



Paper Accepted\*

ISSN Online 2406-0895

Case Report / Приказ случаја

Miljan Folić<sup>1,2,†</sup>, Dragoslava Đerić<sup>1,2</sup>

Facial nerve paralysis as first sign of metastatic breast cancer to the temporal bone

Парализа фацијалног живца као први знак метастазе карцинома дојке у темпоралној кости

<sup>1</sup> School of Medicine, University of Belgrade, Belgrade, Serbia;

<sup>2</sup> Clinic for Otorhinolaryngology and Maxillofacial Surgery, Clinical Centre of Serbia, Belgrade, Serbia

Received: January 10, 2018

Accepted: March 16, 2018

Online First: March 20, 2018

DOI: <https://doi.org/10.2298/SARH180110027F>

\* **Accepted papers** are articles in press that have gone through due peer review process and have been accepted for publication by the Editorial Board of the *Serbian Archives of Medicine*. They have not yet been copy edited and/or formatted in the publication house style, and the text may be changed before the final publication.

Although accepted papers do not yet have all the accompanying bibliographic details available, they can already be cited using the year of online publication and the DOI, as follows: the author's last name and initial of the first name, article title, journal title, online first publication month and year, and the DOI; e.g.: Petrović P, Jovanović J. The title of the article. *Srp Arh Celok Lek*. Online First, February 2017.

When the final article is assigned to volumes/issues of the journal, the Article in Press version will be removed and the final version will appear in the associated published volumes/issues of the journal. The date the article was made available online first will be carried over.

† **Correspondence to:**

Miljan FOLIĆ

Clinic for Otorhinolaryngology and Maxillofacial Surgery, 2 Pasterova Street, 11 000 Belgrade, Serbia

E-mail: [mfolic@yahoo.com](mailto:mfolic@yahoo.com)

## Facial nerve paralysis as first sign of metastatic breast cancer to the temporal bone

Парализа фацијалног живца као први знак метастазе карцинома дојке у темпоралној кости

### SUMMARY

**Introduction** Facial nerve paralysis originates from various factors, although in most cases etiology is idiopathic. Temporal bone metastases are quite rare, but still should be suspected in cases when congenital disorders, inflammatory disease, infection or trauma are excluded as cause of facial palsy.

The aim of this work was to present an unusual case of facial nerve paralysis as initial sign of temporal bone metastasis of breast carcinoma and discuss diagnostic pitfalls.

**Case outline** A 70-year-old patient presented with facial nerve palsy, severe otalgia, hearing loss and vertigo. Patient underwent steroid treatment 6 months earlier due to peripheral facial palsy with complete neurological resolution. CT scan revealed osteolytic lesion of the right temporal bone with extension into the parietal bone and soft-tissue. Additional examination confirmed ductal breast carcinoma and osteolysis of the ribs and vertebrae. Patient with metastatic breast carcinoma to the temporal bone died after four months despite chemotherapy.

**Conclusion** Temporal bone metastasis of breast cancer is very rare condition with poor prognosis. Temporal bone metastasis should be excluded in elderly patient with and even without history of malignancy, especially in cases of peripheral facial palsy refractory to treatment.

**Keywords:** breast neoplasms; neoplasm metastasis; facial paralysis; temporal bone

### САЖЕТАК

**Увод** Парализа фацијалног живца може настати услед разних фактора, али је етиологија у већини случајева идиопатска. Метастаза у темпоралној кости се јавља изузетно ретко, али треба посумњати на њу као узрок фацијалне парализе у случајевима када су искључени конгенитални поремећаји, запаљенска обољења, инфекције или повреде.

Циљ овог рада је био да прикажемо необичан случај парализе фацијалног живца као првог знака метастазе карцинома дојке у темпоралној кости и дискутујемо о дијагностичким замкама.

**Приказ болесника** Седамдесетогодишња болесница је испољила периферну парализу фацијалног живца и жалила се на интензиван бол ува, ослабљен слух и вртоглавицу. Лечена је кортикостероидном терапијом шест месеци раније због периферне фацијалне парализе са потпуним неуролошким опоравком. КТ је показала остеолитичну лезију десне темпоралне кости са пропацијом у паријеталну кост и у мека ткива. Додатна испитивања су доказала постојање дукталног карцинома дојке са остеолитом ребара и кичмених пршљенова. Болесница је преминула након четири месеца упркос спроведеној хемиотерапији.

**Закључак** Метастаза карцинома дојке у темпоралној кости је врло ретка и има лошу прогнозу. Њено постојање би требало искључити код старијих, са или без података о претходном малигнитету, а нарочито у случајевима периферне парализе фацијалног живца која не реагује на терапију.

**Кључне речи:** тумор дојке; метастаза тумора; фацијална парализа; темпорална кост

### INTRODUCTION

Facial nerve paralysis originates from various factors, although in most cases etiology is still defined as idiopathic. The exclusion of congenital disorder, inflammatory disease, infection or trauma as cause of facial palsy should raise a suspicion of metastatic tumors to the temporal bone, as well as primary malignancies. However, temporal bone metastases are quite rare and early diagnosis is a challenge due to asymptomatic course of the disease [1].

In some cases, coexistence of several pathological conditions may affect diagnostic process and treatment approach. Difficulties in distinction between temporal bone metastasis and some inflammatory diseases of the ear might be explained with overlapping signs and symptoms. In patients with a history of malignancy, persistent otologic symptoms should actuate otorhinolaryngologist to investigate the possibility of metastatic tumor to the temporal bone.

The aim of this work was to present an unusual case of facial nerve paralysis as initial sign of temporal bone metastasis of breast carcinoma and discuss diagnostic pitfalls.

### CASE REPORT

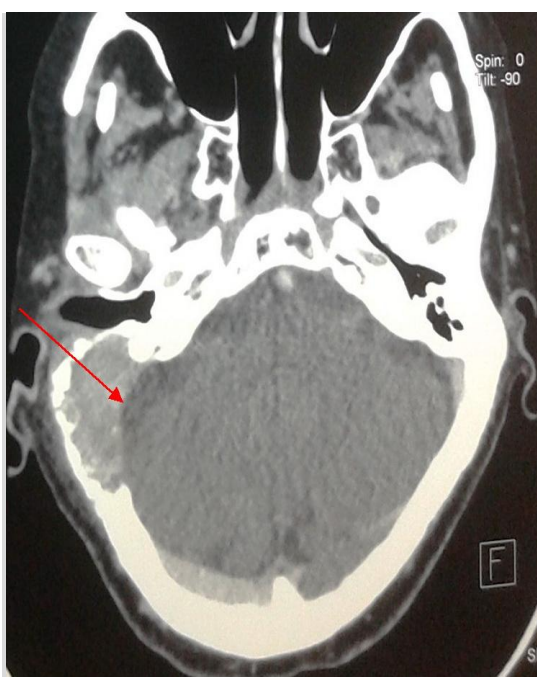
A 70-year-old female patient presented with peripheral facial nerve palsy (PFNP), severe otalgia, hearing loss and vertigo. Patient underwent steroid treatment 6 months earlier due to peripheral facial palsy with complete neurological resolution, which sustained a diagnosis of Bell's palsy. During the second episode of PFNP, physical examination revealed right facial paralysis (House-Brackmann scale, grade IV) with no signs of acute inflammation on otomicroscopy. A pure-tone audiometry showed profound sensorineural hearing loss on the right ear and moderate sensorineural hearing loss on the left ear. Hearing loss, type B tympanogram and peripheral vestibular lesion

on the right side raised a suspicion for neoplastic process in the temporal bone.

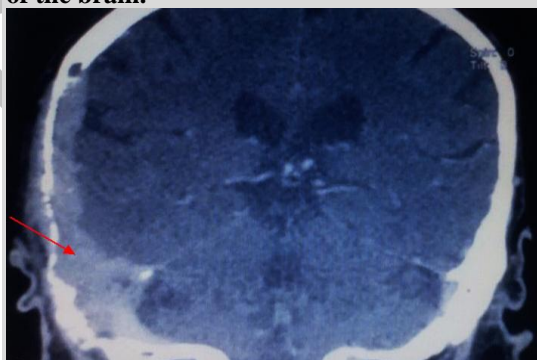
Computed tomography and magnetic resonance imaging of the temporal bone revealed expansive osteolytic lesion of squamous and mastoid parts of the right temporal bone with extension into the parietal bone and soft-tissue (Figure 1). Despite the fact that extraosseous part of the tumor had affected the epidural space and dura mater, creating the compressive impact on middle temporal gyrus of the brain, patient had no cognitive impairments.

Further examination revealed a lump in left breast and surgical biopsy was performed to obtain tissue samples. Histopathological and immunohistochemical analysis confirmed infiltrative ductal breast carcinoma and chest CT scan showed large expansive lesion in the right breast that infiltrate pectoral muscle and pericardium, pleural effusion as well as osteolysis of third and fourth right ribs, sternum and several thoracic vertebrae.

Although patient had received chemotherapy, malignant disease was evaluated as progressive with further intracranial extension (Figure 2). The patient with incurable metastatic breast carcinoma died four months after PFNP appearance.



**Figure 1. CT scan: Osteolytic tumor of right temporal bone with extension into the parietal bone and soft-tissue. Arrow shows compressive effect on middle temporal gyrus of the brain.**



**Figure 2. Coronal view of CT scan: progressive metastatic breast cancer after chemotherapy treatment (arrow).**

## DISCUSSION

The most frequent causes of sudden unilateral facial paralysis are Bell's palsy, Ramsey Hunt syndrome, Lyme disease and complications of chronic otitis. On the other hand, PFNP as first sign of temporal bone metastasis is very uncommon. Furthermore, in our patient PFNP recovered after steroid treatment, which drew attention from the real cause of paralysis. This is quite unique, since we found no case in literature concerning facial paralysis recovery in patient with temporal bone metastasis. We presume that steroid treatment has temporarily sustained compressive effects of the tumor which has made possible the neurological resolution. Additionally, our patient was not aware of the breast cancer in the moment of PFNP occurrence. Delayed diagnosis of primary breast cancer affected treatment options and made a great impact on the survival of the patient.

Metastatic tumors in the temporal bone are relatively rare and usually originate from the breast, lung or kidney [2, 3]. The true prevalence of metastatic tumors to the temporal bone is unknown [4] and determination may encounter some difficulties due to fact that histopathological evaluation of temporal bones is not a part of routine autopsy examination in patient with primary malignant diseases. Also, literature data are scanty and substantiated mostly by case reports and several studies of small number of cases.

In the largest study of post-mortem examination on temporal bones of 212 patients with primary malignant neoplasms, Gloria-Cruz et al. reported temporal bone metastases in 22 % of patients [5]. Temporal bone metastases are reported to originate from 20 different primary malignant tumors and the most common were breast and lung carcinoma. These results are contradictory with previous Maddox's findings [6], where renal carcinoma is the most frequent malignancy to metastasize to the temporal bone. This is not surprising, considering tendency of those cancers to metastasize to bone and the fact that about 75% of temporal bone metastases demonstrate hematogenous spread. Berlinger and colleagues described 5 distinct patterns of temporal bone involvement with secondary malignant processes and hematogenous route is typical form of spreading to marrow tissue of temporal bone [7]. Additionally, breast carcinoma is able to pass blood-brain barrier in order to form a brain metastasis. Temporal bone can be involved afterwards by direct or leptomeningeal extension, which is the sign of very advanced malignant disease.

Interestingly, it is reported that coexisting metastases are found elsewhere in each patient with temporal bone metastasis [5]. Therefore, temporal bone seems to be another site for metastatic spread along hematogenous course of dissemination. Detection of breast carcinoma metastasis to the temporal bone is potential indicator of the secondary deposits in other organs. Furthermore, there was a 100% correlation between absence of local recurrence and absence of temporal bone dissemination, which highlights the importance of adequate treatment of primary breast cancer.

Metastatic tumor to the temporal bone is usually asymptomatic for a certain period of time. In some cases, hearing loss could be the only sign of the disease. The presentation of a patient with

otalgia, facial nerve paralysis and periauricular swelling should raise a suspicion for a metastasis to the temporal bone [6]. Other symptoms include hearing loss, tinnitus, vertigo, ear secretion or aural mass. Different authors reported various incidence of facial paralysis in patients with temporal bone metastasis, ranging from 15 to 50 % [5, 8]. There isn't a consistent correlation between invasion of the facial canal and facial paralysis. It seems that facial paralysis is exhibited in about 50 % of patients with facial canal involvement [9], which excludes it as an early sign of temporal bone metastasis.

Inflammatory diseases, infections or some benign tumors should be considered in differential diagnosis. Suryanarayanan et al. reported a case of secondary deposit in the temporal bone mimicking facial nerve schwannoma and stressed the importance of having a suspicion for metastatic tumors in patient with a previous history of malignancy [10]. Considering the fact that some patients with chronic otitis may have similar presentation, temporal bone imaging is mandatory. Imaging studies have irreplaceable role in determination of disease extent and possible surgical treatment assessment.

CT scan typically reveals expansive osteolytic lesion, devastating various portions of the temporal bone. Further extension to the soft-tissue, surrounding bones or brain could be detected as indicators of advanced disease and poor prognosis. Differentiation between inflammatory and neoplastic process of the temporal bone is a difficult challenge due to osteolytic pattern observed on CT scan in patients with cholesteatoma or necrotizing otitis externa. Progressive bony destruction doesn't seem to be pathognomonic sign of metastatic disease to the temporal bone [11] and should be interpreted with caution.

MRI is superior to CT in detecting soft-tissue mass involving meninges or brain. It is powerful diagnostic tool to assess pathological processes along whole course of facial nerve, which makes MRI obligatory during work-up of unusual PFNP. If there is a suspicion of skull base involvement, additional CT scanning is strongly recommended. The main advantage of CT scan is excellent evaluation of bone erosion, especially petrous part of the temporal bone.

Novel radiological methods provide us a possibility of detection of multiple, coexisting breast cancer metastases. Caglar and associates reported 97.6 % sensitivity of FDG-PET/CT for the detection bone metastases, as well as high precision in identification of soft-tissue extension [12]. PET-MR showed even higher sensitivity in detection of breast cancer bony metastases than PET-CT [13]. Their utilization in determining local or metastatic recurrence is crucial for assessment of treatment response.

The treatment comprises chemotherapy with radiotherapy of the affected temporal region. Prognosis of breast cancer metastasis to the temporal bone is poor and it depends on coexisting metastasis elsewhere and primary site status. The 2-year survival rate is less than 40 % due to asymptomatic course and late diagnosis of the disease. The absence of temporal bone involvement in cases with adequately treated primary tumors stresses the importance of early diagnosis and management of breast cancer. Temporal bone metastasis should be excluded in elderly patient with and even without history of malignancy, especially in cases of peripheral facial palsy refractory to

treatment. In today's society with increased incidence of breast cancer, determination of individual risk is the key factor for prevention of breast neoplastic transformation and metastatic dissemination.

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