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Clinical Reports

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Abstract
Clinical case patient SFM code: 7612, date of birth September 9, 1978. Patient starts treatment on November 25, 2019, had already had other dental treatments, still complaining of cervical reflex pain, in addition to facial tension, headaches, complaints of tiredness, fatigue, malocclusion, verticalization of the divergent buccal void, inflamed microsystems with stagnation and blood ischemia, oral dysbiosis, sinusitis recurrence and some significant autoimmune systemic changes. Dental treatment was multidisciplinary and aimed at reducing inflammation processes, improving systemic microcirculation, improving occlusion, better load distribution, improving oral biocybernetics together with the body axes, trying to minimize the histamine effects released that lead to triggers of conditions autoimmune. The treatment consisted of dental procedures with endodontics and extraction of structures incompatible with the patient's health, biochemical evaluation of markers, medical follow-up. Methodology used were laboratory blood tests (hemogram as a reference and auxiliary tests to confirm the clinical finding, panoramic view, x-ray), neural therapy procedures, tooth extraction, endodontics, ozone therapy. Results obtained were significant in the circulatory system, improvements in the excretion system, hepatic system, improvements in the glycemic condition. Conclusion The patient had a significant gain in quality of life and is still undergoing treatment because some blood markers need long-term changes and cannot be worked on all at once.

Keywords: Exodontia, endodontics, blood markers

1. Clinical Report

Patient SFM, with code 7612, born on September 9, 1978, initiated their treatment on November 25, 2019. They had previously undergone other dental treatments and complained of referred cervical and lumbar pain, facial tension, headaches, recurrent sinusitis, fatigue, and exhaustion. After a clinical and imaging examination, malocclusion, divergence of the oral cavity, inflamed microsystems with stagnation and blood ischemia, oral dysbiosis, recurrent sinusitis, and some significant autoimmune systemic alterations were identified.

The patient reported traumas from previous dental treatments, which is why we proposed minimal multidisciplinary interventions. After obtaining their consent, treatment began with the request for laboratory tests, panoramic and periapical radiographs of all teeth to elucidate the clinical examination results. A Huneke test was performed, which tested positive for alterations in the molars of teeth 18, 16, 48, 28, and 37.

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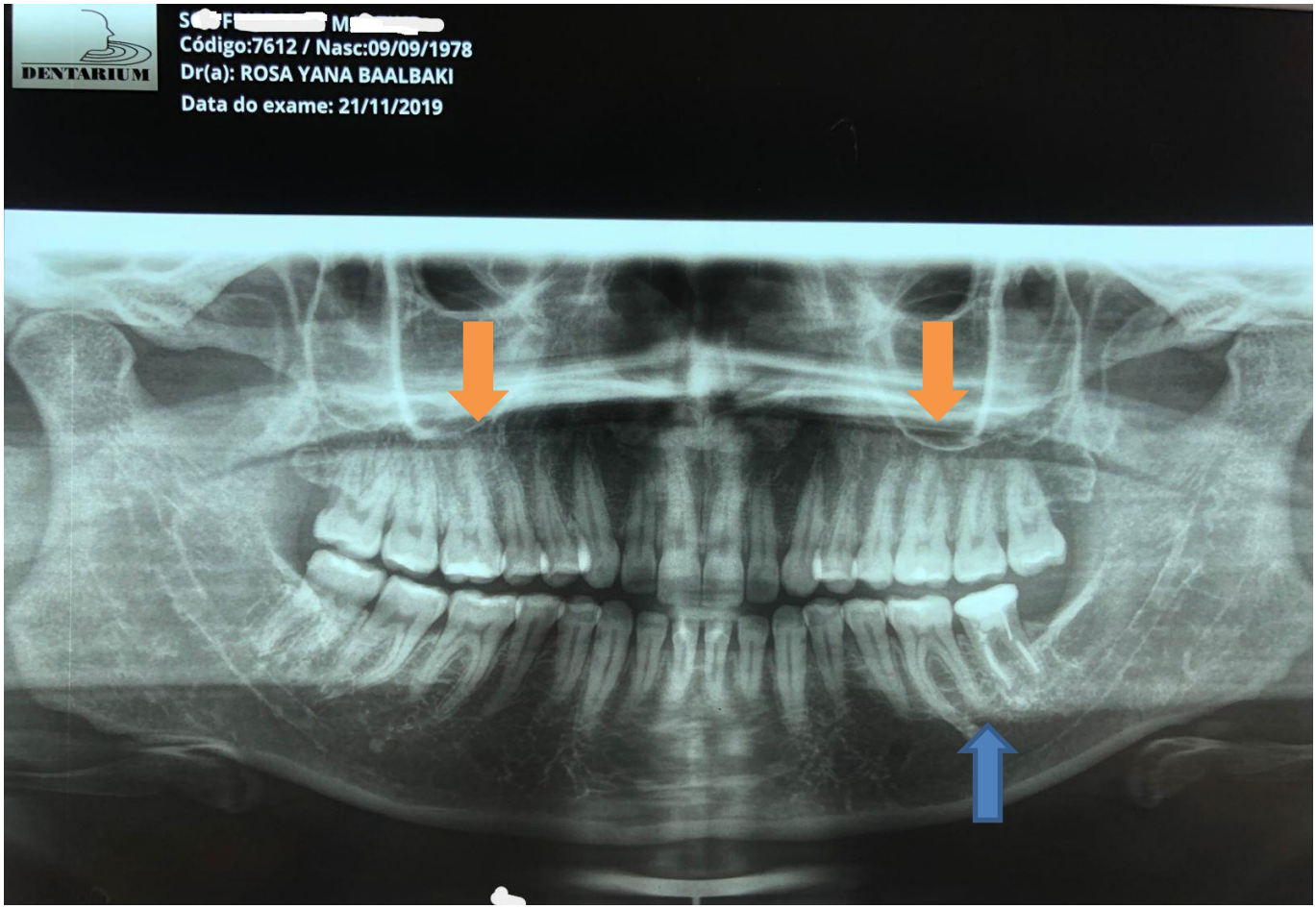


Figure 1 Panoramic X-ray of Patient SFM

The blue arrow indicates an area with lesions at the apex of the root canal of tooth 37, and the yellow arrow can be observed both in the panoramic X-ray and in the visualization of the oral mucosa, confirming the indication of recurrent sinusitis and a dysbiosis process. Through imaging exams, the endodontic lesion of tooth 37 and the mispositioning of tooth 28, both identified as positive in the Huneke test, were confirmed. Extraction of tooth 28 was recommended, as well as endodontic treatment for tooth 37. Vestibular and lingual applications were initiated in the regions of positive teeth (areas of 3rd molars, incisors, centrals, 36, 37, 27, 28).

In the endodontic retreatment of tooth 37, performed with ozone application in the canals, a fractured file and prefabricated metallic core were successfully removed. The patient wished to retain the anatomical piece, and after a few days, procaine was applied again to the affected areas.

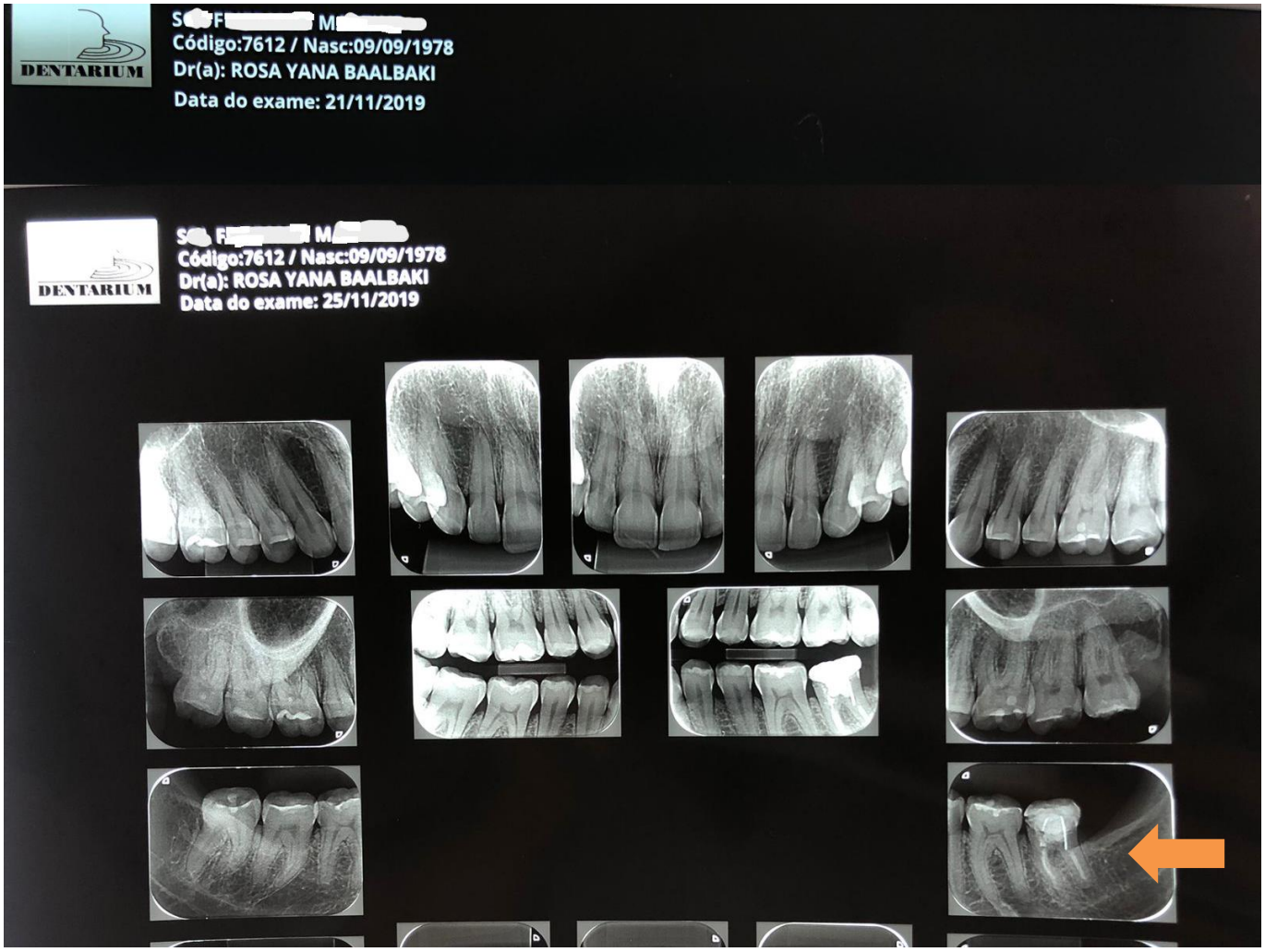


Figure 2 Periapical X-ray of Patient SFM

The orange arrow shows the lesion. In late 2019 until 2022, many healthcare procedures were suspended or reduced due to the pandemic, causing the patient to postpone the extraction and endodontic treatment. The patient underwent neural therapy with the application of 0.7% Procaine Hydrochloride at specific points on the head and neck, as clinically indicated during the dental treatment.

Figure 3 Periapical X-ray of the patient after endodontic treatment

In an effort to preserve teeth 18, 28, and 48 (at the patient's request), resin restorations were redone on December 4, 2019, December 11, 2019, and January 15, 2020. However, the patient still exhibited clinical signs of discomfort in these teeth and a positive Huneke test even after the restorations were replaced. On March 6, 2020, a full molding and assembly of study models in an A.S.A (semi-adjustable articulator) revealed premature contact occurring between tooth 28 and 37 during mandibular excursive movements. Extractions of teeth 18 and 48 were initiated on March 5, 2021, and extraction of tooth 28

on June 11, 2021. In June 2022, it was decided to perform endodontic retreatment of tooth 37, with removal of the metallic core and fractured file. A full ceramic crown with contact point and satisfactory occlusion was placed, and there were no longer any positive Huneke test results for this tooth.

In January 2022, the patient presented with a COVID-19 infection.

Throughout the entire duration, the patient's clinical condition was monitored through blood marker tests. It was decided to follow the patient for at least an additional 3.5 years, investigating their markers even after the completion of dental treatment.

Reference values will be adopted for the patient according to current laboratory literature, but a more detailed analysis will be performed using quartiles from the Gaussian curve to visualize and report any biochemical alterations in the results.

Table 1 Reference Values Table: Red Section

Complete Blood Count	
Red Blood Cells	3,800,000 to 5,200,000/mm3
Hemoglobin	12.0 to 16.0 g/dl
Hematocrit	35.0 to 47.0%
Mean Corpuscular Volume (MCV)	80.0 to 100.0 fl
Mean Corpuscular Hemoglobin (MCH)	26.0 to 34.0 pg
Mean Corpuscular Hemoglobin Concentration (MCHC)	32.0 to 36.0%
Red Cell Distribution Width (RDW)	11.6 to 14.6%

Table 2 Reference Values Table: White Blood Cells

White Blood Cells	
Total Leukocyte Count	4,000 to 11,000 /mm3
Bands	40 to 80%, 2,000 to 7,000/mm3
Segmented	67%, 4,221/mm3
Eosinophils	1 to 6%, 2 to 500/mm3
Basophils	0 to 2%, 0 to 100/mm3
Monocytes	2 to 10%, 200 to 1,000/mm3
Lymphocytes	20 to 40%, 1,000 to 3,000/mm3
Reactive Lymphocytes	0%, 0/mm3
Other Hematology Findings: Marked anisocytosis, microcytosis, and hypochromia. Rare macrocytes. Mild poikilocytosis and slight polychromasia	0%, 0/mm3
Platelets	140,000 to 450,000/mm3

The medical literature tells us that there are no acceptable values for heavy metals, proposing a retrograde contamination limit for acute manifestation. Therefore, tests were requested, and the gradual biological terrain cleansing of the patient was initiated.

1.1 Blood Marker Results:

1.1.1. In the clinical examination in 2019 during the anamnesis, pale eyelid conjunctiva and oral mucosa were observed, slightly whitish, lacking vitality, and with mild ischemia, suggesting anemia.
1.1.2. In November 2020, the first extraction of the wisdom teeth was performed.
1.1.3. In the clinical examination in 2020 during the anamnesis, the eyelid conjunctiva and oral mucosa were slightly whitish, lacking vitality, with mild ischemia, but there is no indication of anemia.

86
87

Table 3 Table of Marker Results after the First Therapeutic Intervention

Complete Blood Count							
	Value on 11/20/2020		**Values before application on 02/21/2022**	**Values on 04/22/2022 after application**		**Values after COVID on 05/15/2022**	**Values on 06/23/2022**
Red Blood Cells	4.43 x 10^6 /µL	Still in the first quartile of the Gaussian curve, indicative of tissue oxygenation recovery and peripheral microcirculation	4.22 x 10^6 /µL	4.51 x 10^6 /µL	Interfering Field	4.44 x 10^6 /µL	4.56 x 10^6 /µL
Hemoglobin	13.6 g/dL		13.4 g/dL	14.0 g/dL		13.6 g/dL	13.9 g/dL
Hematocrit	41.4%		39.0%	41.3%		41.3%	41.0%
MCV	93.3 fL	The mean corpuscular volume is in the third quartile of the curve, still within the normal range. However, it is not within the desirable range, indicating that the spatial configuration of the mean corpuscular volume was larger than desirable. Therefore, oxygenation in the capillaries and oxygen transport are somewhat compromised. Suspicions of heavy metal intoxication and an inflammatory process were suggested.	92.5 fL	91.8 fL	Volume corpuscular closer to the ideal	93 fL	90.5 fL
HCM	30.7pg	It falls within the ideal range, suggesting good iron absorption, not dependent on Methylcobalamin.	31.8 pg	31.1 pg		30.6 pg	30.7 pg
CHCM	32.9 g/dL		34.3 g/dL	33.9 g/dL		32.9 g/dL	33.9 g/dL
RDW	12.9%	The erythrocyte sedimentation rate is within the normal range; however, it is lower.	13.8%	13.2%		13.8%	13%
Within the white blood cell series, we observe a chronic inflammatory response in the intestines and autoimmune aspects. Although the patient's results fall within reference values, the quartiles show clinical findings consistent with the patient's clinical history and reported complaints.							
Leukocytes	100% 5.070/ µL		100% 6100/µL	100 % 6.240 /µL		100 % 5610 /µL	100 % 6100 /µL
Neutrophils	59,3% 3.007/ µL		67,7% 4130/µL	55,4 % 3.457 /µL		61,5 % 3.457 /µL	67,7 % 4.130 /µL
Eosinophils:	1,5% 76/µL		1,3% 79//µL	0,9 % 56 /µL	Allergenic load decreases	1,7 % 95 /µL	1,3 % 79 /µL
Basophils							

	0,3% 15/µL		0,5% 31//µL	1,8 % 112 /µL		0,4 % 22 /µL	0,5 % 31 /µL
Lymphocytes	31,4% 1.592 /µL		24,4% 1488//µL	33,7 % 2.103 /µL	Autoimmune condition	29,7 % 1666 /µL	24,4 % 1488 /µL
Monocytes	7,5% 380 /µL		6,1%372//µL	8,2 % 512 /µL		6,7 % 376 /µL d	6,1% 372 /µL

It can be observed that there is an improvement in the microcirculatory process despite the emergence of other symptoms. The patient experienced a reduction in allergens, a reduction in the dysbiotic condition, and improved visual appearance of the mucous membranes. During this initial period, the patient still had some restrictions on achieving better dietary control. She was advised to undergo a food allergy test with the aim of reducing systemic inflammatory processes, improving the control of mucus channels, and regulating systemic histamine release, all of which significantly contribute to the treatment of autoimmune symptoms. It can be noted that the complete blood count was an excellent, low-cost, simple, sensitive, and rapid biological marker in the diagnostic process, and other tests were requested mainly as laboratory evidence to support the findings of the complete blood count.

Monitoring of lipid patterns, essential minerals, insulin response, and inflammatory factors was also carried out due to the patient's clinical condition. Additionally, in-office evaluation of endodontic procedures was performed, followed by medical monitoring. The results for minerals were quite homogeneous, such as Blood Zinc (73.02 µg/dL), Magnesium (2.0 mg/dL), Sodium (140 mMol/L), Calcium (9.3 mg/dL), Potassium (3.9 mEq/L), and the observed alterations were not related to the patient's mineral patterns. Ferritin (20.1 ng/mL), Vitamin C (8.2 mg/dL), Copper (83.9 µg/dL), Iron Metabolism; Iron (74 µg/dL), Total Iron-Binding Capacity (250 µg/dL), Iron (324 µg/dL), Transferrin Saturation (23%). Reference values for serum iron and other tests related to iron metabolism are standardized for samples collected up to 11:00 AM due to circadian rhythm variations. Therefore, the observed hematopoietic alterations are related to sympathetic stimulation of the vegetative system and autoeco-organization processes to achieve homeostasis, as per Burtis, CA; Ashwood, ER; Bruns, DE. Tietz Textbook of Clinical Chemistry and Molecular Diagnosis. 4th Ed. Saint Louis: Elsevier Saunders, 2006; Soldin, SJ; Brugnara, C; Wong, EC, Soldin, OP. Pediatric Reference Intervals. 7th Ed. Washington DC: AACCPress, 2011. Additionally, Methylmalonic Acid (0.10 µmol/L) and Vitamin B-12 level of 455 pg/mL were observed.

The patient has a more sympatholytic profile, experiencing constant stress, which was measured by salivary cortisol levels. She also has an androgenic profile with levels within the normal range but in the third quartile of testosterone production, which increases the severity and exacerbation of autoimmune pathologies. These include Basal Cortisol 21.0 µg/dL measured in the morning, Calculated Free and Bioavailable Testosterone, Total Testosterone 59.0 ng/dL (elevated), Sex Hormone-Binding Globulin (SHBG) 85.0 nmol/L, Free Testosterone 19.2 pmol/L, and Bioavailable Testosterone 12.9 ng/dL.

2. Results

Figure 4 Result of glycemic markers after treatment.

With a Hemoglobin A1c (HbA1c) result of 5.3% and assessment of homo and beta insulin activity, possible causes of cellular dehydration and low enzymatic activity due to the biological terrain were identified. Reference: American Diabetes Association. Standards of Medical Care in Diabetes. Diabetes Care. 2017. As the patient's energy gain and disposition improved, there was a reduction in dysbiosis processes.

Figure 5 Glycemic and uric acid factors

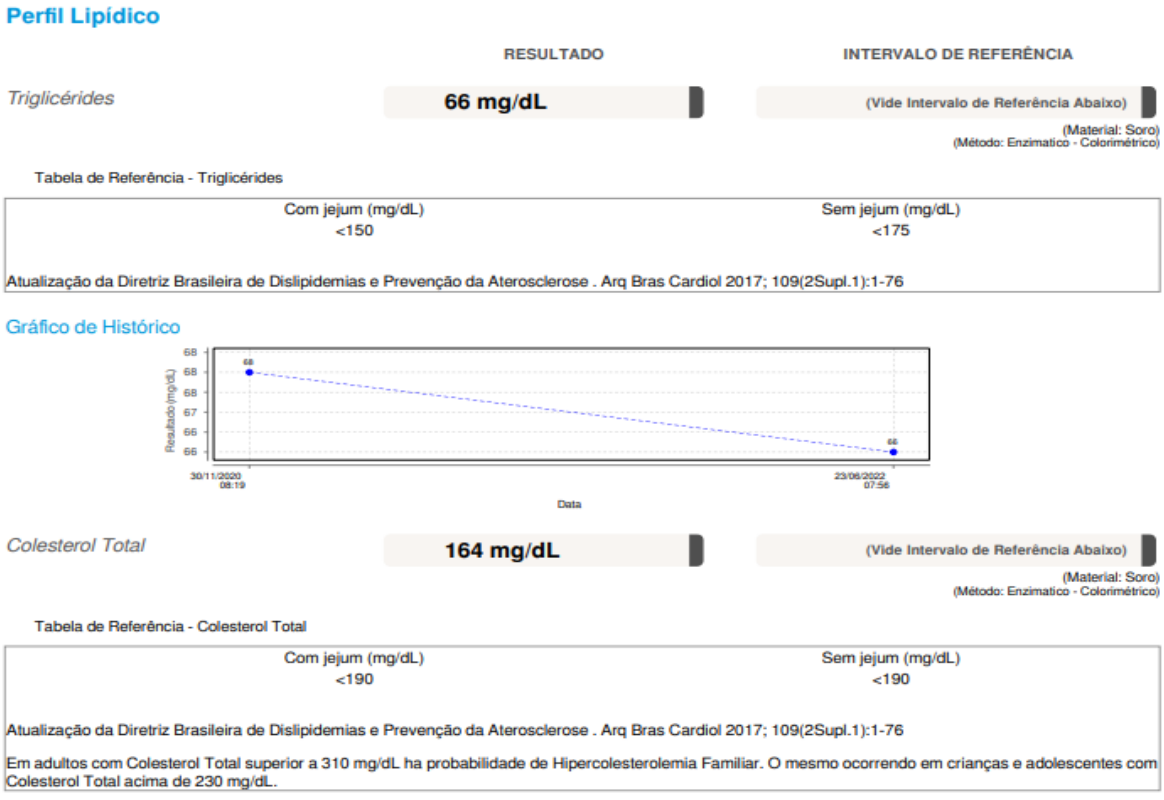


Figure 6 Lipid profile (Triglycerides and Total Cholesterol)

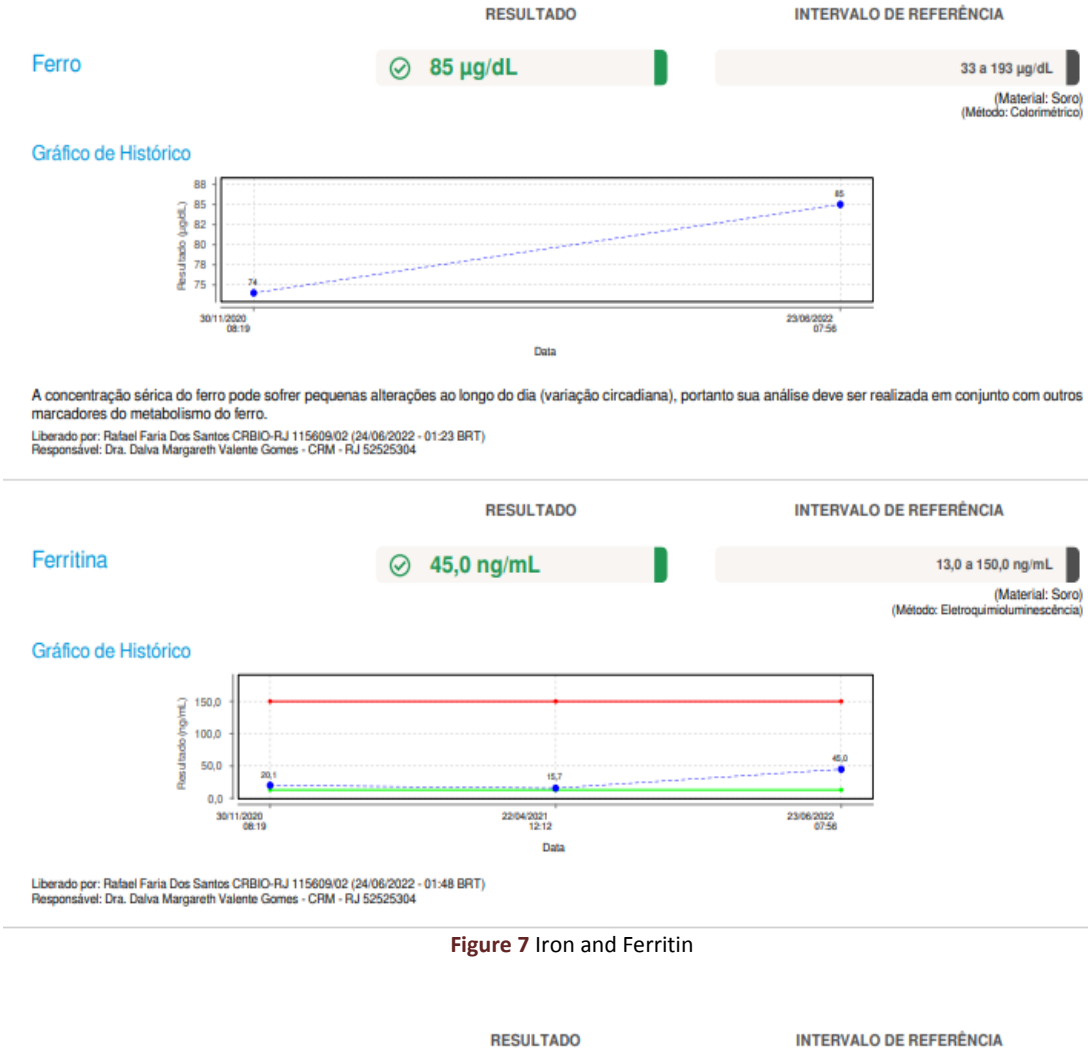


Figure 7 Iron and Ferritin

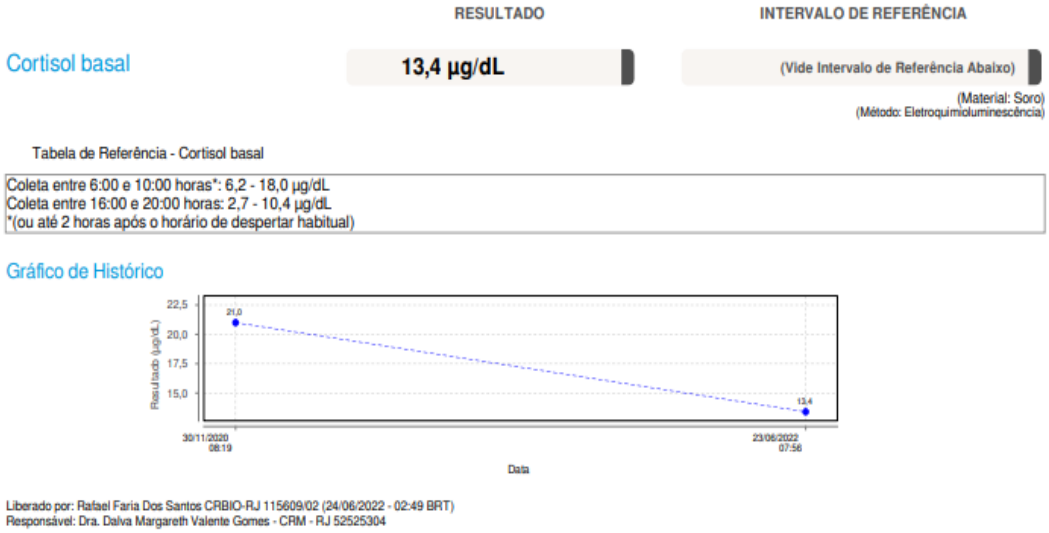
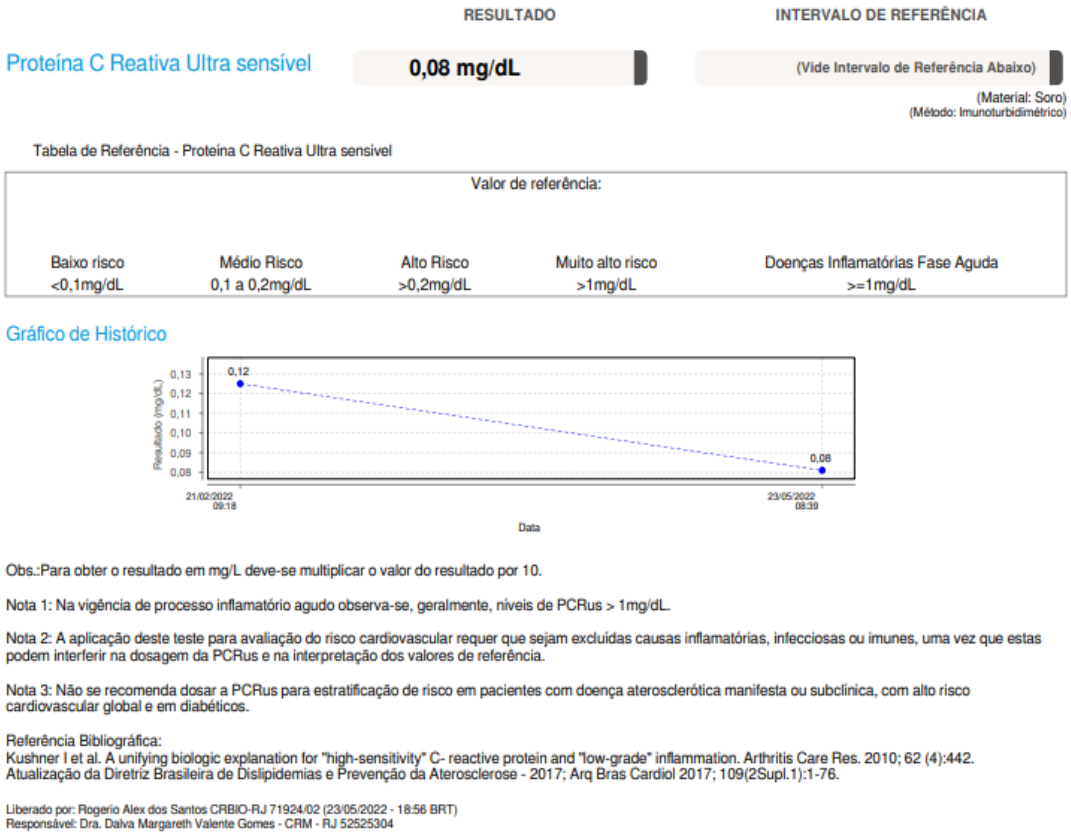


Figure 8 Basal Cortisol

Figure 9 Total bilirubin, direct and indirect bilirubin



	RESULTADO	INTERVALO DE REFERÊNCIA
Proteína C Reativa Ultra sensível	0,08 mg/dL	(Vide Intervalo de Referência Abaixo)

(Material: Soro)
(Método: Imunoturbidimétrico)

Tabela de Referência - Proteína C Reativa Ultra sensível

Valor de referência:

Baixo risco	Médio Risco	Alto Risco	Muito alto risco	Doenças Inflamatórias Fase Aguda
<0,1mg/dL	0,1 a 0,2mg/dL	>0,2mg/dL	>1mg/dL	>=1mg/dL

Gráfico de Histórico

Obs.:Para obter o resultado em mg/L deve-se multiplicar o valor do resultado por 10.

Nota 1: Na vigência de processo inflamatório agudo observa-se, geralmente, níveis de PCRus > 1mg/dL.

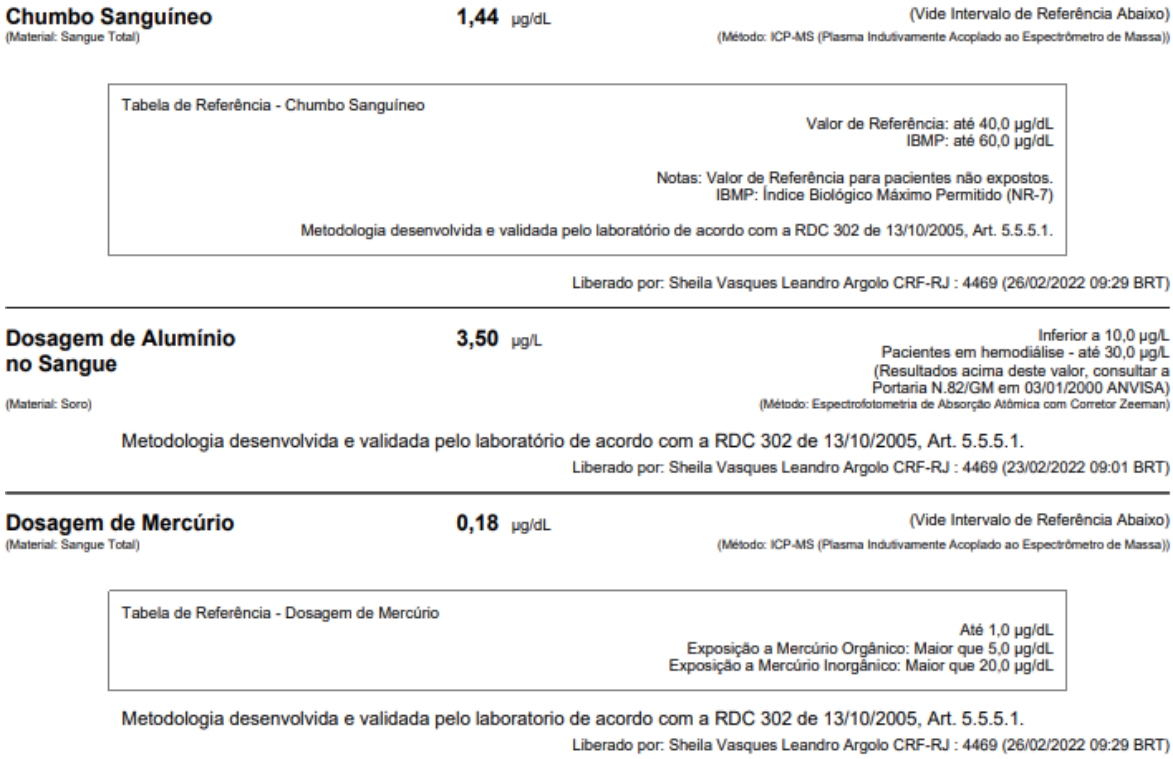
Nota 2: A aplicação deste teste para avaliação do risco cardiovascular requer que sejam excluídas causas inflamatórias, infecciosas ou imunes, uma vez que estas podem interferir na dosagem da PCRus e na interpretação dos valores de referência.

Nota 3: Não se recomenda dosar a PCRus para estratificação de risco em pacientes com doença aterosclerótica manifesta ou subclínica, com alto risco cardiovascular global e em diabéticos.

Referência Bibliográfica:
Kushner I et al. A unifying biologic explanation for "high-sensitivity" C- reactive protein and "low-grade" inflammation. Arthritis Care Res. 2010; 62 (4):442.
Atualização da Diretriz Brasileira de Dislipidemias e Prevenção da Aterosclerose - 2017; Arq Bras Cardiol 2017; 109(2Supl.1):1-76.

Liberado por: Rogerio Alex dos Santos CRBIO-RJ 71924/02 (23/05/2022 - 18:56 BRT)
Responsável: Dra. Dalva Margareth Valente Gomes - CRM - RJ 52525304

Figure 10 Ultra-sensitive C-reactive protein



Chumbo Sanguíneo 1,44 µg/dL (Vide Intervalo de Referência Abaixo)
(Material: Sangue Total) (Método: ICP-MS (Plasma Indutivamente Acoplado ao Espectrômetro de Massa))

Tabela de Referência - Chumbo Sanguíneo

Valor de Referência: até 40,0 µg/dL
IBMP: até 60,0 µg/dL

Notas: Valor de Referência para pacientes não expostos.
IBMP: Índice Biológico Máximo Permitido (NR-7)

Metodologia desenvolvida e validada pelo laboratório de acordo com a RDC 302 de 13/10/2005, Art. 5.5.5.1.

Liberado por: Sheila Vasques Leandro Argolo CRF-RJ : 4469 (26/02/2022 09:29 BRT)

Dosagem de Alumínio no Sangue 3,50 µg/L
(Material: Soro)

Inferior a 10,0 µg/L
Pacientes em hemodiálise - até 30,0 µg/L
(Resultados acima deste valor, consultar a Portaria N.82/GM em 03/01/2000 ANVISA)
(Método: Espectrofotometria de Absorção Atômica com Corretor Zeeman)

Metodologia desenvolvida e validada pelo laboratório de acordo com a RDC 302 de 13/10/2005, Art. 5.5.5.1.

Liberado por: Sheila Vasques Leandro Argolo CRF-RJ : 4469 (23/02/2022 09:01 BRT)

Dosagem de Mercúrio 0,18 µg/dL (Vide Intervalo de Referência Abaixo)
(Material: Sangue Total) (Método: ICP-MS (Plasma Indutivamente Acoplado ao Espectrômetro de Massa))

Tabela de Referência - Dosagem de Mercúrio

Até 1,0 µg/dL
Exposição a Mercúrio Orgânico: Maior que 5,0 µg/dL
Exposição a Mercúrio Inorgânico: Maior que 20,0 µg/dL

Metodologia desenvolvida e validada pelo laboratorio de acordo com a RDC 302 de 13/10/2005, Art. 5.5.5.1.

Liberado por: Sheila Vasques Leandro Argolo CRF-RJ : 4469 (26/02/2022 09:29 BRT)

Figure 11 Metals in the blood

3. Discussion

It can be concluded that there has been a significant improvement in microcirculatory parameters, an improvement in the anti-inflammatory pattern, Ultra-sensitive C-Reactive Protein 0.09 mg/dL, but still with a slight alteration in the coagulation cascade pattern and Erythrocyte Sedimentation Rate (ESR) 1st hour 30 mm, which still shows alterations, with Prothrombin Time 12.70 s. There has been an improvement in the potassium bioavailability, stabilization of ferritin levels, consequently improving oxygen transport and the systemic and peripheral microcirculatory systems, as well as liver function. Gamma-Glutamyl Transferase 9 U/L (low index), Total Bilirubin, Direct, and Indirect Bilirubin: Total Bilirubin 0.23 mg/dL, Urea 13 mg/dL (normal range: 15 to 50 mg/dL), and C-Reactive Protein at the time of tooth extraction. The suspicion arises from the fact that the removal of some heavy metals, as well as dental materials and iron filings, altered the biological terrain, facilitating the elimination processes dependent on the same metabolic pathways. After COVID, an attempt was made to eliminate homotoxins and exotoxins.

Medical and nutritional follow-up of dietary patterns after endodontic and dental extraction interventions was suggested to determine the therapy's response in the patient's clinical condition. The patient is now undergoing therapeutic neural treatment and following a dietary plan. A food allergen test has already been conducted, including milk, eggs, egg yolk, nuts, and flour, all of which showed reactive results. However, the highest reactivity was observed with flour products and household dust, which were already indicated in the complete blood count and clinical history.

The multidisciplinary dental treatment aimed to reduce inflammatory processes, improve systemic microcirculation, enhance occlusion, distribute loads better, improve oral biocybernetics along with body axes, and attempt to minimize the histamine release triggers that led to autoimmune conditions.

4. Conclusions

Finally, the treatment objectives were successfully achieved. Significant results were obtained in the circulatory system, improvement in the excretion system, liver function, and glycemic control. In conclusion, the patient has experienced a significant improvement in quality of life and continues with treatment because some blood markers require long-term changes and cannot be addressed all at once due to considerable levels of heavy metal contaminants in the circulatory system. Further reduction in these levels has led to gradual improvement in the complete blood count and other markers.

Ethical considerations

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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