

## ACUTE CAROTID ARTERY OCCLUSION CAUSED BY TUMOR EMBOLI – CASE REPORT

### AKUTNA OKLUZIJA KAROTIDNE ARTERIJE IZAZVANA TUMORSKIM EMBOLUSIMA – PRIKAZ SLUČAJA

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Case report

Prikaz slučaja

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#### Abstract

**Introduction.** Tumor embolism is a recognized but uncommon cause of cancer-related stroke. Unlike systemic emboli from left atrial myxomas, tumor emboli large enough to cause symptomatic cerebral ischemia are rare. Lung carcinoma may lead to embolization through spontaneous vascular invasion or secondary to surgical manipulation, with the latter being more frequent. **Case Report.** We present a 60-year-old woman with a history of lung adenocarcinoma but no active metastatic disease, who was admitted to our Clinic with acute right middle cerebral artery syndrome. On admission, a head computed tomography scan showed an Alberta Stroke Program Early Computed Tomography score of 8 in the right hemisphere. A computed tomography angiogram of the head and neck revealed occlusion of the right internal carotid artery, prompting administration of intravenous tissue plasminogen activator. The following day, a routine carotid ultrasound detected an atypical heterogeneous mass on the posterior wall of the right internal carotid artery, suggestive of a metastatic embolus with distal occlusion. Further evaluation with a contrast-enhanced chest computed tomography confirmed regional metastatic dissemination, showing adenocarcinoma progression to the superior mediastinum with satellite metastatic lesions. **Conclusion.** This case highlights spontaneous internal carotid artery occlusion due to tumor embolus spreading from lung cancer, leading to ischemic stroke. Our findings suggest that carotid ultrasound may be superior to computed tomography angiography in identifying tumor emboli, which could influence therapeutic decision-making in similar cases.

**Key words:** Carotid Arteries; Arterial Occlusive Diseases; Lung Neoplasms; Neoplasm Metastasis; Embolism; Ultrasonography, Carotid Arteries; Stroke

#### Introduction

Cancer-associated stroke (CAS) is a severe complication of malignancy, with an increased risk of ischemic stroke observed in the early stages of cancer diagnosis [1]. Patients with lung cancer have a 1.5-folds higher stroke risk compared to the general population [2].

#### Sažetak

**Uvod.** Tumorska embolija je dobro prepoznata kao mogući mehanizam moždanog udara povezanog sa karcinomom. Isključujući sistemske tumorske embolije uzrokovane miksomima leve pretkomore, tumorski embolusi – dovoljno veliki da izazovu simptomatsku cerebralnu ishemiju, prilično su retki. Karcinom pluća može formirati embolus nakon invazije krvnih sudova spontano ili kao posledica hirurške manipulacije, što je češće. **Prikaz slučaja.** Predstavljamo slučaj 60-godišnje žene sa istorijom adenokarcinoma pluća, bez poznate dijagnoze aktivne metastatske bolesti, koja se javila u našu kliniku sa akutnim sindromom srednje moždane arterije desne strane. Na dan prijema, snimak kompjuterske tomografije glave pokazao je *Alberta Stroke Program Early Computed Tomography* skor osam u desnoj hemisferi, dok je kompjuterska angiografija glave i vrata pokazala okluziju desne unutrašnje karotidne arterije, nakon čega je pacijentkinja primila intravenski tkivni aktivator plazminogena. Sledećeg dana, rutinski ultrazvuk karotida pokazao je atipičnu heterogenu masu na zadnjem zidu desne unutrašnje karotidne arterije, nalik verovatnom metastatskom embolusu, sa distalnom okluzijom. De novo regionalna metastatska diseminacija potvrđena je kontrastnom kompjuterskom tomografijom grudnog koša, koji je pokazao progresiju adenokarcinoma na gornji medijastinum, sa satelitskim metastatskim lezijama. **Zaključak.** Ishemijski moždani udar kod naše pacijentkinje nastao je kao posledica spontane okluzije unutrašnje karotidne arterije tumorskim embolusom koji se proširio iz karcinoma pluća. Ovaj slučaj može ukazati na to da u sličnim situacijama ne treba zanemariti ultrazvuk karotida, jer može biti superiorniji od kompjuterske angiografije i shodno tome dovesti do drugačijih terapijskih odluka.

**KLjučne reči:** karotidne arterije; arterijska okluzivna bolest; tumori pluća; metastaza; embolizam; ultrasonografija karotidnih arterija; moždani udar

The underlying mechanisms remain inconclusive but may include direct tumor effects, hypercoagulability, tumor embolism, or treatment-related factors such as chemotherapy [3]. Among these, tumor embolism often manifests as acute stroke due to cerebral artery occlusion [4]. Here, we present a case of acute stroke secondary to tumor embolism from lung adenocarcinoma.

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### Abbreviations

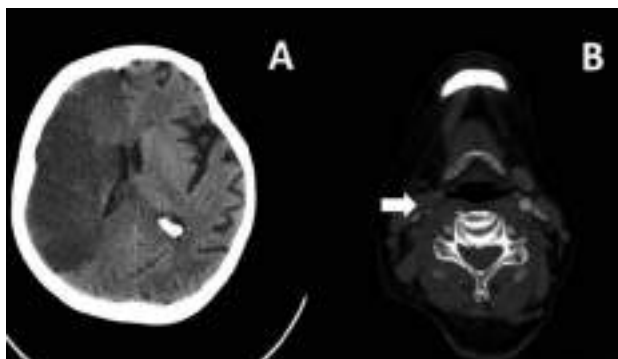
|        |                                   |
|--------|-----------------------------------|
| CAS    | – cancer-associated stroke        |
| MRI    | – magnetic resonance imaging      |
| MRA    | – magnetic resonance angiography  |
| CT     | – computed tomography             |
| CTA    | – computed tomography angiography |
| ICA    | – internal carotid artery         |
| ECA    | – external carotid artery         |
| ASPECT | – Alberta Stroke Program Early CT |
| IVT    | – intravenous thrombolysis        |
| CCA    | – common carotid artery           |

### Case Report

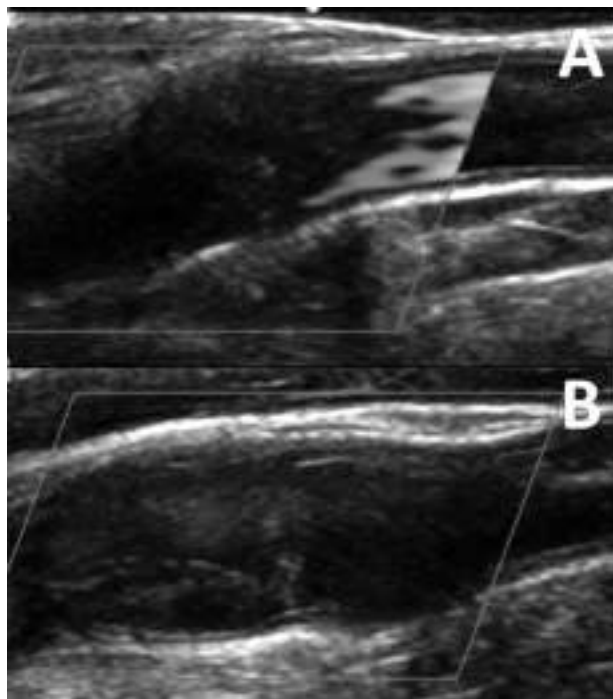
A 60-year-old woman was admitted to the Emergency Centre due to the sudden onset of left-side limb weakness 90 minutes before arrival. She had been diagnosed with lung adenocarcinoma two months prior, presenting as 78 x 89 x 74 mm tumor in the left upper lung lobe, infiltrating the aortic arch and left subclavian artery. A brain MRI and MR angiography (MRA) performed the day before admission showed no signs of metastasis, acute stroke, or atherosclerosis. She had received two cycles of chemotherapy, the last one a month prior.

Neurological examination revealed left central facial palsy, dysarthria, and left hemiparesis, with NIHSS score of 11. Initial brain CT and CT angiography (CTA) showed intraluminal thrombus in the right carotid bifurcation, no visible contrast in the orifice of the internal carotid artery (ICA) and external carotid artery (ECA), with Alberta Stroke Program Early CT (ASPECT) score of 8 (**Figure 1B**). Intravenous thrombolysis (IVT) was administered within three hours of symptom onset, but thrombectomy was not performed. A follow-up brain CT scan after 24 hours confirmed an acute infarction in the right hemisphere (**Figure 1A**).

On Day 2, a carotid ultrasound showed occlusion of the distal part of the right common carotid artery (CCA), bifurcation, ICA, and ECA with elongated,



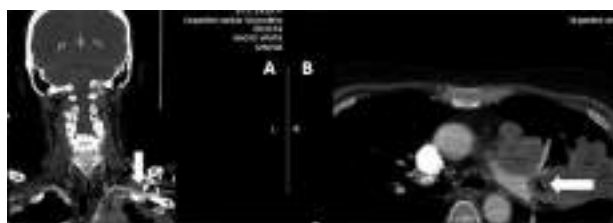
**Figure 1A, 1B.** Brain CT scan showing infarction in the right middle cerebral artery territory (1A); CT angiography showing right common carotid artery occlusion (1B)



**Figure 2A, 2B.** B-mode carotid PW Doppler (longitudinal) showing occlusion in the distal right common carotid artery (2A); bifurcation and internal carotid artery with a hypoechoic mobile structure (2B)

mobile hypoechoic structures with irregular contours, moving with the cardiac cycle (**Figure 2A, 2B**).

An abdominal ultrasound showed no abnormalities, but a contrast chest CT scan confirmed progression of adenocarcinoma into the superior mediastinum with satellite metastatic lesions (**Figure 3A, 3B**).



**Figure 3A, 3B.** Contrast-enhanced chest CT showing adenocarcinoma progression into the superior mediastinum with satellite metastatic lesions

Infiltration was also registered in over two-thirds of the aortic circumference, as well as the left subclavian artery and vein, with complete encasement of the left pulmonary artery. The patient received combined anticoagulant-antiplatelet therapy. On Day 17, she was referred to a physiotherapy center due to persistent neurological deficits, with an NIHSS score of 15.

## Discussion

Tumor emboli large enough to cause symptomatic cerebral ischemia are rare, except for systemic emboli from left atrial myxomas. Most cases originate from primary lung cancer, as seen in our patient [4]. Lung carcinoma may form an embolus after invading blood vessels via two mechanisms: spontaneous embolization due to direct tumor invasion into the bloodstream, and secondary to surgical manipulation, which is more common. In cancer-associated stroke (CAS), embolization typically occurs when tumor fragments enter the circulation, leading to stroke. The distal internal carotid artery (ICA), middle cerebral arteries, basilar artery, and lacunar arteries are the most frequently affected [1, 4]. However, definitive diagnosis requires histological confirmation from an embolus specimen or post-mortem analysis [4].

Carotid ultrasound is essential for detecting mobile plaques, which are associated with recurrent stroke [5]. The most common etiology is complicated atherosclerotic plaque, which is non-atherosclerotic in malignancy, pregnancy, inflammatory, and infectious states [2, 6]. The mobile plaques are classified based on ultrasound morphology as follows: 1) jellyfish type - a part of the fibrous cap is mobile; 2) streaming-band type - a part of the ruptured fibrous cap is fluttering; 3) mobile thrombus type - a tethered thrombus caused by plaque rupture is mobile, and 4) fluctuating ulcer type - a part of the ulcer is pulsating [5].

In our case, carotid ultrasound revealed a hypoechoic mobile structure, distinct from typical carotid atherosclerotic plaques. The mobile structure resembled the jellyfish type but lacked a fibrous cap. Given the absence of vascular risk factors, CCA intima thickening, and conventional plaque morphology, a tumor embolus was suspected. Although CTA is highly-effective for evaluating luminal stenosis, it cannot visualize mobile plaques, making carotid ultrasound the superior modality in such cases [7].

The optimal treatment for CAS remains undefined, there is limited evidence supporting IVT efficacy, except in case reports involving atrial myxoma [8, 9]. In theory, IVT is unlikely to recanalize a vessel occluded by a tumor embolus, as observed in our patient [10]. However, AHA/ASA guidelines do not exclude CAS patients from IVT [11]. According to the author's opinion, embolectomy may have been a more effective therapeutic option, as suggested by previous reports [4].

## Conclusion

Cancer is often underestimated as a stroke risk factor, particularly in cases of tumor embolism. Carotid ultrasound is the only real-time imaging modality capable of detecting mobile carotid lesions, unlike static angiographic methods such as computed tomography angiography. The optimal treatment strategy for cancer-associated stroke remains uncertain, but thrombolytic therapy should not be withheld, even though embolectomy may offer better outcomes.

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