Clinical-Statistical Study on Tongue Modifications in Elderly Stroke Patients

Dana Cristina BODNAR
Traian BODNAR
Mihaela PANTEA
Mihai BURLIBAŞA
Ileana IONESCU
Dorina MOCUŞTA
University of Medicine and Pharmacy “Carol Davila” Bucharest
Society of Osseointegration

Abstract
The purpose of the paper was to highlight the qualitative changes in the tongue of stroke patients and to explain the possible etiopathogenic mechanisms, in correlation with local and general risk factors.

The working method consisted in a multidisciplinary study, using a rigorous working programme, on 91 patients of both genders, aged between 50 and 90 plus, hospitalised in the National Institute of Neurology and Neurovascular Diseases – Bucharest, based on a standard medical observation record, employing classical exploration, through a specialised clinical exam, as well as modern investigation means, and, when possible, metabolic research, in connection with the pathology of cerebrovascular diseases.

The results indicated a 25, 27% frequency of glossitis in stroke patients, as well as a wide variety of clinical manifestations. We studied a series of factors that may be incriminated in glossitis etiopathogeny, related to the clinical characteristics of the disease, the occurrence of comorbidity and the localisation of cerebrovascular lesions. The data of the study are presented in graphs and exemplified through the presentation of some significant cases.

The important conclusion of the paper is that the high frequency of glossitis in cerebrovascular disease sufferers, the etiopathogeny, can be justified not only by the existence of local-regional conditions and comorbidity but also by the fact that an important percentage of glossitis occurred in patients of any age and especially in elderly ones could be explained considering the most important disease of the century, atherosclerosis.

Key words: atherosclerosis, tongue, disease, clinical, morphology
Introduction

The first largest cause of mortality worldwide, Romania included, is represented by cardiovascular diseases. Research in the field of cerebrovascular diseases, a rapidly growing one, has currently become an area of major scientific interest, unique among medical branches, because of the necessity to employ a wide range of specialties: neurology, internal medicine, surgery, radiology, epidemiology, cardiology, haematology, psychology, and specialties related to the patient recovery and integration in the lifestyle previous to the cerebral disorder. Lately, more and more frequently, we have noticed the appearance of some papers related to their employment in different disorders belonging to the oral-dental-periodontal area.

Within cardiovascular pathology, which has an epidemic-pandemic aspect, stroke represents a major global public health problem, because of its mortality and sequels. Stroke patients may face different complications that cause the aggravation of the general condition and a reserved prognosis implicitly. Among the acknowledged complications, urinary infection, bronchopneumonia, deglutition disorders, pulmonary emboli etc. may be mentioned as most frequent (1).

Our research is consistent with these modern trends, synthetically approaching the relationship between cerebrovascular pathology and the oral-dental-periodontal one. The research is based on a rigorous working programme, a multidisciplinary one, employing modern investigation methods, ranging from classical exploration, characteristic of specialised clinical exam, to cutting-edge investigation methods such as computed tomography (CT), Nuclear Magnetic Resonance (NMR), SPECT, PET, and, when possible, metabolic research, in connection with the pathology of cerebrovascular diseases.

On the other hand, oral pathology is so frequent that the explanations provided so far regarding the high rate of morbidity in oral-dental-maxillary disorders will have to be motivated not only by comorbidity and poor hygiene but also by the fact that a part of the diseases that affect this area has not been researched. It provides an explanation for a significant percentage of the dental-periodontal apparatus and oral mucosa diseases that may occur in patients of any age but especially in elderly ones, considering the most important disease of the century, namely atherosclerosis.

Research is difficult as specialised literature offers only a few syntheses related to this topic. However, research in the USA and Western Europe highlights the fact that oral-dental-maxillary pathology should be regarded not only as nosology or local pathology but mainly as a manifestation of multiple systemic disorders. Among all these multiple systemic disorders, atherothrombosis is the most important one, followed by other entities. (1)

Purpose of the paper

The purpose of our multidisciplinary study, employing complex neurological clinical and paraclinical investigations, as well as dental ones, was to approach a possible connection between the vascular pathology of the cervical-
cerebral vessels, especially of the external carotid artery, and the range of qualitative changes it determines at the level of the tongue, in our case. Specialised literature shows that the ischemic mechanism, through impaired blood flow, explains a large part of disorders in oral-dental area, which may result in affecting its normal morphology and function.

**Material and method**

The clinical-statistical study related to the association of different types of glossitis with the most frequent neurovascular disorders, presented in the paper, was conducted on 91 patients of both genders, aged between 50 and 90 plus, hospitalised in the National Institute of Neurology and Neurovascular Diseases – Bucharest, with reference to risk factors and the possible mechanism employed in the occurrence of tongue lesions. Patients were part of a cohort of 1000 patients involved in an ampler research, conducted over a longer period of time, based on a standard medical observation record and employing laboratory explorations, to confirm an essential fact: oral-dental-periodontal pathology should be paid more attention, and it should be regarded in a general context, the vascular element being primordial in the elderly population. Starting from the working hypothesis, we established the research ideas to provide answers to the following questions:

- What is the pathogenic relationship between the arterial cervical-cerebral system and the tongue pathology?
- What prophylactic measures should be taken to prevent these complications?
- What therapeutic measures should be taken if prophylaxis of this type was not possible?

The neurological examination was carried out by specialised doctors within the institute and the complete dental examination was carried out by us, according to the designed medical observation record. Some of the 91 studied patients were examined in the neurological clinic, because of their severe condition, without having a rigorous dental examination, as far as clinical and paraclinical investigations were concerned, and others were examined in ambulatory care. The dental examination was carried out with the consent of the patient or, depending on the situation (aphasic, confused, coma patients), with that of the caregivers.

The main results related to tongue disorders will be presented graphically in the paper.

**Results**

As far as gender is concerned, out of the number of patients that were examined, there were 55 (60.43%) males and 36 (39.56%) females (fig. 1). As far as both age and gender are concerned, males predominated, most patients being males aged between 70 and 79 (41 out of 91, representing 45.05% ), followed by patients aged between 60 and 69 (29 patients, 31.86%) (fig. 2)
The distribution of vascular lesions in examined patients indicates their certain predominance in the carotid system (27 observations, representing 29.67%), followed by cardiac lesions (25 observations, 27.47%) and global vascular lesions (15 observations, 16.48%).

A small number of lesions in the vertebrobasilar system were recorded, which may be an argument in favour of the vascular determinism of oral-dental-periodontal lesions.

The graphical representation of vascular lesions, in percentage, refers to the 91 clinical observations. However, in many cases, there are vascular lesions in multiple arterial territories. (fig. 3).
Following the clinical study conducted, we diagnosed, out of the total 91 examined patients, 23, representing 25.27%, with different clinical forms of glossitis. Age- and gender-specific distribution of the patients diagnosed with glossitis indicates 17 cases (73.91%) in males and 6, representing 26.08%, in females. (fig. 4).

Analysing the factors that could determine the tongue disorders in those stroke patients, we retained, following the complex clinical examination that was carried out, the occurrence of recurrent strokes (5 cases); patients with disabilities caused by the disease (hemiplegia), with communication or mastication deficit, dysphagia (8 cases); the occurrence of important comorbidity that could be
involved in the occurrence of the general disease and the glossitis, as follows: high blood pressure in 18 cases, with its consequences on the heart health (ischemic cardiopathy, myocardial infarction as a sequel), type II diabetes (4 cases), psychological disorders (5 cases). The larger number of these factors, compared to the 23 patients with glossitis, is the consequence of the fact that, many times, there were more than one comorbidity in the same patient, as follows: high blood pressure, ischemic cardiopathy, and diabetes, more frequently type II diabetes, or high blood pressure and depression, and so on. As far as gender is concerned, these possible causes were more frequent in males (30), aged between 70 and 79 (14), 9 cases in males aged between 60 and 69, and 3 cases in females of the same age. (fig. 5 a and b)

![Fig. 5a and b. Risk factors for glossitis patients - males (a) and females (b) depending on age](image)

The evaluation of the possible mechanisms that lead to glossitis occurrence, in the global context of the general systemic and local-regional changes, is presented in decreasing order, depending on frequency. Intricate mechanisms were present in 13 cases, hemodynamic mechanisms in 4 cases, in 3 cases cardiac emboli was present, and carotid emboli, microembolism, local atheromatosis, and peripheral vessels affection were mechanisms represented by 2 cases each and 5 local-regional risk factors. (fig. 6)
In relation to the type of glossitis in the 23 patients, we diagnosed:

- 6 cases of glossitis caused by candida (acute, hypertrophic or atrophic), 4 in males and 2 in females;
- macroglossitis in 5 cases, 3 in males and 2 in females;
- ulcerated lesions of the tongue mucosa in 4 cases, 3 in males, 1 in females;
- 6 cases of glossitis with fissure-like, scrotal aspect, out of which 5 cases in males and 1 in females;
- 1 case of glossitis with a satin-like aspect, in males.

They were either singular manifestations or manifestations combined with gingivitis, cheilitis, stomatitis, uranitis etc. (fig. 7)

Most cases of glossitis occurred in the group aged between 70 and 79, 12 cases, out of which 11 in males.

**Discussions**

The rigorous analysis of the vascular lesions, the risk factors and the possible mechanism of tongue lesions in the 23 cases out of the 91 examined
patients led to obtaining multiple pieces of information that were difficult to organise. The first analysis shows that the vascular lesions in these patients are present, certainly, in the carotid system. However, they are also present in the vertebrobasilar arterial or global system. To them, comorbidity is added, such as cardiac disorders, as a complication of high blood pressure, diabetes, more frequently type II diabetes, psychological disorders, and the presence of local-regional factors, which cannot be excluded in such a research as their intervention seems to be very important in the lesion process at the level of microcirculation in the dental-maxillary apparatus territory. As far as cerebral vascular lesions are concerned, we can state with certitude that they represent an etiological marker, although not necessarily, for the explanation of the lesions of the tongue, especially in elderly patients.

The possible mechanism of tongue lesions was evaluated, following a laborious analysis of the obtained data and considering the difficulty of knowing the intimate processes occurred at the level of oral microcirculation. The conclusion was that, most frequently, multiple, intricate mechanisms were employed, followed by embolic and hemodynamic mechanisms, and by the process of local atheromatosis. As we did not intend to conduct a statistical study on the mechanism of the lesions, we only highlighted the predominance of intricate phenomena, between a systemic factor (ischemic cardiopathy, high blood pressure, diabetes etc.) and one or more local factors, in determining the lesions. (1)

We have to accept, considering the extended research this present research is part of, that clinical, radiological, sonological or ultrasonological, imagistic etc. data allow us to draw the conclusion that the existence of the external carotid artery obstruction is not absolutely necessary so that a vascular-type change may occur at the level of the tongue; artery obstruction is an extremely important factor. (1)

As far as the tongue lesions described by us are concerned, we cannot speak of a certain specificity, glossitis may frequently occur in elderly patients who present a series of structural and functional modifications of the tongue, whose variety depend on a series of factors such as: individual genetic inheritance, individual rate of ageing, specific lifestyle, individual general condition and the secondary effects of the medication used to treat individual disorders in general. (2, 3, 4)

At the level of the dorsal mucosa of the tongue, where the majority of taste receptors and buds are located, while ageing, the number of filiform papillae decreases and the tongue mucosa becomes smooth, satin-like, thin and dry. Depapillation favours the proliferation of opportunistic germs, such as Candida albicans, and changes the taste perception in the aged. The salivary secretion may also change. (1, 2, 4, 5).

Stroke patients, besides the changes caused by age, may suffer from diverse complications that determine the aggravation of the general condition and implicitly a reserved prognosis. Among the most frequent complications, the following may be mentioned: urinary infection, bronchopneumonia, deglutition disorders etc. (5)
Oral malfunctions depend on the severity and duration of stroke and determine speech, mastication and deglutition impediments. These functions do not always become totally normal after rehabilitation. (5, 6)

A study conducted by HW Zhu et al (6) evinces the fact that, immediately after the stroke acute phase, the oral health of the patient worsens because of both the incapacity to carry out oral hygiene and the other medical problems that endanger life. Poor hygiene and the weak resistance of the body result in a significant increase in the bacterial flora in the dental plaque biofilm, as well as a significant increase in Candida albicans and Klebsiella pneumoniae, as it is shown in the studies conducted and made public by (6). The study also evinces that, in the subacute phase, 6 months after the stroke, the odonto-periodontal and oral mucosa pathology slightly decreases, once normal lifestyle is resumed. However, the patient incapacity to brush the teeth correctly, because disabilities or other neurological disorders, results in the dental plaque accumulation. It also happens because of the medication secondary effects and malnutrition, determined by the changes in diet, mastication and deglutition impediments, dysphagia, xerostomia and the lack of taste, following the tongue papillae atrophy. (2, 3, 4, 5, 6)

The nutrition factor is involved in the increase in the pathogenic action of Candida albicans, through local or systemic mechanisms (6). Salivary secretion disorders, characterised by xerostomia, represent another risk factor for oral candida infection. After the remission of the stroke acute episode, depending on the lesion localisation and extension as well as the premorbid condition of the patient, the patient may frequently have invalidating sequels, meaning that, after a longer or shorter period of time, the patient is confronted with a depressive syndrome that may have different aspects. These sequels (psychological) as well as the cerebral biological modifications (organic) lead to psychical disorders that may be divided into: psychical disorders related to affection (depression, anxiety, post-stroke mania) and disorders manifested through disproportionate feelings and emotions related to the neurological disorder severity (catastrophic reaction, indifferent reaction etc.) Psychiatric medical practice provides multiple examples of patients with emotional lability, fatigability, memory and cognition disorders (7, 8, 9, 10).

Disease-specific personality disorders, medication secondary effects, the weak resistance of the body and the predisposition to recurrent infections, following malnutrition, the altered general condition, and poor immune response mechanisms may be considered causes for the aggravation of oral health. On the other hand, aspirin administration to treat and prevent thrombotic stroke seems to lead to a decrease in the microflora in the microbial film and to inhibit the increase in Candida albicans. (Sztriha et al, 2005 cited by 6). Future research is to confirm or contradict this hypothesis.

Conclusions
Immediately after a stroke, there is a significant increase in the microbial flora in the oral cavity, because of the altered general condition and the functional disabilities that follow the stroke. After 6 months, it slightly decreases. Local
factors as well as dental plaque accumulation, associated with xerostomia, malnutrition and immunity deficit, may result in the occurrence of a series of manifestations such as: gingivitis, simple decays or the complication of the existing and untreated ones, simple tongue mucosa disorders or disorders that may be associated with other localisations and diverse symptoms. The high frequency in glossitis in stroke patients and the etiopathogenicity can be justified not only by the existence of local-regional conditions and comorbidity but also by the fact that an important percentage of glossitis occurred in patients of any age and especially in elderly ones could be explained considering the most important disease of the century, namely atherosclerosis.

References
Bodnar Dana Cristina: *Contributions regarding the changes in oral mucosa in patients diagnosed with neurovascular disorders*. Infomedica, 2006, No.,4(138), pp. 47-51