ORAL MANIFESTATIONS IN IRON DEFICIENCY ANEMIA: CASE REPORTS

Mihaela Florina Loredana Cojanu,[1a*] Dana Nicoleta Antonescu,[1b] Iulia Constantinescu,[2c] Anca Săsăreanu,[3d] Sabina Andrada Zurac[4e]

[1]Department of Restorative Odontotherapy, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy Bucharest, Bucharest, Romania
[2]Department of Hematology, National Institute of Transfusion Hematology "Prof. Dr. C. T. Nicolau", Bucharest, Romania
[3]Department of Hematology, Institute of Oncology "Prof. Dr. Alexandru Trestioreanu", Bucharest, Romania
[4]Department of Pathology, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy Bucharest, Bucharest, Romania

[a,b]DMD, Clinical Assistant
[c,d]DMD
[e]DMD, Professor

Received: June 01, 2017
Revised: June 15, 2017
Accepted: June 29, 2017
Published: June 30, 2017

Academic Editor: Constantinus Politis MD, DDS, MM, MHA, PhD, Professor & Chairperson, Oral and Maxillofacial Surgery, University Hospitals Leuven, KU Leuven, Leuven, Belgium

Cite this article:
Cojanu MFL, Antonescu DN, Constantinescu I, Săsăreanu A, Zurac SA. Oral manifestations in iron deficiency anemia: case reports. Stoma Edu J. 2017;4(3):114-125.

ABSTRACT **DOI: 10.25241/stomaeduj.2017.4(2).art.4**

The aim of this work is to reveal the clinical, radiological, immunological, cytological, microbiological and histopathological manifestations of oral pathology taking the form of sideropenia, correlations and interdependence.

Summary: During a four-years period a study was conducted on patients with different clinical forms of iron deficiency anemia (IDA) and the prevalence of oral diseases in those patients was highlighted. This paper discusses 24 case results and presents two clinical cases, patients with iron deficiency anemia (by: metrorrhagia, deficiency, gingiva bleeding, colon cancer) and oral symptoms associated. The results are meaningful and applicable to the whole group studied. Sampling was done according to the directions of interest in the study regarding: sex, age, the type of anemia, dental and periodontal lesions.

Key learning points: The originality of the study lies in the association of specific examination of the oral cavity with the investigations used in other medical specialties, which led to the creation of a more accurate diagnosis and the establishment of a connection (sometimes specific issues) between oral diseases and systemic disease, represented in this study by various forms of sideropenia.

Keywords: oral medicine, iron deficiency anemia, sideropenia, dental and periodontal manifestations.

1. Introduction

Anemia represents a world wide health problem which affects both developing and developed countries. It affects all groups of age. Globally 24.8% of the population reveal anemia, in Europe the percentage being 22.9%. Approximately half of the cases with anemia are due to iron deficiency.[1,2]
Anemia may be classified clinically, morphologically, erythro-kinetic and etio-pathogenic.
The clinical classification is associated with decreased levels of hemoglobin and/or a decreased packed red cell volume (hematocrit).[3,4]
Iron deficiency is also characterized by a reduced value of the mean corpuscular volume (MCV) and the mean corpuscular hemoglobin concentration (MCHC), caused by lack of iron.[1]
Grading:
- Mild anemia: Hb 11-9 g/dl, Hct 39-30%;
- Moderate anemia: Hb 9-7 g/dl, Hct 30-22%;
- Severe anemia: Hb 7-3 g/dl, Hct 22-10%.[14]

The purpose of this paper developed on patients with IDA, in collaboration with the "Prof. Dr. C.T. Nicolau" National Institute of Transfusion Hematology, is to identify and describe oral manifestation that occurred and also to establish immunoserological values, histopathological, microbiological and cytological aspects associated.

2. Methodology

Clinical examination determined intraoral assessment of mucosa, periodontium and caries lesions. Detection of caries involved both clinical (visual and tactile) and radiographic examination. Evaluation of the periodontium consisted of clinical assessment of attachment levels, bone topography (radiographs evaluation) and tooth mobility; inflammatory status of the tissue, tissue color, texture, contours, edema and sulcular exudates was also noted.

***Corresponding author:**
Clinical Assistant Mihaela Florina Loredana Cojanu, DMD
Department of Restorative Odontotherapy, Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy Bucharest, Bucharest, Romania, 17-23 Plevnei Street, Bucharest, 1 District, RO-010232 Romania, Tel: +40722766503, Fax: 021.315.85.37, e-mail: loredana.cojanu@gmail.com; lory_cojanu@yahoo.com.

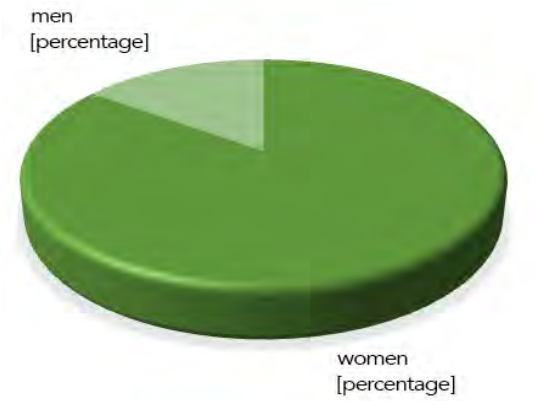


Figure 1. Sex prevalence of IDA.

Figure 2. Oral manifestations among patients diagnosed with iron deficiency was 77,55%.

Biological samples were taken from gingival sulcus or periodontal pockets. After the MGG (May-Grünwald-Giemsa) staining cytologic microscopic aspects were observed. The samples obtained were also cultivated on specific medium and bacterial growth characteristics were observed. Cell staining is a necessary and useful technique to visualize morphology and structure of cells. Serology was used to establish Complement and Immunoglobulin levels. Gingival biopsy was performed, fixation and sectioning of the tissues. A solution of paraformaldehyde was used to fix tissues. IHC is an excellent detection technique and has the advantage of being able to show exactly where a given protein is located within the tissue examined, in our cases gingival chorion and epithelium. The markers used were: CD1a, CD2O, CD3, CD4, CD5 corion, CD7 corion, MPO, CD138, S100, SMA, ki67, p63, p53, AE1-AE3, CD31 and CD34.

This prevalence study was carried on a number of 40 patients with various degrees of iron deficiency anemia – 34 females and 6 males (Fig. 1), between 16 and 82 years of age and revealed, 24 patients with dental and periodontal lesions, gingiva inflammation in 7 patients and lack of symptoms on 9 of the cases (Fig. 2).

The main factors involved in developing caries are: dental structures, the plaque and diet influenced by the immune system, saliva, timing and topical

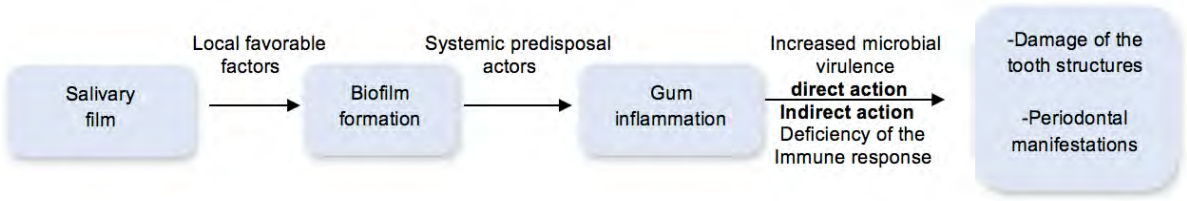


Figure 3. Ethological factors influencing the development of caries process and periodontal diseases.

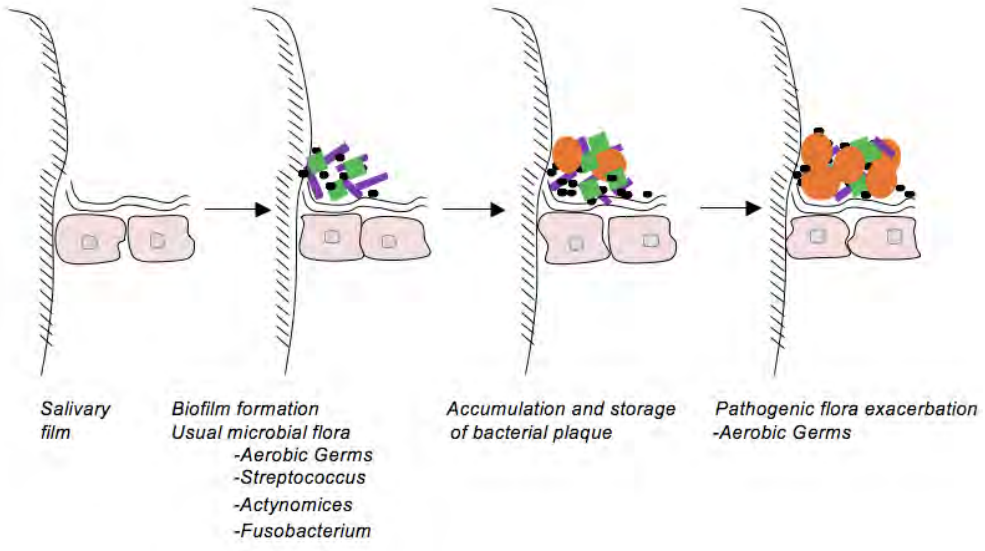
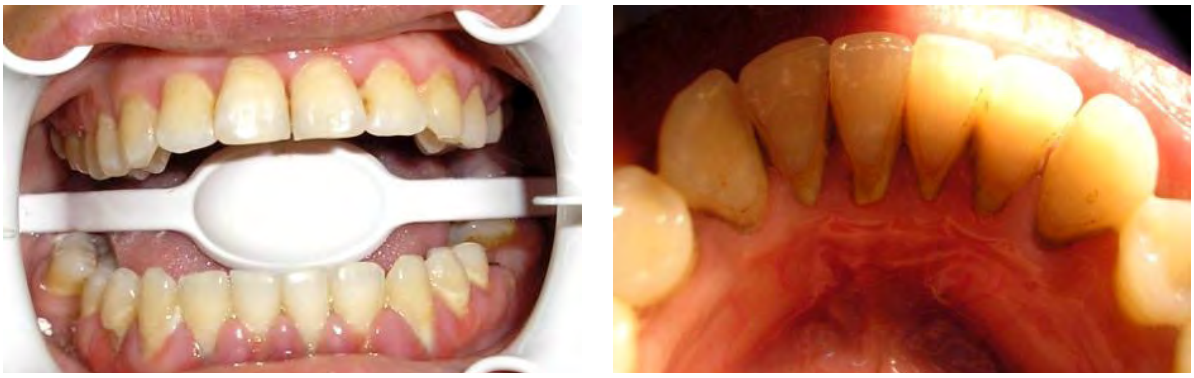


Figure 4. Emergence of salivary biofilm with the development of common microbial flora and exacerbation of the pathogen flora under the action of systemic predisposing factors.



a. b.

Figure 5. Chronic marginal periodontitis, active approximal and cervical caries lesions: a. facial aspect; b. lingual aspect.

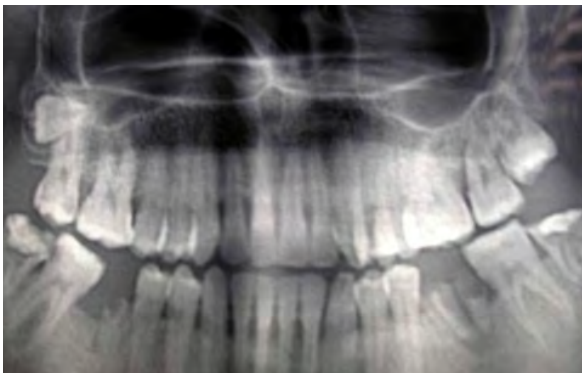


Figure 6. Panoramic image.

fluoride. In addition, there are general factors such as: education, socio-economic status, behavior, health attitude, income. When one of the risk factors increases, it produces an imbalance, leading to caries (Fig. 3).[5,6,7]

The most complex and accessible microbial ecosystem of the human body lies in the oral cavity, there are about 700 species of known bacteria, at least 30 species of fungi (especially Candida) and several species of protozoa (associated with food bacteria) and some intracellular viruses.[8,9,10,11]

In a healthy oral cavity, what is normally found is between 20-50 bacterial species, the number going up to 200-400, in case of disease. These microorganisms are always found in communities and vary with the cavity environment.[12,13,14] The dental surfaces and the mucosa are the areas of microbial colonization. The constant production of saliva and the intermittent food feeding with sugars and amino acids generate nutrients for microbial growth.[15]

The increased number of microorganisms, their development on a favorable ground and the association with the inflammatory response of the host are responsible for caries development under the plaque (Fig. 4).[16,17]

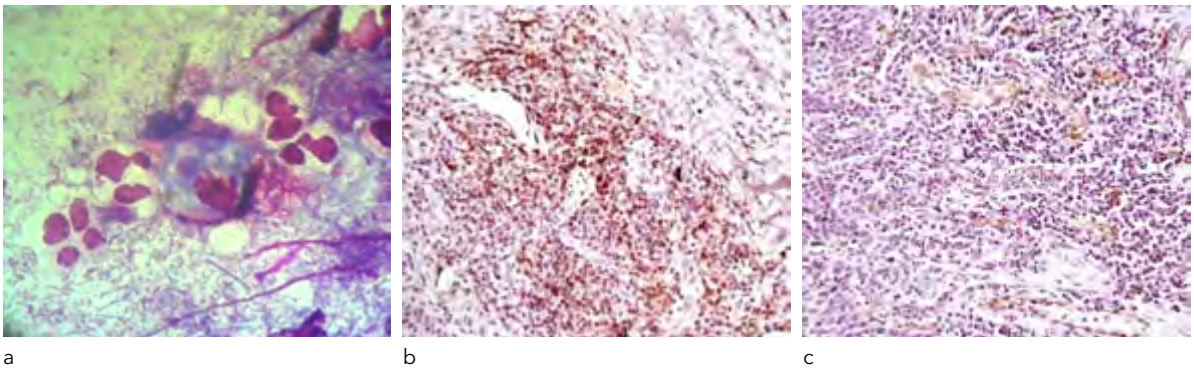
Immunity is the ensemble of humoral and cellular, specific and nonspecific factors, which protect the human body against infectious diseases, parasites aggressions and malignant proliferation. The presence of microorganisms and their products initiating and producing caries causes an immunity response based on specific and nonspecific factors.[18,19,20]

A systemic disease can influence the effectiveness of the immunity response which can lead to an intense microbial activity consequently with dental or periodontal manifestations.

3. Cases reports

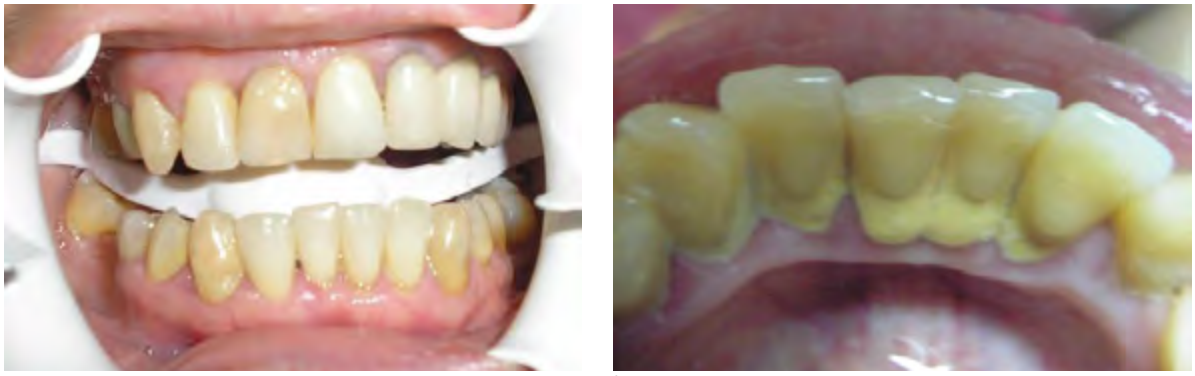
3.1. Case no. 1: M.Ş., f, age 25

3.1.1. Oral diagnosis – active approximal caries: mesial on 12 and 22; cervical caries



a b c

Figure 7. Laboratory aspects: a. inflammatory infiltrate, macrophages, frequent cocci, bacilli, candida filaments; b. abundant inflammatory infiltrate in the corion (IHC-CD3); c. mild vascular hyperplasia (IHC-CD34).



a b

Figure 8. Chronic periodontitis, active cervical lesions: a. facial aspect; b. lingual aspect.

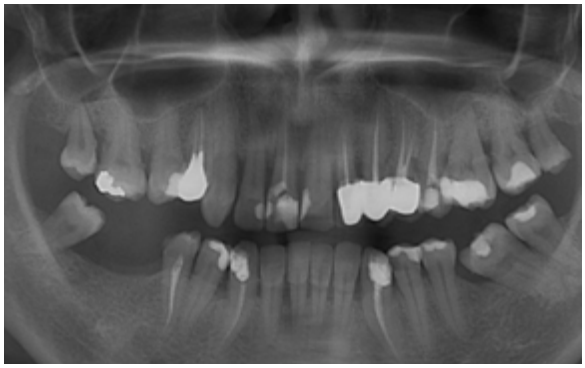


Figure 9. Radiograph aspect – horizontal bone atrophy with localized vertical resorption.

lesions distal on 43 and 44, facial on 45; chronic marginal periodontitis. The exam of the marginal periodontium revealed: calculus index 34.48 percent; gingival inflammation index 11.20 percent; periodontal inflammation index 6.03 percent; periodontal pockets with dimensions between 3-4 mm; gingiva color changed, from light red to brick red, with a bordure periphery area (lisere) and ulceration areas; bleedings at slight touch; the periodontal chart revealed slight gingiva recession at the level of the front inferior incisive, periodontal pockets in 11. 12. 15. 27. 33. 42. 43. 44. 45 and slight dental mobility (first degree) at the inferior incisive (Fig. 5-a; b).

3.1.2. Hematologic diagnosis – iron deficiency anemia due to metrorrhagia: HGB 10.47 g/dL; HCT 33.75 %; RBC 3.61 10^6/µL; MCV 79 fL; Fe 23 µg/dL.

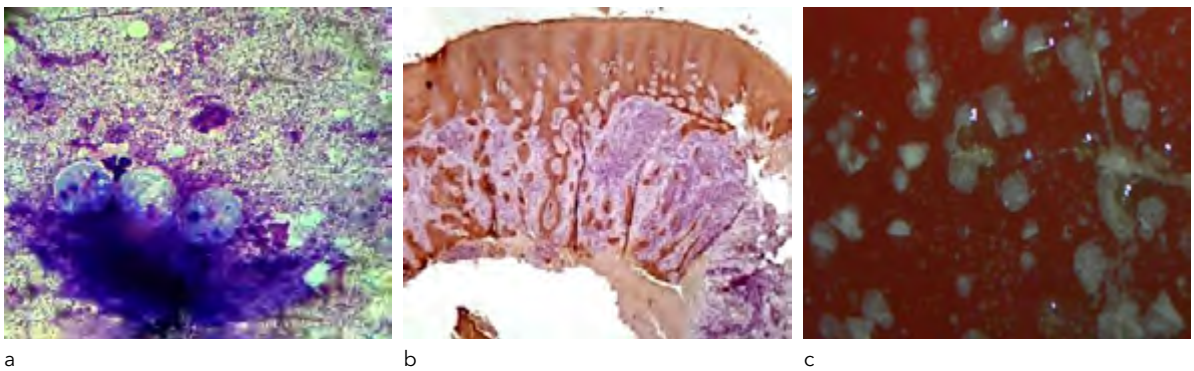
Complementary exams: radiological, cytological, immunohistochemical, microbiological, immuno-serological.

3.1.3. Serology – slight modification: CRP 3.0 g/dL; IgA 3.63 g/L; IgG 11.84 g/L; IgM 1.82 g/L; C3 1.2 g/L; C4 0.4 g/L.

3.1.4. Radiological – generalized horizontal minimal bone loss; radiotransparency with different site: cervical on 43.44.45; approximately on 47 and 48; vertical bone resorption on 13 (Fig. 6).

3.1.5. Cytologic appearance: microbial loaded epithelial cells were observed interspersed in a background of inflammatory cells: macrophages, granulocytes, lymphocytes with microbial elements: cocci, diplococci, Treponema denticola, fusobacterium, yeasts (Fig. 7-a).

The histopathologic examination revealed fragments of squamous mucosa with prominent acanthosis with irregularly elongated epithelial cristae and abundant inflammatory lymphoplasmacytic infiltrate in lamina propria. Moderate edema within the lamina propria and moderate epithelial spongiosis were noted; focally, erosive and ulcerative areas were present (Fig. 7-b; c).



a b c

Figure 10. Laboratory aspects: a. inflammatory lymphoplasmocytic infiltrate with macrophages loaded with germs; b. acanthotic squamous epithelium with important elongation of the interpapillary cristae and abundant chronic infiltrate in corion; islands of odontogenic epithelium in corion; c. aerobic macroscopic aspect.

3.2 Case no. 3: S. M., f, age 41

3.2.1. Oral diagnosis – on teeth diagram: active cervical lesions on 13.31.41 and 43; arrested brown lesions on 37 and 48; on periodontal chart: chronic periodontitis with calculus index of 25.89%; gingival inflammation index of 10.71%; periodontal inflammation index of 7.14%; generalized gingiva retraction, with Stillman's clefts on 16.26; seropurulent exudate when exercising pressure on the sides of the periodontal pockets at 13.12.23.37.43.44; bleedings on gingival pressure level of the inferior front incisive; moderate dental mobility (second degree) (Fig. 8-a; b).

3.2.2. Hematologic diagnosis – iron deficiency anemia: HGB 10.8 g/dL; HCT 38 %; RBC 4.79 10^6/µL; MCV 73.1 fL; Fe 21 µg/dL.

Complementary exams: radiological, cytological, immunohistochemical, microbiological, immuno-serological.

3.2.3. Serology – increase of the IgM: CRP 5.5 g/dL; IgA 1.93 g/L; IgG 12.4 g/L; IgM 2.40 g/L; C3 1 g/L; C4 0.2 g/L.

3.2.4. Radiological – general horizontal bone minimal loss; proximal demineralization on 34 and recurrent caries lesion under restoration on 37 (Fig. 9).

3.2.5. Cytology – microbial loaded macrophages, mixed cellular component (epithelial and conjunctive), cocci, bacilli, candida filaments (Fig. 10-a).

3.2.6. Histopathologic appearance: squamous mucosa with hyperkeratosis with parakeratosis, acanthosis, diffuse spongiosis; mild lymphoplasmocytic inflammatory infiltrate, mild hyperemia and important interstitial edema within the corion; minute remnants of odontogenic epithelium are identifiable within the corion (Fig. 10-b).

3.2.7. Microbiological – on a rich macrophages inflammatory infiltrate ground, intercellular cocci and bacilli phagocytosis, the presence of some large, creamy, half-transparent colonies belonging to Gram-negative bacteria, considered as Klebsiella was noticed (Fig. 10-c). Also, smaller colonies, also with mucoid aspect, that could be considered by their aspect, as belonging to the germs of Pseudomonas sp. Colony culture anaerobically developed revealed a very abundant growth, non differentiated regarding the aspect of the colonies; the colonies were in confluence, creating a creamy aspect and above them some other types of colonies developed with different forms and aspects, difficult to identify.

4. Results

4.1. Oral aspects

The study noticed the following by clinical examination, periodontal chart and radiographs on patients: active caries lesions; arrested brown lesions; defective restoration; cervical lesions; fissures; tooth fractures; matte white active cervical lesion; secondary caries; plaque and calculus; general marginal gingivitis; chronic periodontitis; aggressive periodontitis with localized and general bone loss. Gathering this information, a graphic image of the oral manifestations distribution in associated systemic disease (IDA in these cases) was obtained (Fig. 11).

4.2. Immunohistochemical analysis

On the patients included in the studied lot gingival biopsy was performed. The harvest was made from the affected periodontal structure. The iron deficiency anemia from metrorrhagia (13 cases) is characterized by: 5 cases with lack of T helper cells and PMNs, 3 cases with absence of T helper cells, 1 case with absence of PMN, frequent Langerhans cells, T and B lymphocytes in 4 cases. The following was noticed with respect to IDA (11 cases): the absence of T helper cells in 2 cases, the absence of PMNs in 3 cases and in 4 cases the absence of both T helper cells and PMNs. In 2 cases frequent Langerhans cells, melanocytes and B-lymphocytes were noticed (Table 1).

The 24 patients with dental and periodontal manifestations showed: the absence of T helper cells and PMNs in 9 cases; PMNs absence in 4 cases and in 5 cases the absence of T helper cells (which implies the lack of bacterial component in 13 cases, as well a decrease of the cellular immune line in 14 cases); frequent Langerhans cells, T and B lymphocytes in 6 cases (Fig. 12).

4.3. Serology

Generally, in the case of anemia there are no patent systematic changes of immunoglobulin and/or Complement, and, when present, there is an associated cause (Table 2).

This study showed:

- high levels of IgM (associated to dental and periodontal manifestations) in 2 cases;
- decreased IgG level in 2 cases (possibly due to hypogammaglobulinemia);
- low values of C3 (due to chronic periodontics infections) in 6 cases;
- decreased C4 in 2 cases (SLE, macrophages iron storage) (Fig. 13).

4.4. Microbiology

Samples were taken from gingival sulcus or periodontal pockets. After the Gram staining, bacterial cultures were obtained. Bacterial investigations were limited, due to the given conditions of their metabolical cultivation and activity testing. A series of observations started from lesion peculiarities of some of the cases. The investigation was limited only to morphology and characteristics of the cultivation of the growth of the respective bacteria, in aerobic and anaerobic environment. A rich bacterial polymorphism was found, which could not be significantly correlated with the lesion aspects encountered. Among the isolated major groups, the following can be mentioned: Gram positive cocci from Micrococcus

sp. and Staphylococcus sp. genres (nonhemolytic); Klebsiella Gram negative bacillus (colonies with characteristics: big, mucoid); spiral shape bacteria and morphological aspects specific for yeasts, labeled as Candida. It should have been surely necessary to expand the bacterial investigations with molecular biology tests. There are studies about the preponderance of some bacteria from the genres of: Actynomices sp.; Fusobacterium nucleatum; Bacteroides sp.; Prevotella intermedia, Aggregatibacter actynomicetemcomitans; Porphyromonas gingivalis; Tannerella forsythia; Treponema denticola; Prevotella intermedia; Fusobacterium nucleatum; Eikenella corrodens; Eubacterium nodatum; Peptostreptococci; Selenomonas noxia; Capnocitophaga; Klebsiella, more frequently met in caries and periodontal pathology.[13] From the group of aerobic and anaerobic bacteria cultures were developed, whose cultivation rate suggested the presence of certain bacterial groups. Seven of the cases indicated the presence of homogeneous cultures, especially of positive gram cocci, which can be associated with the aggressiveness of ecological dominance, selected under the action of local pressure factors and even constitutional general factors (anemia determines growth in monocultures). The frequent cultures were the associated ones, associations of at least 2 bacterial groups, which could have been distinguished through their morphological characteristics. In one single case, the presence of Candida was identified, frequently mentioned in oral conditioned pathology, associated with small, round scattered colonies, with homogeneous shape and dimensions, which suggests a bacterial presence. The presence of a polymorph microbial flora correlated with the dental and periodontal affections was also found.

4.5. Cytology

Gathering samples at the level of gingival sulcus and periodontal pockets from the studied patients revealed:

- The morphology of exfoliating cells in the inflammatory process (hyperplasia, parakeratosis, hyperkeratosis and acanthosis), epithelial cells microbial filled, with a various flora: cocci, bacilli, candida filaments, fusobacterium species;
- The presence of inflammatory infiltrate of several types of cells (neutrophils, monocytes, lymphocytes, leukocytes, macrophages) histiocytic proliferation; morphologic and erythrokinetic characteristics of the cellular factors of the immunity system were correlated with the type of anemia (acquired or genetic);
- Microbial polymorph flora characteristic to the acute or chronic degree of dental and periodontal manifestations (coccus Gram positive, bacillus Gram negatives, fusobacterium spp., candida filaments).

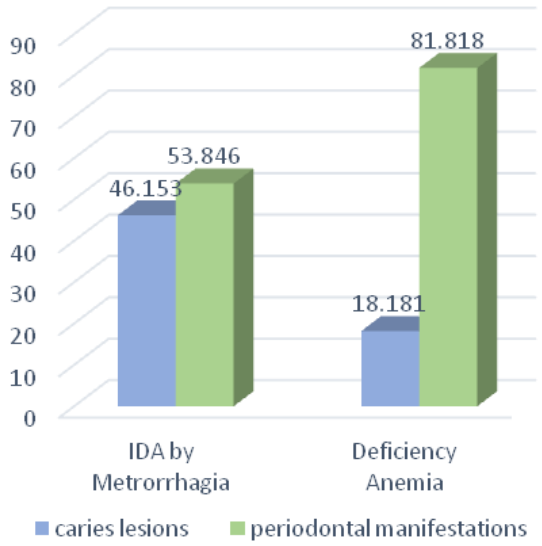


Figure 11. Distributiom of dental and periodontal manifestations in types of anemia.

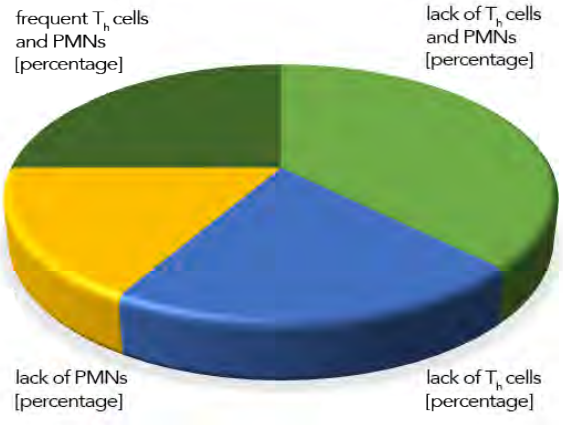


Figure 12. Graphic representation of cases with low cellular defense.

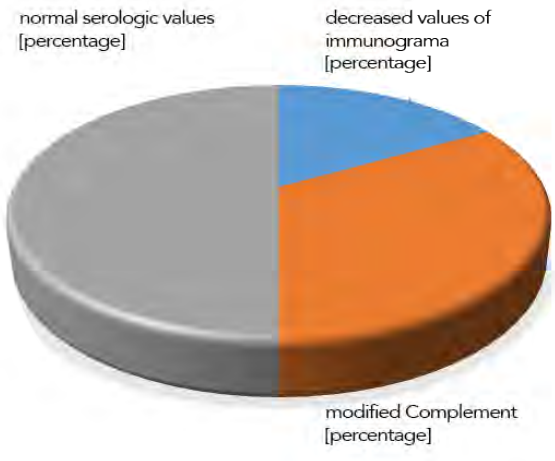


Figure 13. Immunogram graphic representation.

Table 1. Specific markers values on patients with IDA and oral manifestations

No.	Name	Sex	Age	Hematologic diagnosis	Etiology of anemia	Oral diagnosis
1	L.A.	F	25	IDA	Chronic gastrointestinal blood loss	Chronic gingivitis Numerous stained class 5 caries lesions
2	E.R.	F	35	IDA Colon cancer	Chronic gastrointestinal blood loss	Chronic gingivitis Cervical lesions consistent with brown arrested lesions
3	G.I.	F	32	IDA	Metrorrhagia	Chronic gingivitis Cavitated active cervical lesions
4	P.D.	F	35	IDA	Metrorrhagia	Chronic gingivitis Matte, white, active cervical lesions
5	I.F.	F	29	IDA	Metrorrhagia	Generalized marginal gingivitis Multiple adjacent defects that fit the description of abfraction lesions
6	M.Ş.	F	39	IDA	Metrorrhagia	Chronic marginal periodontitis Active approximal and cervical caries lesions
7	N.V.	F	35	IDA	Metrorrhagia	Chronic marginal periodontitis Multiple active caries lesions
8	Ş.G.	F	30	IDA Thrombocytopenia	Metrorrhagia	Chronic marginal periodontitis Extensive active caries
9	Ş.A.	F	25	IDA	Metrorrhagia	Chronic marginal periodontitis Active recurrent caries lesions
10	C.A.	F	30	IDA	Metrorrhagia	Chronic marginal periodontitis Smooth surface caries lesions presenting microfractures in the surface
11	C.V.	F	27	IDA	Metrorrhagia	Chronic gingivitis active root-surface caries lesions
12	T.A.	F	34	IDA Systemic lupus erythematosus	Metrorrhagia Chronic inflammation	Chronic periodontitis Inactive or arrested caries lesions
13	T.C.	F	28	IDA	Metrorrhagia	Chronic periodontitis Cavitated active cervical lesions
14	B.L.	F	21	IDA	Deficiency	Aggressive periodontitis Extensive active cervical caries
15	B.R.	M	22	IDA	Deficiency	Chronic gingivitis Matte, white, active cervical lesions
16	V.M.	F	26	IDA	Deficiency	Chronic gingivitis, Arrested lesions and active localized caries
17	G.C.	F	25	IDA	Deficiency	Chronic periodontitis Arrested caries lesions
18	M.R.	F	23	IDA	Deficiency	Chronic periodontitis Arrested non-cavitated lesions
19	I.B.	F	20	IDA	Deficiency	Aggressive periodontitis, Extensive active root-surface caries lesions
20	R.A.	M	29	IDA	Deficiency	Chronic periodontitis Non-cavitated lesions and fissures
21	S.A.	F	43	IDA	Deficiency	Chronic periodontitis, Active caries lesions with small and large cavities
22	R.M.	F	31	IDA	Deficiency	Chronic periodontitis generalized Cavitated lesions
23	I.M.	F	24	IDA	Deficiency	Chronic periodontitis Active discolored lesions
24	S.M.	F	41	IDA	Deficiency	Chronic periodontitis Active cervical lesions

SMA	S100	S100	CD20	Plasmatic cells	CD4	MPO chorion	MPO epith	CD3 chorion	CD3 epith	CD5 chorion	CD5 epith	CD7 chorion	CD7 epith
gran tissue	2	2	1	1	1	1	1	2	1	2	1	1	1
-	1	1	1	1	1	1	1	2	1	2	1	1	1
-	1	1	-	-	0	0	0	0	1	1	1	1	1
-	1	1	2	1	0	1	0	2	1	1	1	1	1
gran tissue	1	1	-	-	0	0	0	0	0	0	1	-	-
gran tissue	1	1	1	2	0	2	1	1	1	2	1	1	1
gran tissue	1	1	1	1	1	0	0	2	1	2	1	1	1
-	1	1	1	2	0	1	1	2	1	2	1	1	1
-	2	2	1	1	0	1	1	1	1	1	1	1	1
-	2	2	-	-	0	1	0	1	1	2	1	1	1
gran tissue	1	1	-	-	1	1	0	2	1	1	1	1	1
-	1	1	1	1	1	1	2	2	2	2	1	1	1
gran tissue	1	1	-	-	1	2	2	2	1	2	1	1	1
gran tissue	2	2	1	2	0	2	1	1	1	1	1	1	1
-	2	2	-	-	0	0	0	2	1	2	1	1	1
-	1	1	2	1	1	-	-	-	-	-	-	-	-
gran tissue	1	1	1	1	0	2	1	1	1	1	1	1	1
-	1	1	2	1	1	1	0	1	1	1	1	1	1
-	2	2	2	1	1	1	0	2	1	1	1	1	1
-	2	2	1	1	0	1	0	2	1	2	1	1	1
-	2	2	-	-	1	0	0	2	1	1	1	1	1
-	1	1	-	-	1	1	0	2	1	1	1	1	1
gran tissue	1	1	1	1	1	1	2	1	1	1	1	1	1
-	1	1	1	1	0	1	0	2	1	2	-	-	-

Table 2. Serological values on patients with IDA and oral manifestations.

No.	Name	Sex	Age	Hematologic diagnosis	Etiology of anemia	Oral diagnosis
1	L.A.	F	25	IDA	Chronic gastrointestinal blood loss	Chronic gingivitis Numerous stained class 5 caries lesions
2	E.R.	F	35	IDA Colon cancer	Chronic gastrointestinal blood loss	Chronic gingivitis Cervical lesions consistent with brown arrested lesions
3	G.I.	F	32	IDA	Metrorrhagia	Chronic gingivitis Cavitated active cervical lesions
4	P.D.	F	35	IDA	Metrorrhagia	Chronic gingivitis Matte, white, active cervical lesions
5	I.F.	F	29	IDA	Metrorrhagia	Generalized marginal gingivitis Multiple adjacent defects that fit the description of abfraction lesions
6	M.Ş.	F	39	IDA	Metrorrhagia	Chronic marginal periodontitis Active approximal and cervical caries lesions
7	N.V.	F	35	IDA	Metrorrhagia	Chronic marginal periodontitis Multiple active caries lesions
8	Ş.G.	F	30	IDA Thrombocytopenia	Metrorrhagia	Chronic marginal periodontitis Extensive active caries
9	Ş.A.	F	25	IDA	Metrorrhagia	Chronic marginal periodontitis Active recurrent caries lesions
10	C.A.	F	30	IDA	Metrorrhagia	Chronic marginal periodontitis Smooth surface caries lesions presenting microfractures in the surface
11	C.V.	F	27	IDA	Metrorrhagia	Chronic gingivitis active root-surface caries lesions
12	T.A.	F	34	IDA, Systemic lupus erythematosus	Metrorrhagia Chronic inflammation	Chronic periodontitis Inactive or arrested caries lesions
13	T.C.	F	28	IDA	Metrorrhagia	Chronic periodontitis Cavitated active cervical lesions
14	B.L.	F	21	IDA	Deficiency	Aggressive periodontitis Extensive active cervical caries
15	B.R.	M	22	IDA	Deficiency	Chronic gingivitis Matte, white, active cervical lesions
16	V.M.	F	26	IDA	Deficiency	Chronic gingivitis Arrested lesions and active localized caries
17	G.C.	F	25	IDA	Deficiency	Chronic periodontitis Arrested caries lesions
18	M.R.	F	23	IDA	Deficiency	Chronic periodontitis Arrested non-cavitated lesions
19	I.B.	F	20	IDA	Deficiency	Aggressive periodontitis Extensive active root-surface caries lesions
20	R.A.	M	29	IDA	Deficiency	Chronic periodontitis Non-cavitated lesions and fissures
21	S.A.	F	43	IDA	Deficiency	Chronic periodontitis Active caries lesions with small and large cavities
22	R.M.	F	31	IDA	Deficiency	Chronic periodontitis generalized Cavitated lesions
23	I.M.	F	24	IDA	Deficiency	Chronic periodontitis Active discolored lesions
24	S.M.	F	41	IDA	Deficiency	Chronic periodontitis Active cervical lesions

Serum immunoglobulins			Complement		
IgA	IgG	IgM	C3	C4	CRP
325	1401	102	100	14,3	++
133	876	70	60	20	++
158	1450	234	110	30	++
228	1010	65	123	23,2	++
192	1500	142	140	20	-
363	484	182	120	40	++
166	1100	124	100	60	++
205	1100	150	130	30	++
255	1030	496	110	20	++
372	1060	124	80	30	++
332	1250	120	70	30	++
77	1540	108	126	14,3	-
274	1160	123	110	30	-
184	1002	100	110	50	++
185	1210	90	110	20	-
78	1220	129	100	20	++
144	983	182	110	40	++
156	1410	176	100	30	++
136	68	154	160	40	++
271	1210	122	90	30	++
158	1340	168	70	30	-
164	1200	122	90	30	-
216	1230	139	110	20	++
193	1240	240	100	20	++

5. Conclusions

- The microbial macroscopic determinations showed species of: Streptococcus mutans, Lactobacillus, Porphyromonas gingivalis, Tannerella forsythia etc. correlated with the degree of impairment of the oral structures;
- The evolution of the caries and other oral manifestations can be slow or rapid depending on the patient's background, the microbial component and the systemic factors (anemia in this case), which can change the general state;
- A reduced or abundant inflammatory polymorphous infiltrate was also revealed, depending on the degree of the inflammation and tissue destruction (neutrophils, macrophages, histiocytes, lymphocytes, plasma cells) and also related to the epithelial alterations (hyperplasia, acanthosis, parakeratosis);
- The immunohistochemical exam showed a chronic inflammatory process consisting of numerous T cells (pan T markers CD3 and CD5 positive) retaining CD7 expression and belonging mostly to T helper phenotype (CD4+). inflammatory infiltrate includes also B-lymphocytes (expressing CD20), neutrophils, Langerhans cells (expressing CD1a and S100); it also revealed a moderate vascular hyperplasia with significant angiogenesis (revealed with CD34 marker);
- The immunoserological exam demonstrated modifications of the Immunogram values and of the Complement system; these findings are not characteristic for the systemic affection, but for infections;
- The results lead to a better understanding of the determining factors of oral pathology (in clinical types of anemia); further studies involving larger groups of subjects are necessary in order to definitely establish a causal relation between these entities.

Acknowledgments

The authors declare no conflict of interest related to this study. There are no conflicts of interest and no financial interests to be disclosed.

References

1. Greer JP, Arber DA, Glader B, et al. Editors. Wintrobe's clinical hematology, 13th Edition. Philadelphia, PA: Lippincott, Williams & Wilkins; 2009. Google Scholar(4115)
2. Nørskov-Lauritsen N, Kilian M. Reclassification of Actinobacillus actinomycetemcomitans, Haemophilus aphrophilus, Haemophilus paraphrophilus and Haemophilus segnis as Aggregatibacter actinomycetemcomitans gen. nov., comb. nov., Aggregatibacter aphrophilus comb. nov. and Aggregatibacter segnis comb. nov., and emended description of Aggregatibacter aphrophilus to include V factor-dependent and V factor-independent isolates. Int J Syst Evol Microbiol. 2006;56(Pt 9):2135-2146. doi: 10.1099/ijs.0.64207-0 [Full text links] [PubMed] Google Scholar(245) Scopus(127)
3. Bach J-F, Lesavre P. [Immunology] French. Paris, France: Ed. Flammarion Médicine-Sciences; 1989.
4. Popescu Mut D. [Clinical Hematology] Romanian. Bucureşti, România: Ed. Medicală; 2001.
5. Allison DG, Gilbert P, Lappin-Scott HM, Wilson M. Editors. Community structure and co-operation in biofilms. Cambridge, UK: Cambridge University Press; 2000.
6. Flint SR, Moos KF, Porter SR, Scully C. Oral and Maxillofacial Diseases, Third Edition. New York, NY: Taylor & Francis eBooks; 2004.
7. Dumitriu HT, Dumitriu S. [Periodontology] Romanian. VI Edition. Bucureşti, România: Ed. Viaţa Medicală Românească; 2015.
8. Bernhard AE, Field KG. A PCR Assay to discriminate human and ruminant feces on the basis of host differences in Bacteroides-Prevotella genes encoding 16S rRNA. Appl Environ Microbiol. 2000;66(10):4571-4574. [Full text links] [Free PMC Article] [PubMed] Google Scholar(630) Scopus(408)
9. Jenkinson HF, Lamont RJ. Oral microbial communities in sickness and in health. Trends Microbiol. 2005;13(12):589-595. Review. doi: 10.1016/j.tim.2005.09.006 [Full text links] [PubMed] Google Scholar(469) Scopus(265)
10. Lamont RJ, Burne RA, Lantz MS, LeBlanc DJ. Editors. Oral Microbiology and Immunology. Washington, DC: ASM Press; 2006. Google Scholar(85)
11. Roberson TM, Heymann HO, Swift Jr EJ. Editors. Sturdevant's Art and Science of Operative Dentistry, Fifth edition. St. Louis, MI: Mosby Elsevier Inc.; 2006.
12. Gao B, Gupta RS. Phylogenetic framework and molecular signatures for the main clades of the phylum Actinobacteria. Microbiol Mol Biol Rev. 2012;76(1):66-112. Review. doi: 10.1128/MMBR.05011-11. [Full text links] [Free PMC Article] [PubMed] Google Scholar(148) Scopus(100)
13. Lamont RJ, Jenkinson HF. Oral Microbiology at a Glance. Oxford, UK: Wiley-Blackwell Publishing; 2010. Google Scholar(49)
14. Summitt JB, Robbins JW, Hilton TJ, et al. Editors. Fundamentals of Operative Dentistry: A Contemporary Approach, Third Revised edition. Chicago, IL, United States: Quintessence Publishing Co Inc.; 2006. Google Scholar(656)
15. Jobin MC, Mohsen A, Richard PE. The Molecular Biology of the Survival and Virulence of Treponema denticola, Molecular Oral Microbiology, Caister Academic Press, Norfolk, UK; 2008. Google Scholar(3)
16. Marsh PD, Nyvad B. The oral microflora and biofilm on teeth. In: Fejerskov O, Kidd EAM. Dental caries: The disease and its clinical management, 2nd edition. Oxford, Ames, Iowa: Blackwell Munksgaard;2008, 163-187.
17. Socransky SS, Haffajee AD, Goodson JM, et al. New concepts of destructive periodontal disease. J Clin Periodontol. 1984;11(1):21-32. [Full text links] [PubMed] Google Scholar(853) Scopus(416)
18. Cojanu MFL. [Gingival-periodontal manifestations in anemias] Romanian. Bucureşti, România: Editura Universitară "Carol Davila"; 2014.
19. Newman HN, Wilson M, editor. Dental plaque revisited, oral biofilms in health and disease. Cardiff, UK: BioLine; 1999.
20. Cionca N, Giannopoulou C, Ugolotti G, et al. Microbiologic testing and outcomes of full-mouth scaling and root planing with or without amoxicillin/metronidazole in chronic periodontitis. J. Periodontol. 2010;81(1):15-23. doi: 10.1902/jop.2009.090390. [Full text links] [PubMed] Google Scholar(95) Scopus(51)

Mihaela Florina Loredana COJANU
DMD, DMSc, Teaching Assistant
Restorative Odontotherapy Department
Faculty of Dental Medicine
"Carol Davila" University of Medicine and Pharmacy Bucharest
Bucharest, Romania

CV

Loredana Cojanu is a clinical dentist with experience and passion for aesthetic dentistry who graduated from the Dental Medicine "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania; PhD in Periodontology; Competence in Implantology. She is currently a Teaching Assistant in Restorative Odontotherapy Department of Dental Medicine "Carol Davila". She is a member of ESCD, SSER. An author of scientific articles, she also has collaboratively authored book chapters in academic textbook.

What means the acronym IDA?

❑a. Immune disorder activity;
❑b. Iron deficiency anemia;
❑c. Increased data analyses;
❑d. Iron disease autoimmune.

Anemia is associated with:

❑a. Decreased levels of hemoglobin (Hb);
❑b. Increased values of hematocrit (Hct);
❑c. High levels of hemoglobin (Hb);
❑d. Developing countries only.

Oral manifestations can appear due to:

❑a. A healthy diet;
❑b. An imbalance immune system;
❑c. Lack of risk factors;
❑d. Normal dental structures.

Increased number of microorganisms in the oral cavity, the inflammatory reaction of the host and immunity response based on specific and nonspecific factors in the previous clinical cases are revealed by:

❑a. Normal microbial macroscopic aspects;
❑b. Epithelial cells with no trace of cocci, bacilli, candida filaments and fusobacterium species;
❑c. Lack of inflammatory infiltrated;
❑d. Immunohistochemical exam that showed a chronic inflammatory process.