



REVIEW ARTICLE

IMPAIRED SENSE OF SMELL: AN EARLY SIGN OF TOP OF THE BASILAR ARTERY SYNDROME

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ARTICLE INFO

Article History:

Received 10th July, 2022
Received in revised form
27th August, 2022
Accepted 19th September, 2022
Published online 19th October, 2022

Key words:

Anosmi, Basilar Artery, Covid-19,
Seizure.

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Citation: Omer Yusuf Erdurmus. 2022. "Impaired sense of smell: An early sign of top of the basilar artery syndrome". *International Journal of Current Research*, 14, (10), 22420-22422.

ABSTRACT

Top of the basilar artery syndrome is a rare condition that can cause intracranial ischemia. In this syndrome, there may be mild findings as well as permanent neurological disorders and death. A 60-year-old male patient, who applied to the emergency department with complaints of olfactory and speech disorder, was diagnosed with top of the basilar artery syndrome after neurological examination and cranial imaging, and reperfusion therapy could not be performed due to contraindications. In the following time, the neurological symptoms progressed and the patient was intubated due to the development of respiratory failure. The patient died in the 12th hour of his admission to the emergency department. Impaired sense of smell may be the presenting finding of top of the basilar artery syndrome, especially in patients with risk factors for cranial ischemia. Emergency physicians should be careful in this regard and provide early diagnosis and treatment.

INTRODUCTION

Top of the basilar artery syndrome, also known as rostral brain stem infarction, is rare and constitutes 1% of strokes¹. The basilar artery arises from the intersection of the two vertebral arteries and terminates at the level of the pons-mesencephalon. The basilar artery, which plays an important role in the circulation of the structures in the posterior cranial fossa (pons, cerebellum). In this syndrome, which is caused by basilar artery occlusion, muscle weakness, paresthesia, oculomotor disorders, behavioral disorders, hallucinations, seizure, cerebellar finding, mental status changes, memory impairment and paralysis can be seen¹. Locked-in syndrome can be seen frequently in proximal and middle basilar artery occlusions, and consciousness is preserved. In distal basilar artery syndrome (top of the basilar artery syndrome), ischemic findings are observed in the midbrain and thalamus, and it is mostly seen with oculomotor and behavioral disorders¹. Symptoms associated with top of the basilar artery syndrome are usually of sudden onset and prodromal symptoms may occur. Initial symptoms, such as impaired smell and taste, may rarely be prodromal symptoms. Physiopathologically, it is thought to develop due to thalamus ischemia. While a full recovery can be achieved in patients with early diagnosis and treatment, late diagnosis and delay in treatment may be mortality². Diffusion-weighted magnetic resonance imaging (MRI) is critical for imaging and diagnosis³. Intravenous thrombolytic and mechanical thrombectomy are treated separately or used together³. In our article, a case of top of the basilar artery syndrome in a 60-year-old male patient with chronic hypertension and coronary artery disease who was not followed up regularly is presented.

A 60-year-old male patient had known chronic hypertension and coronary artery disease and had no previous history of thrombosis. There was no medication that our patient used regularly. The patient smoked 30 packs/year and did not drink alcohol. Our patient and his relatives had no history of stroke. The patient presented to the emergency department with complaints of impaired of smell and was referred to our clinic 24 hours after admission with complaints of slurred speech. On physical examination, the patient was conscious, cooperative, and oriented, and his speech was impaired. Neurological examination: Consciousness was normal, Glasgow-Coma scale: 15, pupils were equal and reactive, there was no lateralized finding. Cerebellar examination and tests were also normal. There was no loss of muscle tone and power in the upper and lower extremities, bilaterally. Other systemic examinations were normal. Arterial blood pressure: 220/120 mmHg, fever: 36.1°C, pulse: 86 beats/min, respiratory rate: 18/min, and oxygen saturation in room air was 94%. Electrocardiography (ECG) revealed normal sinus rhythm. Laboratory values; Troponin T: 24.51 pg/ml (Reference limit [RL]: 0–14 pg/ml), D-dimer: 114.15 ng/mL (RL: 0–243 ng/ml), White blood cells (WBC): $12.59 \times 10^9/l$ (RL: 4.5–11 $\times 10^9/l$); Blood sodium: 135 mmol/l (RL: 136–145 mmol/l); Blood potassium: 4.8 mmol/l (RL: 3.5–5.1 mmol/l); Hemoglobin (Hb): 16.3 g/dl (RL: 11.7–16.1 g/dl); International normalized ratio (INR): 3.5 (RL: 0.85–1.11); and Platelet count: 70×10^9 (RL: 150–400 $\times 10^9/l$). Other biochemical parameters were within normal ranges. The patient's SARS Cov polymerase chain reaction (PCR) test was negative. Cranial CT angiography revealed a 15x11mm thrombosed basilar artery aneurysm distal to the basilar artery (Figure 1). Acute diffusion restriction was detected ventrally in the right pons on diffusion MRI (Figure 2). Mechanical thrombectomy and reperfusion therapy with thrombolytics could not be performed because the acute period of 24

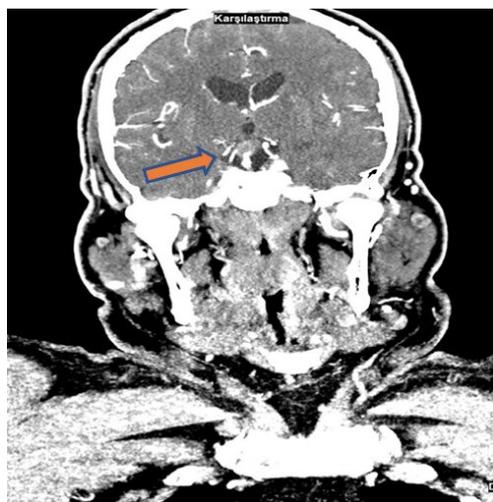


Figure 1. 15x11mm thrombosed basilar artery aneurysm distal to the basilar artery in cranial CT angiography imaging (red arrow)

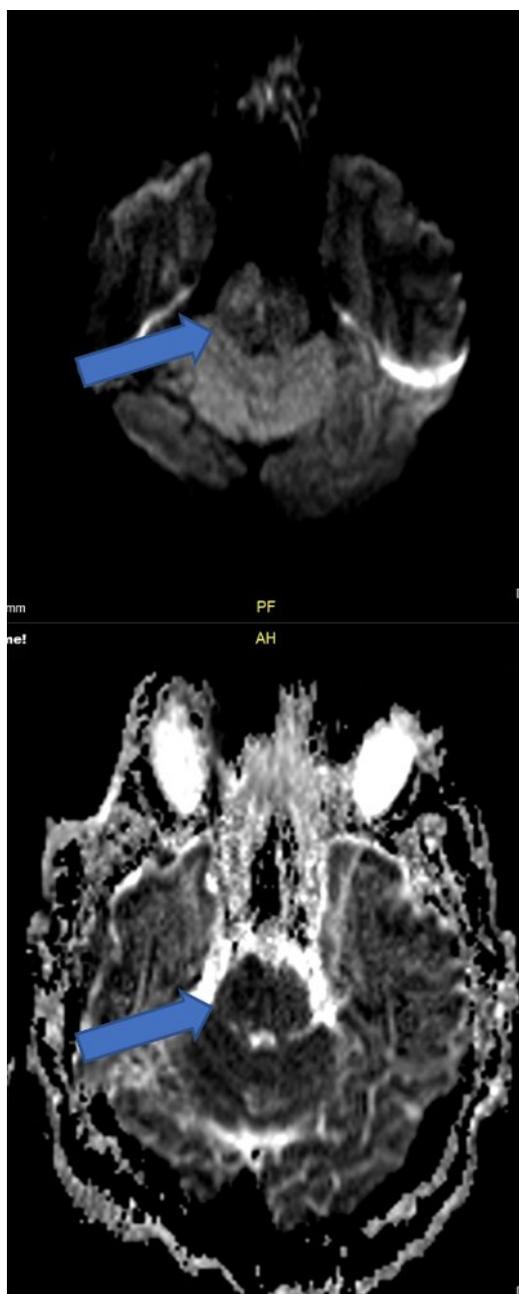


Figure 2. Diffusion restriction in the right pons ventral and midline in Diffusion MRI imaging (blue arrow)

hours passed and the platelet count was low, the INR was high, and the vascular region was not suitable for thrombectomy. Antihypertensive treatment was started due to his hypertensive course (mean arterial pressure >150) at admission. Intravenous nicardipine was started at a dose of 5 mg/hour infusion. In the treatment of the patient whose target blood pressure values were reached 1 hour after the drug was started, no dose changes were made and intravenous antihypertensive treatment was terminated. The patient was treated with antiagregan and anticoagulant. The patient developed a tonic posture after 5 hours of admission to our clinic and exhibited epileptiform seizures, losing consciousness for a short time, and recovering spontaneously. New loss of muscle power in the left upper extremity (4/5–1/5) and dysarthria (speech disorder) were observed. As time progressed, the patient, who developed respiratory distress, was intubated and taken to the neurology intensive care unit and died in the 48th hour. Informed consent was obtained from the relatives of the patients to present the case in scientific environments.

DISCUSSION

Top of the basilar artery syndrome may present with bilateral thalamic infarction findings, cerebral findings and cerebellar findings¹. As in our case, most of the patients have chronic diseases that may cause vascular disorders such as hypertension and diabetes mellitus. Previous studies have reported cases presenting with seizures, altered consciousness, and visual and speech disorders. While this syndrome may progress with mild symptoms, it may also result in permanent neurological impairments and death⁴. This rare medical condition accounts for approximately 1% of strokes⁵. Oculomotor disorders, behavioral disorders, hallucinations and seizures can be seen in this syndrome but motor dysfunction symptoms are not common to top of the basilar artery syndrome. The case of top of the basilar artery syndrome, which starts with symptoms of impaired smell and followed by neurological disorders, is very rare. Risk factors such as chronic hypertension and coronary artery disease in our patient increase the risk of stroke.

The fact that our patient has chronic diseases that are not under control and that he is not under medication due to these diseases is one of the main reasons that increase the risk of stroke⁶. Viral infections can cause ischemic symptoms by causing vascular damage⁷. Cases with speech impairment, epileptic seizures, behavioral disorders and ischemic symptoms during the Covid 19 pandemic period are also included in the literature⁷. In some cases in the literature, it has been reported that the impairment in taste and smell persists for a while after the development of viral infection⁸. As seen in our case report, anamnesis and physical examination are the most important diagnostic bases of top of the basilar artery syndrome. Early imaging and early diagnosis are very important in suspicious cases⁹. In a retrospective study conducted by Burns et al., it was stated that the delay in diagnosis had an effect on mortality and morbidity¹⁰. In the differential diagnosis of patients presenting with taste and smell disorders, intracranial ischemic diseases should be included and a careful neurological examination should be performed. We describe a 60-year-old male patient with top of the basilar artery syndrome who presented with an atypical presentation of olfactory dysfunction. Patients with top of the basilar artery syndrome benefit greatly from reperfusion therapy, but delay in admission and diagnosis may result in permanent damage and death. In order to prevent misdiagnosis and discharge, it is very important to use MRI in the diagnosis, especially in elderly patients with underlying chronic diseases. In the literature, the character and variety of symptoms vary according to the region of involvement, and symptoms such as impaired smell, which we frequently encounter during the COVID 19 pandemic period, may cause a delay in diagnosis and treatment, as in our case. Neurological examination should be performed carefully in patients with olfactory disorders whose presenting symptom is thalamic infarction.

Consent: The patient's wife gave written consent for the publication of the case report.

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