DIAGNOSTICATION OF PARAPROSTHETIC STOMATITES AND OF STOMATITES WITH CANDIDOSIC ETIOLOGY

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Abstract

Mobile gnatoprosthetic devices solve the problems caused by the morpho-functional recovery of the stomatognat system, even if their application affects the tissues contacting them. In the case in which the injuries produced to the mucous membrane of the prosthetic field exceed the physiological tolerance, various pathological modifications may occur, generically defined as paraprosthetic stomatopathies. Paraprosthetic stomatopathies and their occurrence are varied and their complexity is insufficiently known. The problem of etiopathogeneicity is still to be elucidated, as to the series of unknown quantities caused by the interference of the numerous systemic and local factors, whose individual influence is difficult to state. Several studies have indicated that the lesions of prosthetic stomatites are associated with the detected presence of Candida spp., while other factors, such as local traumatisms, scarce hygiene of the prostheses, systemic maladies and immune deficiencies may be also involved [1,2].

Keywords: Candida spp., stomatitis paraprosthetic

1. INTRODUCTION

Even if prostheses recover the functions of the stomatognat system, affected by partial or total edentation (mastication, physiognomy, fonation, deglutition, homeostasis), application of mobile gnatoprosthetic devices affects the tissues contacting them.

At the level of the oral mucous membrane, a modification frequently associated with the presence of mobile gnatoprosthetic devices is represented by paraprosthetic stomatitis. Insertion of the prosthesis induces an important modification of the microbial flora, the fungi being responsible for the occurrence and manifestation of certain inflammatory lesions [3]. The main causes producing it are the incorrectly realized, too extended prostheses, causing traumatisms by their improper margins, unstable on the prosthetic field, by an insufficient oral hygiene, as well as by ”opportunistic” candidosic infections. The pathogenic action of Candida spp. results from the action of both general and local factors. Most frequently, the etiology of paraprosthetic stomatopathies is viewed as a multifactorial one, the prosthesis being a primary etiological factor contributing to the formation of the bacterial plaque and to the development of an environment favorizing fungi colonies.

The bacteriological and micologic examination (direct microscopy on smears and cultivation on selective media) may correctly establish the microorganisms involved in the installation of stomatopathies in patients with mobile prostheses (Clostridii, anaerobi, fungi).

2. MATERIALS AND METHOD

Diagnosis of paraprosthetic stomatopathies involves several, equally important stages (complete clinical and paraclinical examinations).

A clinical study on the diagnostication of candidosic prosthetic stomatitis was developed on a group of 117 patients (65 women and 52 men) with ages between 48 and 88 years, who addressed the Clinic of Dental Prosthetics of the Faculty of Dentistry, ”Apollonia” University of Iaşi, for stomatological treatments.

The investigation was based on the data obtained from the classical, complete and complex
examination of the patients forming the experimental group: anamnesis, general medical examination, extra and intraoral exams.

The results obtained supported the suspicion of oral candidosis. To confirm the diagnosis, clinical examination was followed by paraclinical, mycological investigations.

3. RESULTS AND DISCUSSION

Anamnesis permitted collecting of all details on the demographic data of the subjects (age, sex), their general personal antecedents and the medicinal treatments they follow prior to or in the moment of their clinical examination, as well as their stomatological antecedents.

In the experimental group here considered, distribution of patients on groups of age (Fig. 1) was the following: 48–54 years – 27, 55–64 years – 39, 65–88 years – 51.

One may observe that most of the patients (43.6%) belong to the IIIrd category of age.

It is important to state the age as, at older ages, neuro-muscular coordination is difficult, the old ones having problems with their new condition, while younger patients adapt themselves more easily to the mobile prosthesis. Also, in aged persons, the oral epithelium is less elastic and dehydrated, while salivary secretion is diminished, so that the mucous membrane is less resistant to mechanical insults.

As to sex distribution, the experimental group was as homogeneous as possible – analysis of patients’ civil data showing that, out of the 117 examined subjects, 65 are women (55.55 %) and 52 (44.44 %) - men (Fig.2).

Table 1 - Systemic diseases

<table>
<thead>
<tr>
<th>No.</th>
<th>Systemic diseases</th>
<th>No. Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardiovascular</td>
<td>69</td>
</tr>
<tr>
<td>2</td>
<td>ENT</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>Rheumatic</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>Digestive</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>Chronic bronchitis</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>Dermatological</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Ophthalmological</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>Neuropsychic</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Diabetic</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>Renal (B)</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Bronchic asthma</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Osteoporosis (F)</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Chronic hepatitis (F)</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>Chronic ethylism (B)</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Brain vascular accident (AVC)</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>BPOC (F)</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Zoster Zone (F)</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Hypercholesterolemia (F)</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Parkinson (B)</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean values of systemic diseases/patient = 1.6
B - diseases present only in men
F - diseases present only in women

As to patients’ drug consumption, the first position is occupied by antihypertensive drugs, in many cases associated (two or even three), followed by diuretic drugs, nonspecific anti-inflammatory drugs, antispastics, antialgic drugs, proton pump inhibitors, choleretic and cholagogue, bronchodilatating drugs, antibiotics, antihistaminic, antidepressive drugs and topic glucocorticoids.

Mention should be made of the fact that the treatment with antibiotics, only occasionally applied, either as auto-medication or following therapeutical schemes recommended by the physician, frequently modifies the existing microbial balance, as it destroys a considerable number of bactera which, normally, prevent the development of *Candida albicans*, permitting an excessive development of fungi. Consequently, in the special trophic conditions of the region, related to the presence of systemic diseases, the symbiotic saprophyte microbes become pathogenic agents, invading the tissues.

Other secondary effects of the administration of the above-mentioned drugs involve reducing of the salivary secretion, which might favorize accumulation of the alimentary rests and, implicitly, a quantitative increase of microorganisms, once known that saliva has a buffer effect in the oral cavity, maintaining an optimum neutral pH.

The personal stomatologic antecedents refer to the stomatological treatments of the patients, special stress being laid on the presence of mobile prostheses, on their age and manner in which they had been accepted.

The clinical intraoral examination oriented on subjective symptomatology evidenced the presence, in the oral mucosa, of lesions characteristic to prosthetic stomatites and oral candidosis:
- erytematous, congestive lesions, localized especially on the palate and edentulous crests, in intimate contact with the totally or partially mobile AGP,
- the presence of volumetric modifications, oedema and hyperplasia, or irritation signs,
- angular cheilites,
- modification of integrity, characterized by the presence of erosions or of ulcerative lesions with marginal or basal localizations.
- white deposits with cheese-aspect, resistant to mechanical removal (*figs. 3 and 4*)

Also, a number of 12 patients (10.25 %) evidenced oral erosions and congestive-type fissures, specific to angular cheilites, at commissure level (*figs. 5 and 6*).
The presence of objective clinical signs was correlated with subjective symptoms (burning, smarting, pruritus, dry mouth, altered taste) identified in some patients during anamnesis.

A careful extra and intraoral examination of the totally or partially mobile gnathoprosthesis apparatus provided information on the local etiological factors responsible for the installation of prosthesis stomatitis (atrophic chronic or chronic erytomateous candidosis) and of angular cheilitis.

Extraoral examination of total prostheses provided information on: time-deteriorated bases, with multiple repairs and linings, correct or insufficient hygiene, appreciated from the presence of plaque and scale deposits, artificial arches.

The intraoral examination also analyzed the various types of edentation, and the presence or absence of prosthetic treatments (table 2, fig.7).

Analysis showed that 53 patients (31 women and 22 men), respectively 45.3% of the subjects forming the experimental group, were carriers of partial and total gnathoprosthetic devices.

Evidencing of the objective signs in the patients with mobile prostheses, and their correlation with the subjective symptoms observed in certain cases, permit classification of lesions in one of the following clinical forms of stomatopathia: erythemato-congestive, generalized erythemato-congestive, ulcerative, marginal hyperplastic or basal hyperplastic.

This symptomatology was identified in 35 patients, which represent about 66% of the subjects with mobile prostheses.

The data obtained by clinical examination were completed and correlated with the results of the mycological analyses of the patients carrying mobile AGP.

<table>
<thead>
<tr>
<th>Type of edentation: treated/un‑treated</th>
<th>Sex</th>
<th>Group of patients</th>
<th>No. on type of edentation</th>
<th>% of the whole group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total non-prosthesized edentation</td>
<td>Female</td>
<td>9</td>
<td>13.84</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>6</td>
<td>11.53</td>
<td>5.12</td>
</tr>
<tr>
<td>Total prosthesized edentation</td>
<td>Female</td>
<td>16</td>
<td>24.61</td>
<td>13.7</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>10</td>
<td>19.23</td>
<td>8.5</td>
</tr>
<tr>
<td>Extended partial non-prosthetic edentation</td>
<td>Female</td>
<td>13</td>
<td>20</td>
<td>11.11</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>11</td>
<td>21.15</td>
<td>9.4</td>
</tr>
<tr>
<td>Fixed prosthesis</td>
<td>Female</td>
<td>14</td>
<td>21.53</td>
<td>11.96</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>11</td>
<td>21.15</td>
<td>9.4</td>
</tr>
<tr>
<td>Mobile prosthesisizing</td>
<td>Female</td>
<td>15</td>
<td>23.07</td>
<td>12.82</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>12</td>
<td>23.07</td>
<td>10.25</td>
</tr>
<tr>
<td>TOTAL ON SEXES</td>
<td>Female</td>
<td>65</td>
<td>100.00</td>
<td>117</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>52</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>TOTAL GROUPS</td>
<td>117</td>
<td>-</td>
<td>100.0</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2 - Types of edentation in the patients of the experimental group
Isolation and identification of Candida strains in the patients with lesions characteristic to prosthetic stomatitis involve the following steps:

- **sample harvesting**;
- **direct examination of the samples**;
- **fungi culture**.

### I. SAMPLE HARVESTING

Samples of saliva or of microbiological material have been collected from the areas with a suggestive clinical aspect: the palatinal mucosa, edentulous crests, gingival mucous membrane, oral comissures.

Harvesting was done in the morning, “a jeune”, after rinsing the mouth with water. In some cases, it also involved the surface of the prostheses (usually the mucous one), a predetermined area of about cca. 2 cm².

The method applied for obtaining samples permitting isolation of the Candida strains present in the oral cavity was the “buffer method”, using harvest sticks with transport tubes for pharyngeal exudates (fig.8).

The sticks were repeatedly (10 times) applied, through either frictioning or scraping over the zone of interest, if deposits were observed. After harvesting, the rod of the buffer was introduced inside the transport tube without touching its walls. Mention should be also made of the fact that the collected samples were sent to the laboratory accompanied by a special bulletin.

### II. DIRECT MICROSCOPY

Direct examination of samples, permitting an initial, rapid orientation as to the diagnosis, may be performed on:

- Fresh preparation;
- KOH-treated preparation;
- Coloured smear.

1) **Examination of the fresh preparations**. A drop of neutral glycerine was poured onto a degreased plate, inside which the wire loop with which the sample had been taken over was introduced. The plate was covered with a clean lamella and examined microscopically, for evidencing the fungi elements characteristic to Candida.

2) **KOH-treated preparations** – employed for a better transparence of the sample. The exam is made between the plate and the lamella, without coloration.

3) **Coloured smears** (e.g. Gram or methylene blue) state the aspect of the fungi put into evidence in the fresh preparations.

In the case of smears prepared for subsequent microscopic analysis, the May Grünwald Giemsa colouration was applied (Fig. 10).
III. SAMPLE CULTIVATION

With a view to limiting bacterial contamination and for optimizing growth (as, actually, it inhibits multiplication of contaminating bacteria), the medium employed was *Sabouraud Agar with Chloramphenicol*.

The aspect of the solid Sabouraud medium poured into Petri plates for isolating fungi through surface impregnation is a gelosis, yellow-brown in colour one (fig. 2.9).

Prior to impregnation, the Petri boxes prepared for this operation were left 2 hrs at room temperature, as impregnation at cold might prolonge the time of yeast growing. Striating was done on the surface of the culture medium, without affecting its integrity.

**Incubation of samples** – mention should be made of the fact that a temperature of 35-37°C favourizes yeast development or conversion of dimorphous fungi into yeasts, while a temperature of 25-30°C is optimum for most of the pathogenic fungi. The incubation period ranges frequently between 48 and 72 hrs, sometimes being prolonged up to 7 days.

**Culture examination**

The Petri plates were incubated at a temperature of 36 °C ± 1°C, for 48 – 72 hrs. The Petri boxes which, when the incubation interval was over, showed a minimum number of 50 colonies with the same morphology, were considered positive, while those with a number of colonies < 50 were appreciated as porting and not as a levuric infection.

Worth mentioning is the fact that some sources indicate that the samples developing < 30 colonies, in the case of normal patients, and < 49 colonies, respectively, in those having mobile prostheses, represent the condition of fungal porting.

Also present have been samples which, after impregnation and incubation, developed a very low number of colonies (< 10) or none, so that the result obtained was a negative one.

**Macroscopic examination of colonies**

The colonies developed on the Sabouraud culture medium were examined as to their cultural characteristics starting with the third day of their impregnation, their form, colour, size and aspect being analyzed.

The white-yellowish, glossy, creamy colonies smelling like yeast have been identified as *Candida albicans* (fig. 11).

![Fig. 11 - Candida albicans growth](image1.png)

According to the data listed in table 3, the micological exam was positive in **56.6 %** of the patients carrying totally or partially mobile prostheses.

The incidence of mycotic stomatitis is higher in women than in men, the causes being the following:

- vulnerability of the oral mucous membrane to the external aggressive factors, resulting from the negative influence of the reduced estrogen secretion at menopause, which determines the atrophy of the oral mucous membrane;
- the higher prevalence of mobile prostheses in women than in men.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. patients with mobile prosthesis</th>
<th>Mycological examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>nr.</td>
<td>%</td>
</tr>
<tr>
<td>Women</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td>Men</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>Total group</td>
<td>53</td>
<td>14</td>
</tr>
</tbody>
</table>

**Table 3 – Results of the Mycological examination**

In 8 patients, candidosic angular cheilitis was associated with candidosic stomatitis (26.66% of cases) while in 2 cases, even if lesions characteristic to angular cheilitis (eritematous fissures at commisure level) were observed, the candidosic nature was not confirmed in the laboratory.

Even if, usually, angular cheilitis is associated with intraoral candidosic infections, other factors may be also involved in its etiology, such as staphylococci and streptococci, or deficiencies of Fe, folic acid or vitamin B<sub>12</sub>. The cases of
non-candidosic angular cheilitis require additional investigations for the possible identification of some systemic causes.

Two other cases of angular cheilitis should be also mentioned, even if the patients had not mobile AGP, having reduced DVO, caused by general abrasion.

4. CONCLUSIONS

1. The micological exam performed for establishing the final candidosic etiology of prosthetic stomatitis involves several stages, absolutely necessary for a correct diagnosis:
   - Samples taking over by the “buffer” method, utilizing harvest sticks with transport tubes;
   - Direct microscopy;
   - Cultivation of the collected samples on an Agar Sabouraud medium inhibited with Cloramfenicol.

2. Candidosic etiology of prosthetic stomatitis appears in 56.6% of cases, an incidence explainable by the presence of a vulnerable space, affected by several systemic diseases and by the quite old age of the group.

3. The incidence of oral candidosis is higher in women, comparatively with men.

4. Angular cheilitis occurred in 10.25% of the patients (12 cases), but the mycological exam was positive only in 8 cases.

References