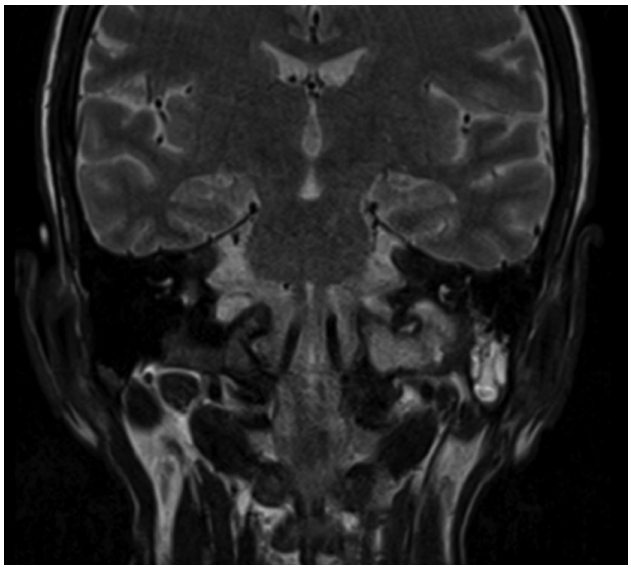
a



b



c



d

Figures 5. Magnetic resonance imaging of brain and skull base (axial and coronal view).
(Figure 5a - Axial T1-weighted, Figure 5b - Axial T2-weighted, Figure 5c - Coronal T1-weighted, Figure 5d - Coronal T2-weighted) showing ill-defined mass at left jugular foramen, measuring 1.7x2.5x2.3 cm with erosion of surrounding bony structures. The mass is intermediately hyperintense on T2-weighted image, hypointense on T1-weighted image, with subtle enhancement in post contrast sequence suggestive of metastatic lesion of skull base. There is no intracranial extension.

ipsilateral moderate to profound mixed hearing loss caused by the jugular fossa metastatic tumor with involvement of the petrous and mastoid part of temporal bone. The sensorineural hearing loss is due to extension of the bony erosion to the petrous part of the temporal bone where the cochlea is situated. The conductive component is due to the fluid in the middle ear cleft as evidenced by fluid in the mastoid air cells on CT, caused by the adjacent malignant tumor with bony erosion.

In this case, we faced a diagnostic challenge as the patient presented initially with an insidious onset of unilateral hearing loss with tinnitus for months followed by a sudden progressive symptoms of jugular fossa syndrome that changed our initial diagnosis from glomus jugulare tumor to suspicion of a malignant disease. The patient also did not have any other associated symptoms initially suggestive of the primary malignancy, and chest X ray and computed tomography were unable to detect any evidence of the primary tumor. We were also faced with the dilemma of whether to proceed with biopsy of the jugular fossa tumor or not to do any intervention due to its location and possibility of it being a glomus tumor.

CT with bone window would be able to detect lytic bone lesions but it would not be able to delineate boundaries, dural invasion or demonstrate concomitant brain metastasis[5]. Both glomus jugulare and skull base metastatic tumors are known to show an infiltrative destructive lesion at jugular fossa on computed tomography, with glomus jugulare tumors having the propensity to involve the middle ear cavity[4]. In this case, the initial computed tomography of skull base showed an ill-defined heterogeneously enhancing mass at the left jugular fossa with surrounding skull base erosion involving the mastoid cavity.

The best way to detect skull metastasis is MRI using pre and post gadolinium contrast T2 and T1-weighted sequences (pre and post gadolinium contrast) with fat suppression. MRI is sensitive for the detection of metastatic skull lesions as it can detect early metastasis to bone marrow, demonstrated by distortion of normal symmetrical pattern of fat distribution in diploic space in marrow of skull base on pre and post contrasted images. MRI is also valuable in detecting invasion to dura or cranial nerves[5]. MRI of skull base would be able to exclude glomus jugulare tumor as it usually demonstrates a vascular tumor with “salt and pepper” appearance with intense contrast enhancement. Whereas metastatic tumors usually lack high signal on T2-weighted images unless they are very vascular[6].

Management of metastatic tumors to skull base is complex, with treatment options comprising of irradiation, chemotherapy, endocrinological therapy and surgical excision[5].

Conformal fractionated radiotherapy is the mainstay treatment for skull base metastatic lesions together with systemic chemotherapy or hormonal therapy to treat the primary malignancy. Radiation therapy can offer pain relief in up to 90% of cases and may improve cranial nerve function[3]. Patients that tend to respond well to radiotherapy are those that present symptoms less than one-month duration. Patients with breast cancer or lymphoma also tend to fare better than those with prostatic or lung cancer after radiotherapy[3]. Stereotactic radiosurgery offers good local tumor control with side effects similar to conventional radiotherapy, and can be offered as an option of primary treatment, or as a treatment for post-surgical or post-radiotherapy residual or recurrent skull base metastasis with response rates ranging between 65, and 90%[5,7].

Bone resorption inhibitory drugs also have a role in the treatment of bony metastasis. Bisphosphonates, particularly zoledronate, have a role in palliative treatment for painful bony metastasis[5]. Studies are also being done for human monoclonal antibody, inhibiting RANK ligand, denosumab, which has so far been shown to be superior to zoledronate. However, the adverse effect of both drugs is osteonecrosis of the jaw[7].

Surgical excision of skull base tumors should be consi-

dered for histological diagnosis or palliative decompression of radiotherapy resistant tumors manifesting with worsening neurological deficits[7]. However it carries the risk of worsening cranial nerve deficits and cerebrovascular morbidity, cerebrospinal fluid leak and meningitis[3].

Prognosis for metastatic skull base tumors is influenced by factors such as high Karnofsky Performance Status, status of the primary tumor, age less than 65 years, and absence of systemic metastasis[8]. Mitsuya et al.[5] reported that lung cancer patients fared the worst, with overall survival from the time of diagnosis of metastatic skull tumor was 5 months for patients with lung cancer, compared to prostate cancer (23 months), breast cancer (15 months), and lymphoma (6 months).

CONCLUSION

In this case, the patient presented initially with jugular fossa syndrome with no clinical evidence of primary lung malignancy. The symptoms of lung malignancy only developed months after the onset of neurological symptoms. To add to the diagnostic challenge, initial CT findings of the brain and skull base were non-specific, and we were not able to differentiate between metastatic skull base tumor and glomus jugulare tumor initially until MRI was done. Hence, high index of suspicion must be applied when investigating for any jugular foramen tumor.

REFERENCES

1. Greenberg HS, Deck MD, Vikram B et al. Metastasis to the base of the skull: clinical findings in 43 patients. Neurology. 1981;31(5):530-7. https://doi.org/10.1212/WNL.31.5.530
2. Laigle-Donadey F, Taillibert S, Martin-Duverneuil N et al. Skull-base metastases. J Neurooncol. 2005;75(1):63-9. https://doi.org/10.1007/s11060-004-8099-0
3. Hayward D, Morgan C, Emami B. et al. Jugular Foramen Syndrome as Initial Presentation of Metastatic Lung Cancer. J Neurol Surg Rep. 2012;73:14-8. https://doi.org/10.1055/s-0032-1301406
4. Caldemeyer KS, Mathews VP, Azzarelli B, Smith RR. The jugular foramen: a review of anatomy, masses and imaging characteristics. Radiographics. 1997 Sep-Oct;17(5):1123-39. https://doi.org/10.1148/radiographics.17.5.9308106
5. Mitsuya K, Nakasu Y, Horiguchi S, et al. Metastatic skull tumors: MRI features and a new conventional classification. Journal of Neuro-Oncology. 2011;104(1):239-45. https://doi.org/10.1007/s11060-010-0465-5
6. Vogl TJ, Bisdas S. Differential Diagnosis of Jugular Foramen Lesions. Skull Base. 2009;19(1):3-16. https://doi.org/10.1055/s-0028-1103121
7. Mitsuya K, Nakasu Y. Metastatic skull tumours: Diagnosis and management. Eur Assoc Neuro Oncol Mag. 2014;4:71-4.
8. Soffietti R, Rudā R, Mutani R. Management of brain metastases. J Neurol. 2002;249(10):1357-69. https://doi.org/10.1007/s00415-002-0870-6