DENTAL MANAGEMENT IN STROKE PATIENTS

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INTRODUCTION

In most developed countries, the cerebro-vascular diseases represent the third cause of death, after cardiovascular diseases and cancer, with a prevalence of 5% in individuals over 65 years old. This is a severe neurological condition caused by a sudden interruption or decrease of the cerebral blood flow, due to one or more pathological processes involving the cervical and/or the cerebral skull blood vessels, and is considered to be a serious neurological and/or neurosurgical emergency, which imposes a prompt and effective response.

The stroke is often fatal; if not fatal, it can determine several disabilities, more or less serious: speech deficiency, hemiplegia or paresis, different forms of paralysis or palsy with diminished or lost sensorial capacity, motor deficiency. Social and professional disabling due to stroke, as well as hospitalization duration, have a very strong economic impact.
On the other hand, dental and periodontal lesions occur very often in individuals with a cerebral vascular accident in their medical history, especially for those suffering from ischaemia of the carotidian vascular system, since the external carotid artery with its branches provides blood supply for the dento-maxillary region. The importance of ischaemia for the local vascular and neurological structures of the dental and periodontal system is increased, since it induces functional disorders and morphological disturbances, which can operate like a pathological “chain”, its „links” being able to trigger insufficiently known physiopathological mechanisms. According to this assumption, the dental and periodontal lesions can be very often fastened first of all due to affected arterial afferent system, while the local etiological factors, very important and very well known otherwise, are to be considered risk factors tightly connected to the morbid process.3

There are two main issues regarding the dental management in ischemic stroke patients: the risk of dental treatment upon a patient suffering from cerebrovascular ischemic disease, as well as the dental and periodontal lesions that can be induced by ischemia of the carotidian afferent branches.6,7

**MEDICAL MANAGEMENT OF THE STROKE PATIENT**

The first target in medical approach of cerebral vascular accident is prevention, since the risk of a stroke increases with 1.5% for every known risk factor. Therefore, it is important to identify these factors and also the related systemic diseases and biological factors able to increase the seriousness of the stroke, as well as it is to try to reduce or eliminate them, as much as possible.

In 60-80% of the cases, ischemic stroke is induced by thrombosis of cerebral blood vessels. Cerebrovascular diseases are related to atheromatosis and cardiac diseases (myocardial infarction, atrial fibrillation), to other known risk factors among which there are periodontal diseases.8-14 (Table 1)

Calcified atheromas of the carotid artery can be sometimes revealed by the dentist, examining the X-ray orthopantomography of elderly or diabetic patients. If attentively and appropriately examined, this can be a warning about the risk of stroke.15

Specific therapy during stroke is vital and aims at keeping patients alive during and immediately after the attack. This is neurologists’ attribute and it must also take into consideration the prevention of a second stroke by prescribing appropriate treatment.

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A patient surviving stroke presents an increased risk of a new episode: for 33.3% of the patients, it can occur within one month, the risk remains high during the first six months and decreases to 14% after one year. Fifty percent of patients surviving a stroke present little disabilities, 15-30% present disabilities that need special care and 10-20% need to be institutionalised.1,6,16

**DENTAL MANAGEMENT OF THE STROKE PATIENT**

A patient with stroke in his record shall get special care during dental treatment: appointments shall be for choice in the morning, shall be short and without stress. Clinical approach shall take into consideration several aspects:17,18

- Disabled patients shall be helped by the nurse to sit on dental chair, their airways shall be free and they shall be accompanied by the persons taking care of them, especially if speech difficulties are present;
- Anamnesis shall be simple and optimistic, dentist shall stand in front of the patient, without mask, shall look him in the eyes, shall move slowly and questions shall be simple and clear, for plain answers (yes/no);
- Anamnesis should reveal patient’s risk factors: if the medical record shows high blood pressure, cardiac diseases, transient vascular accidents, diabetes, dyslipidemia, coronary atheromatosis, (heavy) smoking, old age, then such a patient is prone to stroke and/or
myocardial infarction;
- History of past strokes needs to be elicited: date, seriousness, treatment, disabilities. There are situations when patient’s speech is not affected, but he cannot realize the extent of the palsy (he is not aware of it) or situations when a patient with brain injury on his right side is neglecting his left side of the body;
- Blood pressure and pain should be monitored and under control during the entire intervention.

Emergency dental treatment is allowed six months after stroke, it should be performed carefully, by neurologist’s advice and some precautions are needed, according to the specific characters of the stroke.1,16,19

- If needed, dental treatment produces bleeding (teeth extraction, pulpectomy, subgingival scaling, periodontal surgery), anticoagulant systemic medication may cause serious hemorrhage, therefore anticoagulant drugs like heparin should be stopped at least 6-12 hours before treatment. Six hours after bleeding, when blood clots are built up, heparin systemic treatment can be resumed.7 If there is some other anticoagulant medication involved, it should be stopped several hours or days before bleeding dental treatment, after determining the International Clotting Rate (ICR) and decision depends on neurologist’s advice.19

- The dentist should be ready for emergency intervention in case of local hemorrhage, with haemostatic medication and cautery, blood pressure should be monitored and oxygen therapy device is needed in dental office.

- The minimal amount of anaesthetic solutions should be injected, concentration of added epinephrine should be very low (1:100,000 or 1:200,000). Use of gingival retraction cord soaked with epinephrine should be avoided.

- Metronidazolum and tetracycline should be avoided, since they may affect blood clotting.

- If the patient shows symptoms of stroke, he should get oxygen therapy immediately and should be referred to a hospital as soon as possible.

Patients with transient ischemic attack (TIA) or stroke in their medical record have a very complex dental and periodontal pathology.20-24

Case report No. 1

Name: R.Z., gender - female, age 46 years, medical record No. 8253.

Systemic clinical diagnosis:
- Central vestibular syndrome;
- Leucoaraiosis;
- Dyslipidemia;
- Systolic hypertension;
- Angina pectoris.

Oral, dental and periodontal diagnosis:
- Simple and complicated carious lesions;
- Abfraction cervical lesions;
- Chronic dystrophic progressive periodontitis;
- Kennedy Class III edentulous maxilla;
- Kennedy modified (1 modification) Class II edentulous mandible, with pronounced bone atrophy of edentulous areas.

Figure 1. Clinical aspect of the oral cavity.
Dental and periodontal lesions occur related with important bilateral vascular carotid lesions. The etiological mechanism is probably the hemodynamic vascular disease in association with local factors.

**Case report No. 2**

Name: S.I., gender - male, age 47 years, medical record No. 8985.

- Systemic clinical diagnosis:
  - Recurrent ischemic stroke;
  - Right side cerebellum infarction;
  - Atheromatosis of carotid artery system;
  - Old septal myocardial infarction;
  - Sinus bradycardia;
  - Mixed dyslipidemia;
  - Transient ischemic attack in vertebral/basilar artery system.

- Oral, dental and periodontal diagnosis:
  - Carious and non-carious cavitated lesions (extended loss of hard dental tissues);
  - Chronic dystrophic progressive periodontitis;
  - Kennedy modified (2 modifications) Class III edentulous maxilla, fixed prosthodontic restorations (crowns) in teeth 1.1., 2.5., 2.8.;
  - Kennedy Class III edentulous mandible.
Dental and periodontal lesions occur related with cerebral microvascular lesions (leucoaraisia), due to diffuse bilateral carotid artery atheromatosis, cerebellum infarction and chronic myocardial infarction. There is a high probability of atheroma located in the aortic curvature.

Case report no. 3
Name: M.E., gender - female, age 48 years, medical record No. 8117.
Systemic clinical diagnosis:
- Sequelae of right side thalamus infarction;
- Transient ischemic attack in vertebral/basilar artery system;
- High blood pressure;
- Ischemic coronary heart disease;
- Dyslipidemia.

Oral, dental and periodontal diagnosis:
- Simple and complicated carious lesions;
- Non-carious wear lesions (attrition/abrasion) located on incisal edges of maxillar and mandibular incisors;
- Slow-progressive chronic periodontitis;
- Kennedy modified (2 modifications) Class III edentulous maxilla;
- Kennedy modified (1 modification) Class III edentulous mandible.
Dental and periodontal lesions occur probably related with bilateral hemodynamic vascular disease, but without any present stroke lesion.

Figure 14. CT image, showing remainders of right side lacunar infarction.

Figure 15. Doppler echo-tomography, showing slight thickening of carotid artery wall, without atheroma.

DISCUSSIONS

It is not correct trying to explain dental and periodontal lesions only by one or more risk factors, such as hypertension or diabetes, in patients with stroke. Stroke existence in medical record of a patient leads to mandatory evaluation of causality and cerebral mechanisms lesions that typically occur during development of dental and periodontal lesions. It is the case of stroke occurred within a chronic vascular disease. In some cases, acute lesion of external carotid artery with dental and periodontal associated lesions, could be revealed.

The interpretation of the role of these factors related to major arterial lesion that produced brain infarction must be made with caution, taking into consideration that hypertension, diabetes and other diseases are considered risk factors and not etiological ones.

Ischemia is important to the local dental and periodontal vascular and nervous structures, while it causes disturbance of normal function at this level. Thus endorses a chain with multiple links, which can trigger insufficiently known mechanisms, altering the entire complex morphologic and functional oral cavity balance. This could explain many of the failures that occur in dental and periodontal therapy.

Lesions producing this ischemia may be located mainly in: aortic curvature, common carotid artery, carotid bifurcation, external carotid artery and main branches that irrigate the components of the dento-maxillar system.

Systemic diseases that may intervene in this area, such as vasculitis, collagen diseases, liver diseases, disgenesis, some imunopathies, toxic illnesses, drugs, iatrogenics, a.s.o., should always be taken into consideration when dealing about an appropriate therapy, mainly when prevention programs or minimum risk interventions are to be performed.

In many cases, one can assume that the dento-maxillar injuries may be explained primarily by vascular lesions of the arterial system, while local factors, both important and well known at present, may be considered as risk factors or related to the morbid process.

Dental and periodontal lesions in stroke are very frequent. They occur in 94% of studied cases. In Parkinson’s disease, frequency of these lesions is 20% less and in Alzheimer’s disease is 30% less frequently. Highest frequency of lesions occurs in male patients in the 61-70 years age decade, followed by 71-80 years age decade, and in 11.7% of the cases, injuries were also recorded at ages under 50 years.

Patients’ stroke were located in a proportion of 26.9% in the carotid artery system and 9.7% in the vertebral/basilar artery system. This is explained by the fact that the latter is participating in the irrigation of dento-maxillar device only by anastomosis, that is why our observation represents an indirect argument for a possible vascular cause of dental and periodontal lesions.

In 655 patients (65.5% of cases) vascular lesions were diffuse and not defined in only one particular
territory. It is the case of a finding, with the same meaning, attributed to carotid artery system, because we are dealing with vascular injuries more encompassing, affecting enhanced territories. As an appropriate interpretation, we are entitled to say that 92.4% of the observations fall into one ischemic disease affecting the carotid artery system.

External carotid artery with all its branches which supplies dental and maxillar structures, should be interpreted in the context of carotidian cervical and cerebral axis, and only rarely isolated.

Etiological mechanisms of dental and periodontal lesions in patients with stroke are represented by three pathways:
- Atherotrombosis comprising extracranial and intracranial arteries and microcirculation arteries (penetrating arteries);
- Arterial embolism from aortic arch and including common carotid artery, carotid furcation, external carotid artery, internal carotid artery and direct cardiac embolism, and also the association of local atherotrombosis of cervical and cerebral arterial system with cardiac embolism;
- Systemic hypoperfusion, with ischemia in the territory of the terminal external and internal carotid artery usually caused by cardiac and/or iatrogenic reasons.

Our clinical observations show the following decreasing frequency for possible mechanisms in determining dental and periodontal lesions related to cerebral ischemia:
- Intricate mechanisms;
- Local atherotrombosis;
- Hemodynamic disease mechanism;
- Penetrating vessels affections;
- Heart embolism;
- Local hyalinosis;
- Atherotrombotic local embolism;
- Atherosclerotic occlusion of terminal vessels;
- Carotid artery embolism;
- Atherotrombosis with progressive extension;
- Microembolism;
- Dental and periodontal injuries insignificantly explained by risk factors.

We can discuss the existence of local characteristics as risk elements at the level of external carotid artery, which does not have very effective anastomosis system and has to ensure the energy substrate for the dental and maxillar structures. There are membrane mechanisms, which are difficult to explain at present. Atherotrombosis, local hyalinosis and reduced blood flow certainly influence in a negative way local metabolic processes, without the therapeutic possibility to influence very effective these blood vessels, as can be done for the internal carotid artery. For this reason, treatment of dental and periodontal diseases becomes extremely important for both internal and external carotid artery, knowing that the inflammatory factor is always present in atherosclerosis. Highlighting the presence of pathogens in carotid artery atheromata similar to those in microbial flora of the dental and periodontal lesions supports this observation.

In the case of fibromuscular dysplasia of the external carotid artery, the consequences are similar, but high blood pressure is constantly related.

The existence of severe trophic disorders has been notified, especially in bone structures (maxilla and mandible), such as osteoporosis and many other bone reshufflings, well revealed in CT, which provides a clear image of opportunities for a specific type of prosthodontic therapy and, of course, contraindications for implant therapy.

Dental treatment in such patients must take into consideration first the vascular risk factors and the removal of periodontal inflammatory factors, and only after that should try to approach dental and periodontal lesions. Surgical treatment for dental and periodontal injuries in these patients should be performed according to the neurologist’s advice, in order to avoid recurrent stroke.

Neurovascular treatment, particularly carotid endarterectomy or carotid angioplasty with or without stent, in terms of existing dental and periodontal injuries, should not be performed without treating first the periodontal inflammatory source. The risk of blood dissemination and bacterial endocarditis is well known and of high seriousness.

Although the study does not include specific elements related to iatrogenics, the wide range of medicines used for cerebral vascular pathology leads to the need of assessment regarding the risk of developing dental and periodontal lesions due to side effects of medication. It is mainly about anticoagulant medication, antiplatelet treatment, and also about antihypertensive and antiepileptic treatment. Evaluation of dental and periodontal risk, related to the benefits of these therapies in avoiding recurrent stroke and vascular death risk, should be done in collaboration with the neurologist.

Study of many situations of dental and periodontal lesions in stroke patients and necessary assimilation of notions from complementary investigations, should lead to a different approach of the therapeutic decision for elderly patients who suffered of a stroke.

Experience gained from such studies emphasizes
again the need for further development of gerontostomatology and this concern must cover all specialities in dentistry, because of the large proportion of elderly people suffering from dental and periodontal injuries.

At present, there are enough pathways for technical knowledge of neurovascular and related dental pathology. The most appropriate treatment in cases, sometimes at the limits of acceptable risk, becomes possible, taking into account the elements of this risk. In such conditions, the individual neurological approach fitted to each patient represents a great support for the therapeutic successes that we all desire and expect.

CONCLUSIONS

Dental therapy management of the patient with a medical record of ischemic stroke is particularly important, because of the real risk of recurrence. The risk is higher as time elapsed from the previous accident is shorter and the patient presents more associated risk factors. In this respect, the dentist should be trained to prevent the occurrence of a new vascular attack and of any possible complication. Complications may occur due to the disease itself or because of the side effects of patient’s systemic medication. Dental office and dental medical team shall have the necessary means and knowledge in order to perform effectively in case of need.

Possible causal relationship between seriousness of periodontal disease, carotid atheromata and stroke must be redefined, due to the fact that appropriate periodontal therapy may reduce the risk of occurrence or recurrence of stroke.

REFERENCES