

INTERNAL CAROTID OCCLUSION IN A PATIENT WITH PREVIOUS HISTORY OF PERIODONTITIS: CASE REPORT

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SUMMARY – Although inflammatory periodontal disease has been proven to be related to carotid intima media thickness, it has been recently suggested that even an alteration of carotid hemodynamics might contribute to atherosclerosis in patients with periodontal disease. A 52-year-old female patient was referred to periodontology department due to painful alveolar mucosa. On the basis of dental history, we concluded that the patient had a severe form of generalized aggressive periodontitis that led to complete edentulism. The patient was advised to undergo ultrasonography of carotid arteries with arterial stiffness measurements at neurology department. A diagnosis of the right internal carotid artery occlusion was established. Inflammatory periodontal disease may affect arterial hemodynamics and even lead to artery occlusion. It is advisable that patients with a severe form of periodontitis should be referred for carotid artery ultrasonography.

Key words: *Aggressive periodontitis – diagnosis; Carotid stenosis – diagnosis; Carotid stenosis – ultrasonography; Atherosclerosis – etiology; Hemodynamics; Case report*

Introduction

Periodontitis is a chronic inflammatory disease of the supporting tissues of the teeth in response to subgingival infection. The relationship between periodontal disease and systemic diseases has been thoroughly investigated. For example, it was found that cardiovascular disease, diabetes and rheumatoid disease are significantly correlated to the number of lost teeth¹. Consideration of atherosclerosis as an inflammatory process has aroused interest in the potential role of various infectious agents in modulating or even initiating atherosclerosis. Periodontal bacteria (e.g., *Aggregatibacter actinomycetemcomitans*) can be isolated in atheromatous plaques and periodontal pockets of

the same patients². B-mode ultrasound measurement of the intima-media thickness (IMT) is an established tool to quantify carotid atherosclerosis, while beta stiffness index is most commonly used for arterial stiffness assessment. We present a female patient with internal carotid occlusion that may have been correlated to severe generalized aggressive periodontitis that led to complete loss of teeth.

Case Report

In January 2011, a 52-year-old Caucasian non-smoking female patient was referred to the Department of Periodontology, School of Dental Medicine, Zagreb due to painful alveolar mucosa. Prosthodontic rehabilitation was done a decade before with removable total dentures in both upper and lower jaws. The patient stated that the teeth became extremely mobile in her thirties, and were completely exfoliated in her early forties. Also, her family history of periodontal

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Received October 19, 2011, accepted April 13, 2012

disease was positive. On the basis of these findings, we concluded that the patient had a severe form of generalized aggressive periodontitis.

Ultrasonography of carotid arteries was suggested to the patient, although she was not a suitable candidate for the study that had been conducted at the Department of Periodontology. After consent, the patient was referred to University Department of Neurology, Sestre milosrdnice University Hospital Center, Zagreb. Arterial stiffness measurements on common carotid artery (CCA) were performed using an Aloka ProSound ALPHA 10 with 13 MHz linear probe, and are presented in Table 1. The patient's history was negative for ischemic cerebral hemispheric or retinal symptoms and for coronary heart disease. Of the cerebrovascular risk factors, she had hypertension for 8 years and was on angiotensin-converting enzyme (ACE) inhibitor therapy. Her body mass index was calculated to be 28.7 kg/m², which is considered as overweight. According to ultrasonography measurements, a diagnosis of the right internal carotid artery (ICA) occlusion and mild stenosis of the left ICA with hypoechoic plaque (40%) was established. No Factor V Leiden and Factor II polymorphisms were detected during work up. The patient was heterozygous for PAI-1 and MTHFR genes. Rheumatoid factor, alpha-galactosidase A, anticardiolipin antibodies, ASTA, ANA and ANCA were within the normal range. A statin treatment was introduced considering hypoechoic ultrasonography finding and slightly elevated cholesterol level (total cholesterol 5.5 mmol/L and LDL cholesterol 3.6 mmol/L).

Discussion

In our patient with severe generalized periodontitis, occlusion of the right ICA was found and IMT values were 0.7 and 1.0 mm for the left and right CCA, respectively. A pilot study showed that severe periodontitis patients had IMT for CCA of 0.69 mm and overall IMT of 0.76 mm. Moderate periodontitis patients and periodontally healthy subjects had lower values (0.64 and 0.65 mm, respectively)³. The Oral Infections and Vascular Disease Epidemiology Study (INVEST) provided direct relationship between periodontal bacteria and subclinical atherosclerosis, independent of C-reactive protein, and with overall

periodontal bacterial burden related to carotid IMT. In addition, tooth loss as a marker of past periodontal disease was proven to be related to subclinical atherosclerosis^{4,5}.

Dental panoramic radiographs may also provide useful information about both alveolar bone loss and signs of carotid calcification. In a cohort of 1084 older subjects, a radiographic evidence of periodontitis was found in 48.5%, with carotid calcification in 18.6% of the subjects. It was concluded that alveolar bone loss as assessed from panoramic radiographs was associated with cardiovascular diseases⁶. Another research found that out of 21 carotid artery calcifications detected with Doppler sonography, even 15 were also noticed on panoramic radiographs⁷.

Vuković *et al.* and Demarin *et al.* have gathered results from different studies to evaluate differences between male and female patients regarding ischemic events. Studies show that female stroke patients suffer from ischemic events at an older age, and are more likely to arrive to an emergency room in a comatose state. Women suffer more severe stroke with a higher level of disability than men, but their survival rates are the same^{8,9}. Interestingly, tooth loss and untreated periodontitis are proven to be related to subclinical atherosclerosis in men but not in women¹⁰.

In the present case, beta stiffness indices were 14.1 and 23.2 for the left and right CCA, respectively. Ultrasound and e-tracking can also be used to set appropriate vascular age standards of patients, and therefore assist in disease prevention. A research found that IMT values bilaterally, resistance on the right CCA and interadventitial diameters and circumferential arterial stiffness on the right CCA are age dependent parameters ($p < 0.05$)¹¹. A linear relationship of beta

Table 1. Arterial stiffness measurements in the patient

	Left CCA	Right CCA	Unit
Intima-media thickness	0.7	1.0	mm
Beta stiffness	14.1	23.2	
Young's modulus	254	416	kPa
Compliance	0.41	0.36	mm ² /kPa
Augmentation index	30.6	23.6	%
Pulse wave velocity	9.5	12.1	m/s

CCA = common carotid artery

stiffness index on CCA and age was found when applying a formula modified by Kawasaki¹².

Recently, a link between periodontal indices and carotid wall shear stress was analyzed. The results suggest that an alteration of carotid hemodynamics might contribute to atherosclerosis in patients with periodontal disease¹³.

Previous studies have demonstrated that inflammatory periodontal disease can be a risk factor for the development of atherosclerosis. This case report indicates that inflammatory periodontal disease may affect arterial hemodynamics and IMT. Based on this case, it would be advisable that patients with a severe form of periodontitis be referred for carotid artery ultrasonography. Also, dentists should pay special attention to panoramic radiographs in order to detect the potential carotid artery calcifications.

Acknowledgments

This study was supported by the Ministry of Science, Education and Sports of the Republic of Croatia Grant No. 065-0650444-0415 (chief investigator Darije Plančak, project "Systemic aspects in the etiology of periodontal diseases"), and Grant No. 134-1340036-0034 (chief investigator Arijana Lovrenčić-Huzjan, project "Functional diagnostics of cerebral circulation").

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Sažetak

OKLUZIJA UNUTARNJE KAROTIDNE ARTERIJE KOD PACIJENTICE S RANIJOM POVIJEŠĆU PARODONTITISA: PRIKAZ SLUČAJA

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Iako je dokazano da parodontna bolest može biti povezana s debljinom intime-medije, tek je u novije vrijeme uočeno da i promjene u arterijskoj hemodinamici mogu doprinijeti aterosklerozi kod pacijenata s parodontitisom. Pedesetdvogodišnja pacijentica je upućena na odjel parodontologije zbog bolne alveolarne mukoze. Na temelju stomatološke anamneze zaključeno je da je pacijentica bolovala od generaliziranog agresivnog parodontitisa koji je doveo do potpune bezubosti. Pacijentici je predložen ultrazvučni pregled karotidnih arterija i određivanje arterijske krutosti na odjelu neurologije. Postavljena je dijagnoza okluzije desne unutarnje karotidne arterije. Upalna parodontna bolest može utjecati na arterijsku hemodinamiku i dovesti do arterijske okluzije. Preporučljivo je da se pacijenti s uznapredovalim oblikom parodontitisa upute na ultrazvučni pregled karotidnih arterija.

Ključne riječi: Agresivni parodontitis – dijagnostika; Karotidna stenoza – dijagnostika; Karotidna stenoza – ultrazvuk; Ateroskleroza – etiologija; Hemodinamika; Prikaz slučaja