Abstract

Premises: Sexual hormones may affect the general health condition of women, as early as puberty, continuing during pregnancy and also after menopause. Variations of the hormonal levels may cause different – either local or general – pathological modifications. Sexual hormones may also affect periodontal status, favourizing gingival inflammations and reducing periodontal resistance to the action of the bacterial plaque.

Scope: Establishment of the correlations between the debut or the manifestation of menopause and the modifications produced in the superficial periodontium.

Materials and method: Clinical and paraclinical investigations were performed on female patients with ages between 45 and 66 years, involving macroscopic, microscopic and radiological recording of the aspect of the superficial periodontium (gingiva).

Results: Analysis of the histological sections evidenced atrophic and involutive modifications in the marginal superficial periodontium of female patients at menopause.

Conclusions: Sexual hormones intervene in the histological equilibrium of the marginal superficial periodontium, influencing the periodontal health status, which explains the correlation between the subjective symptomatology specific to menopause and the histopathological aspect at epithelial level.

Keywords: sexual hormones, menopause, marginal superficial periodontium

INTRODUCTION

Sexual hormones may affect the general health condition of women, as early as puberty, continuing during pregnancy and also after menopause. Variations of the hormonal levels may cause different pathological – either local or general – modifications. Sexual hormones may also affect periodontal status, as favourizing gingival inflammations and reducing periodontal resistance to the action of the bacterial plaque [1].

In the women in whom menopause was not still installed, the main circulating hormone is 17β – estradiole. As women approach the age of menopause, the levels of estrogens are decreasing, preponderantly in the follicular and luteal stages of the menstrual cycle, the result of such physiological condition being the installation of irregular cycles. Usually, the interval between the occurrence of irregular cycles and their total disappearance, lasting between 2-7 years, is known as the perimenopause period. Along this period, the concentration of circulating estrogen decreases, while the FSH and LH concentrations increase [2]. At the same time, the effects of estrogens upon the periodontium, listed in the table below, are quite reduced, which diminishes the anti-inflammatory effect of this hormone upon the periodontium [1,2].

EFFECTS OF ESTROGENS UPON PERIODONTIUM

- Increased plaque amount, without subsequent inflammation
- Inhibition of pro-inflammatory cytokines’ release by the medular cells
- Reduction of the inflammation mediated by lymphocytes T
- Inhibition of leukopoesis
- Inhibition of PMN chemotactism
- Stimulation of PMN phagocytosis

Progesterone is another sexual hormone playing an important role in bone metabolism during pre- and post-menopause periods. Literature data [3,4] showed that the ovarian secretory deficiet and the related disorders are, more than the age, the main causes of the bone mass losses along the first two post-menopause decades. The investigations made showed that progesterone competes with the glucocorticoides for a certain receiver from the osteoblaste surface, inhibiting the osteoporosis induced by glucocorticoides. That is why, DMO post-menopause reduction may be the result of a combination between

HISTOPATHOLOGY OF MARGINAL SUPERFICIAL PERIODONTIUM AT MENOPAUSE

A. Georgescu¹, H.T. Dumitriu²

1. Assist. Prof, Dept of Periodontology, Faculty of Med Dent, „Carol Davila” U.M.Ph., Bucureşti
2. Prof. PhD., „Carol Davila” U.M.Ph., Bucureşti, Corresponding member of the Academy of Medical Sciences of Romania
Corresponding author: Alexandru Georgescu alexg22@yahoo.com
stimulation of osteoclastes’ activity, by the low estrogen level, and inhibition of osteoblasts, mediated by cortisone, through reduction of the competition with progesterone.

**EFFECTS OF PROGESTERONE UPON PERIODONTIUM**
- Stimulation of prostaglandine synthesis
- Stimulation of PMN and PGE2
- Reduction of the anti-inflammatory effect of glucocorticoides
- Alteration of collagen and of non-collagenic proteins’ synthesis
- Alteration of fibroblastes’ metabolism
- Increase of vascular permeability

Menopause also affects the concentration of circulating androgens. Prior to menopause, 50% of the circulating androstendione is produced by ovaries and 50% by the medulosuprarenal gland [5]. When menopause is installed, as a result of the ovarian insufficiency characteristic to this period, plasmatic concentration will decrease with 50%. It has been suggested that the process of peripheric conversion of androgens into estrogens might be the main factor of bone protection, as long as it had been demonstrated that estrogens have an inhibiting effect upon osteoclastes. [5]

**EFFECTS OF ANDROGENS UPON THE PERIODONTIUM**
- Stimulates the synthesis of the bone matrix by osteoblasts
- Stimulates the fibroblastes from the periodontal ligament
- Stimulates differentiation and proliferation of osteoblastes
- Reduces the synthesis of IL-6 in inflammations
- Inhibits secretion of prostaglandines
- Increases the concentration of osteoprotegerine (OPG)

Testosterone is also involved in the equilibrium of bone density, as shown by the low concentration of this hormone in the blood of the patients suffering from osteoporosis. [6-8]

**MATERIALS AND METHOD**

The experimental group was formed of women at menopause, selected among the patients having addressed the Periodontology Department of the “Dan Theodorescu” Hospital of Bucharest, for periodontal investigations and treatment. The patients, with ages between 45 and 66 years, suffered of no other general associated diseases, such as diabetes, hepatic or renal problems, metabolic bone maladies, cancer. Also, the patients declared that they do not follow any substitution hormonal treatment and gave their consent for being included in the study.

After a detailed anamnesis, registering several aspects on the debut and history of the disease, personal physiological and pathological antecedents, as well as the heredo-colateral ones, a minute clinical examination of the oral cavity followed, for evidencing the signs related to the installation of menopause and the manifestation of some involutive and distrophic modifications.

Clinical (determination of the indices of periodontal health, measurements of the degree of gingival recession and depth of the periodontal pockets, testing of dental mobility) and para-clinical investigations (retro-alveoloary and panoramic radiographies) were performed for a correct establishment of the diagnosis and for the elaboration of the treatment plan, including registering of the macroscopic, microscopic and radiological aspect of the superficial periodontium (gingiva). Taking over of the biopical pieces was made during interventions of gingival debridement and subgingival curettage at the level of the inter-dental papillae. The samples were fixed in 10% buffered formaldehyde, with neutral pH. After processing and inclusion in paraffin, the samples were sectioned at micrometre, into 2µm sections, and coloured.

The colourations presented below were employed for evidencing the epithelial morphology specific to this period. Out of them, a representative case was selected for discussion.

<table>
<thead>
<tr>
<th>Usual colorations</th>
<th>Special colorations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematoxyline – eosyne, colour</td>
<td>Van Gieson, where</td>
</tr>
<tr>
<td>the nuclei – blue</td>
<td>the nuclei appear black</td>
</tr>
<tr>
<td>basophilic elements – red</td>
<td>collagen – red</td>
</tr>
<tr>
<td>acidophilic elements – orange</td>
<td>Gümöri- silver impregnation</td>
</tr>
<tr>
<td></td>
<td>nuclei appear oxidated</td>
</tr>
<tr>
<td></td>
<td>reticulin fibers – black</td>
</tr>
<tr>
<td></td>
<td>collagen – brown.</td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION

Gingivitis and gingivostomatitis induced by menopause, or the ’atrophic senile gingivitis’, as also known, is not a normal pathological case of the climacterium, as it is installed only in certain cases of physiological or surgically-induced (hysterectomy, ovariectomy) menopause. [9]

Subjectively, the patient complains of a sensation of dry mouth and burning at the level of the oral mucous membrane, of painful sensations on contact with cold or hot aliments or beverages. Another symptom is an altered perception of the sour and salty tastes [10,11]. A systematication of the oral manifestations accompanying menopause is provided in Table 1 [12].

Table 1

ORAL MANIFESTATIONS AT MENOPAUSE

Oral discomfort

- pain
- burning sensations
- modification of the gustative sensations
  (salty, hot, sour)
- xerostomia

Modifications of the oral mucous membrane

1. gingival atrophy
2. menopause gingivostomatitis

Osteoporosis

- accelerated bone atrophy
- severe osteoporosis – rapid loss of teeth and atrophy of the residual edentulous ridge
- may affect the severity of the pre-existing periodontopathy

Objectively, it was observed that the gingival and oral mucous membrane had a smooth, dry aspect, pale in colour, here and there – in the zones in which additional inflammation was visible – reddish. Also, some fissures were observed here and there.

Figures 1-4 illustrate some objective aspects of the fixed gingiva, of the free gingival margin and of the inter-dental papillae, in frontal, lateral and horizontal plane. Mention should be made of the characteristic aspect of the gingiva, with signs of distrophy.
Figure 5 shows the situation of the deep periodontium, especially of the alveolar bone, the aspect of the interdental and inter-radicular septum being flattened, resorbed, which indicates a generalized horizontal atrophy.

The phenomenon may be especially observed for the frontal maxillary teeth, yet suggestive aspects may be also observed in the frontal mandibular region.

At levels 37, 38, as a consequence of the involution process, some vertical demineralization, vertical resorption and occurrence of a real periodontal pocket of about 6mm may be noticed.

Taking over of the bioptic sample during the subgingival curettage performed at this level was made from this area. The intervention was justified by the presence of the inflammatory pathology at this level, of the periodontal pocket and of the subjective symptomatology.

Analysis of the biopsy punch is presented in the following.

Figure 6 presents a portion of an inter-dental papilla, in HE colouration. One should observe the microscopic architecture of the epithelium with atrophic phenomena, and the presence of an infiltrate with PMN in the chorione. The inflammating infiltrate is better seen in the following image (fig. 7), being evidenced by the specific Van Gieson colouration, where the collegene fibers of the chorione appear in red, intercalated with the cells migrated from the vascular bed.

The reticulin fibers situated in the deep chorione were evidenced through silver impregnation (fig. 8).

The cell stroma appears poor, the amount of basic substance is increased, fibroblastes are atrophic, while the limphocytes show degenerative lesions.

At the level of the gingival chorione, groups of cells with deficit of cytoplasm with heterochromatic nuclei may be observed.
CONCLUSIONS

1. Sexual hormones intervene in maintaining the histological equilibrium of the marginal superficial periodontium, influencing the periodontal health condition and explaining the correlation between the subjective symptomatology specific to the menopause and the histopathological aspect at epithelial level.

2. At the same time, they play an important role in the prevention or treatment of the periodontal maladies caused by menopause, by slowing down the advance of the disease, thus favorizing its curing.

The clinician should be informed on the specific characteristics of this type of patients, for the elaboration of a suitable treatment plan, involving the regenerative aspects and on the prevention of dystrophic phenomena.

References