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Research Article

Neuropathic Etiopathogenesis of Burning Mouth Syndrome

Elena Claudia Coculescu[1] and Bogdan-Ioan Coculescu[2,3]*

[1]*Carol Davila, University of Medicine and Pharmacy, Faculty of Dental Medicine, Bucharest, Romania*

[2]*Cantacuzino, National Medico-Military Institute for Research and Development, Bucharest, Romania*

[3]*Titu Maiorescu, University, Faculty of Medicine, Bucharest, Romania*

***Corresponding author:** Bogdan-Ioan Coculescu, Cantacuzino National Medico-Military Institute for Research and Development, 103 Splaiul Independenței, 050096, Bucharest, Romania.

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Abstract

Burning mouth syndrome (BMS) is one of the oral-dental diseases where there are few scientific discoveries in the field, which justifies interest in knowledge in the field. The etiopathogenesis of BMS is still insufficiently known at present. Based on the definition provided by the International Headache Society that presumes that BMS is idiopathic, attempts are being made to identify the possible etiopathological factors associated with the syndrome.

Keywords: Burning mouth syndrome; Neuropathic pain; Non-specific oral pain

Introduction

Based on the recorded medical literature data, BMS was described for the first time in the 19th century. Subsequently, at the beginning of the 20th century, Burning Mouth Syndrome (BMS) was characterized by Butlin and Oppenheim as glossodynia, as the main site of pain in most patients is the tongue. In the following years, BMS was called different names, such as glossopyrosis, oral dysesthesia, tongue pain, stomatodynia, and stomatopyrosis [1-5]. BMS was first classified as a distinct condition by the International Headache Society (IHS) in 2004 [5]. Multiple names, which try to define the illness, either by labelling it as a syndrome or as a disease, express the limited level of knowledge in this area [6-8]. We believe that the nosological framework of BMS, as defined by Țovaru and al [4], by which BMS is considered to be a syndrome, consisting of a complex of clinical symptoms, is current and all-encompassing [2,9]. Etiopathogenically, almost unanimously, it is acceptable to place the pain from BMS into the neuropathic type of group. The anatomical support through which the pain-generating excitation becomes a sensation and after cortical processing has effective responses (motor or secretory) is the reflex arc. The reflex arc is the way to transmit the excitation from peripheral receptors to the nerve centres and hence to the effective organs [2,9]. At the level of the oral cavity, the characteristic of the pain arc is that it overlaps that which transports taste. Thus, pain and taste use a common pathway. This gives the hypothetical possibility that, in case of a change of flavour, it becomes the possible cause of burning mouth syndrome. Starting from this hypothetical version and the existence of a related common pathway, the theory of gustatory arch involvement was defined and accepted in the medical literature alongside that of the pain conductor [2,9].

Material and Methods

The physiological diagnosis of neuropathic pain is based on a thorough anamnesis designed to identify/establish the possible aetiology (trauma, surgical intervention, infections, vitamin deficiencies, neoplasms, administered drugs). Positive diagnostic means and methods involve the assessment of pain through the

following clinical elements [10-12]:

1. use of assessment scales (neuropathy pain scale, McGill questionnaire);

2. objective examination (assessment of the functions of the CNS and PNS, of the motor, vegetative, somatosensory functions) and

3. diagnostic tests - electromyography, measurement of nerve conduction velocity in peripheral nerves, including the use of nuclear magnetic resonance.

4. In general, the correctly formulated diagnostic is 1) of the organ; 2) physiopathology: of the cause (etiological)/stage of evolution; 3) of the clinical form, and 4) of other associated diseases.

Results

Since BMS is characterised by most authors to be a neuropathic-type pain, we thought it useful to address this type of pain in a general way. This is because it enables the particularities of BMS to be facilitated and identified. Pain should not be confused with nociception, as pain can also be experienced in the absence of nociception, as the opposite claim is also sustainable. This allows claiming that the terms of non-nociceptive pain (e.g., psychogenic or neuropathic pain) and nociceptive pain (e.g., pain due to inflammation) express different notions [13,14]. Neuropathic pain is fundamentally different from the nociceptive one because the lesions that determine it are located on the neural pathways (central and/or peripheral) which normally lead to this form of sensitivity. By contrast, nociceptive pain involves the integrity of the pain-conductive neural pathways, with the generation of the nerve impulse being caused by nociceptive stimuli [15,16]. The painful information is transmitted to the central integration regions in the form of "nerve impulses" (nerve action potentials) via the three constituent neurons of the related pathway. Functionally, each impulse can be blocked, transformed into repetitive impulses or integrated associatively with impulses from other neurons. Very complex impulse patterns are generated by integrating nerve impulses. In functional processes for changing nervous impulses, the primary role is assigned to synaptic functions. There are two main types of synapses: chemical synapses and electric synapses. Almost all the synapses used for impulse transmission at the level of the central nervous system are chemical. Within the chemical synapses, the pre-synaptic neuron secrets a chemical substance called a neurotransmitter at the level of its synaptic endings, and it acts on the protein receptors in the membrane of the postsynaptic neuron, causing it to be stimulated, inhibited or altered in sensitivity [17].

At the level of the synapses, the transmission is performed via chemical substances (neurotransmitters, neuromodulators and neurohormones). Neuromodulators coexist with neurohormones and neurotransmitters within the same neurons, sometimes in the same subcellular organelles, both in the central and peripheral nervous systems. The chemical nature of neuromodulators does not differ from that of neurohormones. They are generally neuropeptides, but they can also be monoamines – serotonin, dopamine, norepinephrine [17,18]. More than 40 major neurotransmitters have been discovered so far. Of these, the best known are acetylcholine, norepinephrine, epinephrine, histamine, gamma-aminobutyric acid (GABA), glycine, serotonin and glutamate [17]. Liminar stimulus - basic condition to excite the receptor and generate pain. The importance of the intensity of the stimulus on the perception of pain. When intensive, repeated and extended stimuli are applied, if the tissue is injured or if inflammation is present, the threshold for activation of the primary nociceptors is lower, and the trigger rate is higher for all stimulus intensities. Inflammation mediators such as bradykinin, some prostaglandins and leukotrienes contribute to this process called sensitization. In sensitized tissues, generally harmless stimuli can cause pain [19,20]. Apart from the intensity of the painful stimulus, the tissue lesion that releases chemical mediators – histamine, serotonin, prostaglandins – generally referred to as PPS (pain productive substances) with an effect on the capillary size and permeability and also mediating vascular-exudative inflammation processes also contributes to the determination of pain. The presence of these mediators makes it possible to explain why pain receptor endings continue to emit stimuli even after the action of the traumatic nociceptive stimulus has ended [21].

According to Hăulică [22], alteration of the pain threshold may cause an excessive perception of painful excitations or even non-nociceptive excitations which are felt as pain. Thus, peripheral, central, visceral, and cephalic (shallow and deep) hyperalgesia is distinguished [22]. Peripheral hyperalgesia occurs in some cases of peripheral nerve damage (of a neuralgic, myalgic type). Causalgia, in which burn-type pain is accompanied by important vasomotor, trophic, and psychological disorders, the mechanism being still unclear, is also part of this category (that of peripheral hyperalgesia). Among the central hyperalgesia, the thalamic syndrome is due to the posterior-lateral thrombosis of the posterior-lateral branch of the central posterior artery that supplies the posterior-ventral part of the thalamus, with damage to the posterior-lateral ventral and posterior-medial ventral thalamic nuclei occupies an important place. The hyperalgesia of the cephalic extremity is due to damage to intracranial structures, such as sensory cranial nerves, large venous sinuses, or meningeal arteries; the encephalon is painless. Cephalic hyperalgesia may be divided, depending on the affected structures, into a) superficial; b) deep. Of the superficial hyperalgesia of the cephalic extremity, facial neuralgia (nerve VII) and the primitive trigeminal one stands out. A special category is represented by the deep hyperalgesia of the cephalic extremities consisting of headaches, migraines, glossodynia and odontalgia [22].

Discussions

One of the almost constant symptoms encountered in any condition is pain. This sensation manifests itself differently, depending on subjective perception. Similar to any type of pain, the

one with the oro-facial location has signal value. Burning Mouth Syndrom (BMS) also fits into such a context. The best indicator of the presence of pain in BMS is the patient's report. However, location, character, worsening or ameliorating factors, pain intensity, and any other associated symptoms are criteria that need to be evaluated. Neuropathic pain takes on various clinical forms. One of these is Burning Mouth Syndrome (BMS). Etiologically, BMS can be classified in two forms [23]:

a. the primary (essential/idiopathic) form in which local/systemic organic causes cannot be identified but pathogenically involve the related neurological pathways in any region, from the peripheral to the central.

The features of this primary form can be summarized in the following definition: "a pathological state of an idiopathic nature, characterized by a sensation of burning of the oral mucosa, which appears clinically healthy" [9].

b. the secondary form, determined by local, systemic or psychological factors.

1. The theory is also supported by Fussnegger [24], who states that there are [24]: The primary BMS, following a degenerative process of epithelial nerve fibres or peripheral and/or central neuropathy and

2. BMS secondary to:

a) associated systemic illnesses (e.g., diabetes mellitus, nutritional deficiencies, allergies);

b) local conditions (e.g., oral candidosis, lichen planus) or functional changes (parafunctional activities of the tongue, oral breathing).

3. From the experience of the Oral Pathology Clinic of Faculty of Dental Medicine we can say that secondary BMS can be divided into two types, depending on the related lesions:

a) with clinical lesions detectable upon visual inspection of the oral cavity (Candida spp., lichen planus etc.);

b) without changes of the oral mucosa at the objective clinical examination [9].

c) Thus, BMS is formed as one of the syndromes characteristics of chronic stress, associated with non-specific clinical manifestations and requiring special medical attention as to the assessment and treatment of the condition.

Conclusion

BMS is among the types of pain manifesting in the oral cavity, and it is classified as a syndrome or, according to other authors as a borderline, interdisciplinary condition, between different medical specialties closely correlated with that of Dental Medicine itself. Regardless of the form in which the existence of BMS is diagnosed, the pain is of a chronic, persistent type, able to be classified from a pathogenic point of view as neuropathic.

Acknowledgment

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Conflict of Interest

No conflict of interest.

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