

# DENTAL MANAGEMENT OF THE PATIENT WITH CHRONIC KIDNEY DISEASE

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**Abstract:** The present paper aims at drawing attention on the implications that chronic kidney disease (CKD) syndrome has on oral health. This extremely complex syndrome, a long-term condition, characterised by the gradual loss of the kidney excretory function and the impaired homeostasis of the internal environment, causes a series of morphological-clinical dental aspects in relation to the stage in the evolution of the underlying disease. In this paper we presented data in the literature relating to the oral manifestations of the CKD as well as some ways to prevent and manage them. Prevention and management are possible only if the stage in the evolution of the disease is precisely known. It is the same with the correct assessment of the risks that can be posed by a dental intervention, even a minimal one, for the health of the patient suffering from CKD. It is necessary that the dental practitioner should know the biological constants of the patient (bleeding time, hematorcrit, hemoglobin, prothrombin time, blood pressure etc.). Moreover, any treatment involves the nephrologist who has the patient under observation and treatment.

**Cuvinte cheie:** insuficiență renală cronică, manifestări orale, management oral

**Rezumat:** Lucrarea de față își propune să atragă atenția asupra implicațiilor, pe care sindromul de insuficiență renală cronică (I.R.C.) îl are asupra sănătății orale. Acest sindrom deosebit de complex, instalat lent și caracterizat prin scăderea capacității excretoare renale și tulburarea funcției de homeostazie a mediului intern, determină apariția a o serie de aspecte morfo-clinice stomatologice, în raport cu stadiul evolutiv al bolii de bază. În lucrarea de față, sunt prezentate date din literatura de specialitate privind manifestările orale ale I.R.C., precum și modalitățile de prevenire și gestionare ale acestora, lucru posibil doar după cunoașterea exactă a stadiului evolutiv al bolii și aprecierea corectă a riscurilor pe care o intervenție stomatologică, chiar și minimă, le poate provoca asupra organismului tarat și a bolii de bază. Este necesară cunoașterea de către medicul dentist a constantelor biologice ale pacientului (timp de sângerare, hematocrit, hemoglobină, timp de protrombină, tensiunea arterială etc.) și orice tratament presupune acordul medicului nefrolog, care are pacientul sub supraveghere și tratament.

## General data relating to CKD

Chronic kidney disease (CKD), defined by N. Ursea in 2006 in the “Treatise on Nephrology Vol. I”, as “a chronic syndrome with slow onset, multiple aetiology, physiopathologically characterised by the kidney inability to ensure normal functions ...”, is a functional expression of different types of renal lesions that ultimately result in kidney failure.(1)

The emergence and development of this extremely complex condition in terms of manifestation are due to the progressive destruction of nephrons.

The incidence of the syndrome is estimated at approximately 50-100 cases per 1 million inhabitants and varies by gender, being more common in male patients (60%) compared to 40% in female patients. The syndrome is prevalent in adults in the 30-40 age bracket. However, in recent years, a higher rate has been noticed in patients of median age and in those over 65. (1, 2, 3)

Chronic kidney disease (CKD) syndrome has variable symptoms ranging from nocturia to anorexia, from hypertension and anaemia to multisystem disorders. The stages in the

evolution of the disease can be described as follows:(2,3)

- initially, CKD is characterised by totally compensated renal dysfunction so that clinically this stage may go unnoticed with possible manifestations of the causal disease only;
- compensated renal failure, manifested by characteristic symptoms (anorexia, weight loss, itching, oedema, etc.).
- preuremic stage, with serious disorders in terms of the patient biological constants and condition;
- terminal uremic stage in which there is an alteration of the function of all systems and organs, each with associated symptoms.

In all these stages, the laboratory specific data are very important for the correct diagnosis.

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The main forms of CKD treatment, especially in the last stages are haemodialysis and continuous ambulatory peritoneal dialysis.

The symptoms and general treatment of chronic kidney disease (CKD) are very complex being beyond the scope of this paper.

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### General problems in CKD which are relevant to dental practice

The patients with chronic kidney disease, like many patients suffering from a chronic disease with severe prognosis, often have somatic-mental disorders, which are actually the "psychiatric symptoms caused by a somatic disease".(4) They are generated by a certain mental attitude, more often than not pessimistic, of the patient to the chronic disease and its unpleasant aspects, to the effects of specific treatment, by the fear of the threat the disease poses to life, and the risk of death. Within the communities in which this type of chronically ill patient lives he/she feels isolated from the rest because of the particular status generated by his/her physical and emotional suffering, and of the circumstances in which he/she lives life compared to other members of the community.(4)

Chronic kidney disease has an important role in oral pathology because of the risks associated with dental treatment in the patients suffering from CKD. Among such risks the following can be mentioned:(5,6,7)

- the increased risk of infection and the possibility that the patient might be hepatitis B or/and HIV virus carrier, as a consequence of low immunity;
- the patient may experience anaemia, essentially determined by the decrease in the secretion of erythropoietin and by other causes, as well as an increased tendency to bleeding because of exacerbated haemolysis;
- because of the reduced capability to eliminate medicinal substances, an iatrogenic medication overdose may occur following the routine treatment of the chronic kidney disorder.

By the important imbalances it generates in the body, chronic kidney disease (CKD) causes a series of manifestations at the level of all dental apparatus component elements. They depend on the stage in the evolution of disease.

Subjective symptoms may be as follows:(5,6,8)

- *ammonia-like halitosis* because of the large amount of urea that is present especially in the uremic stage of the disease;
- *taste disorders* characterised by bitter, metallic taste, dry mouth and burning sensation on contact with food. Moreover, changes in taste sensitivity threshold may occur. In the uremic stage, it has been frequently noticed the change in this threshold for sweet and sour (10 times higher) while keeping the salty and bitter taste sensation. (5) Because of the diminished ability to restore and regenerate body cells considering the important changes in immunity, the gustatory cells destroyed during their physiological cycle cannot be replaced and the number of filiform papillae decreases;
- *glossodynia* clinically manifested by twitching, tingling, burning sensation of the tongue;
- *discomfort in mastication and deglutition* because, due to the lack in saliva, the food bolus cannot be correctly managed, as the time of mastication and deglutition is extended, which can result in a large amount of food debris that may be associated with changes in the bacterial flora and Candidiasis glossitis.(8,9)

Functionally, the following aspects may occur:(5,6,7,10)

- *salivary flow rate disturbance* that in dialysis patients is manifested by a 25% decrease in the salivary flow, xerostomia, which can be explained by the fibrotic changes in the salivary acini and accumulation of lipid deposits in the salivary tissue;
- *at the level of the tongue*, in early stages of CKD, the physiological sulci on the dorsal surface of the tongue may be accentuated, favouring the proliferation of some

opportunistic germs such as *Candida albicans* and changing the patient taste. Lingual mucosa is often affected by candidiasis, in the form of abundant white deposits, being favoured by the excessive use of antibiotics, or by macroglossia. In later stages of CKD, the tongue may be dry, pasty, having a dark brown deposit (uremic tongue). The tongue may be often intensely red, glossy, marginally depapillated. Sometimes, the lingual mucosa may be affected by the lichen planus and the patient may have glossodynia manifested by twitching, tingling, burning sensation of the tongue;

- *oral mucosa* may be pale, dry, yellowish-grey or reddish, glossy, having petechiae, ecchymoses, bleeding and painful ulcers. Different forms of stomatitis may occur: erythematous or fungal stomatitis in the early stages of the disease, necrotising ulcerative gingivostomatitis in advanced stages of the disease, leukoplakia lesions that are more frequent in the jugal mucosa, looking like pearly white plaques, due to the decrease in the tissue resistance to infections and the causticity of ammonium carbonate formed by salivary urea. The lesions are aggravated by poor oral hygiene;
- *labial mucosa* appear dry, with excoriation and bloody scabs. In the commissural area can be observed angular erythematous cheilitis that is cracked and bleeding, with or without mycotic plaque;
- *parotiditis*, unilateral or bilateral, having infectious origin, accompanied by swelling and pain, because of urea accumulation in the salivary glands;
- *dental changes*: enamel hypoplasia, erosive demineralisation associated with dental hard substance loss, because of frequent vomit and acid environment, often accompanied by dentin hyperesthesia. There is no difference in terms of prevalence of carious lesions between the patients suffering from CKD and clinically healthy patients. However, there are more single or multiple extractions. Sometimes teeth migrate because of edentulous areas. There are also important changes in the pulp connective tissue, characterised by multiple dystrophic lesions in odontoblasts, the cells forming and maintaining dentin, which are unique in the body. Important fibrosis occurs in the pulp connective tissue accompanied by the decrease in the number of pulp cells. Sometimes, the pulp total fibrosis occurs, which results in the pulp becoming non-reactive and incapable of defence;
- *periodontal changes*. Marginal periodontium may be healthy or may be affected by chronic gingivitis, in which case the gingival mucosa is reddish-purple, with slightly turgid edges and heavy bleeding. Periodontal diseases are frequent, having a chronic evolution, being sometimes complicated by abscesses and retrograde pulpitis.

All these symptoms vary from patient to patient, depending on the stage of the disease and the resistance of the patient. They may occur in early stages of the disease, in the compensated (latent) stage, in the decompensated (manifest) stage, as well as in the end (uremic) stage.(1) Some oral-dental manifestations have prognostic value and are determined by nitrogen retention, metabolic and hydroelectric disorders, chronic uremic syndrome (6), all being actually signs of CKD worsening.

### Oral-dental management of the patient with chronic kidney disease (CKD)

The dental treatment of the patient with chronic kidney disease is not easy, no so much in terms of the condition for which the patient seeks specialised treatment but especially because of the implications this severe chronic general condition

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has on the body as well as of the possible associated systemic diseases (diabetes mellitus, high blood pressure, gastrointestinal disorders, systemic lupus erythematosus etc.), which may result in the occurrence of accidents in the dental office or complications that are difficult to manage.

In order to manage a patient suffering from a severe general condition, as the patient with CKD, the dental practitioner should consider some major elements to assess the risk of dental treatment as follows:

- the patient physical condition;
- the duration and stage of the disease;
- the type of treatment;
- the biological constants (bleeding time, hematorcrit, hemoglobin, prothrombin time etc);

All these pieces of information are obtained from the nephrologist who has the patient under treatment.

The treatment of the patient suffering from CKD should be performed on several levels, considering the high risk of infection, the tendency to bleeding, and the impaired ability to eliminate medicines. All the mentioned elements recommend prevention as the first measure that should be taken in such cases.

Prevention entails the following aspects:(7,8,9)

- the patient should be registered with a dental office and monitored according to the severity of the disease, its stage of evolution, the alteration of biological constants. It involves monitoring of oral-dental-periodontal area at regular intervals established by the dental practitioner;
- the patient should be educated as far as oral hygiene measures are concerned, namely to gently brush teeth with fluoride toothpaste, floss, and use alkaline mouthwash in order to keep the pH of the oral cavity neutral, to stimulate saliva secretion by chewing vigorously and sometimes by using pH neutral salivary substitutes, easy to apply by patients;(11)
- in order to increase the resistance of mineralised hard tissues to the action of the acidic environment, topical application of fluoride, and increase in oral calcium and phosphates are recommended, as inorganic phosphates stimulate remineralisation and adjust mineral imbalance in the oral environment. Dental hypersensitivity should be also treated, which can be performed by the patient at home by individual brushing or by the dental practitioner in the dental office using chemical or physical methods;(11)
- a balanced diet is also necessary not to irritate the oral mucosa; irritating food such as aggressive spices, hard foods that could cause damage to the gingival mucosa, hot food, carbonated drinks with acid pH should be avoided;
- all irritating spines that could cause mucosal ulcer (sharp tooth edges, hooks, damaged dental crowns etc.) should be removed;
- oral mucosa should be carefully examined to early detect any lesion, mucosal ulcer, change in the colour (pallor in the case of anaemia or carotene pigment deposits when glomerular filtration rate is low). Bacterial plaque should be monitored in order to avoid gingivitis, periodontal inflammation, stomatitis and any other type of infection;(10)
- to keep the marginal periodontium in a normal state, subgingival scaling, performed with gentle manoeuvres, is recommended periodically. Moreover, it is recommended to use antimicrobial mouthwash (e.g. chlorhexidine), to brush teeth correctly and effectively, without traumatising gingival mucosa.(6,7,10,11)

The curative treatment of different types of disorders presented by the patient (6,7,10,11,12), entails the following

aspects:

- the presence of a patient suffering from CKD in the dental office requires permanent precautions against contamination and prevention of nosocomial infections. All these precautions are usually mandatory and entail routine procedures known by health professionals;
- in the cases of dental hard tissue loss having carious or non-carious aetiology, they should be treated in early stages, before progressing to acute or chronic inflammation of the pulp or mortification. While choosing the method for crown restoration, the crown durability as well as local and general tolerance should be considered. As for extensive carious lesions, a non-traumatising technique for soft tissues as well as a therapy that does not require the pulp tissue good reactivity should be taken into account. In general, patients with CKD in the compensated stage do not require special dental treatment;
- prosthetic devices should be performed considering the patient motivation, physical and biological condition, as well as the degree of oral hygiene;
- oral infections should be treated with the appropriate antibiotic, the dosage being established by the nephrologist. In the presence of viral infections, antiviral drugs can be used, administered orally or intravenously, and oral candidiasis will be treated topically with antimycotics. Dialysis patients or those using immunosuppressive medication, following the nephrologist recommendations, may benefit from additional treatment with steroids;
- medication that can cause nitrogen retention such as tetracycline, nephrotoxic drugs such as aminoglycosides, cephalosporins, aspirin, nonsteroidal anti-inflammatory drugs that can exacerbate gastrointestinal irritation and bleeding should be avoided, particularly in patients on dialysis, and the doses of drugs should be adjusted in accordance with the nephrologist recommendations;
- in the treatment of dialysis patients, the dental practitioner should take into account the precise timing of dialysis sessions, and dental treatments should be scheduled between these sessions, the day after dialysis, when heparin is no longer present in the patient's vascular system, most toxic metabolic processing products are eliminated, and electrolyte and acid-base balance is as close as possible to normal, so in periods when there is little chance of complications or risk ;
- in the case of interventions that may cause bleeding, the risk of bleeding should be avoided. That is why such treatments should not be performed without the nephrologist consent and, after the assessment of bleeding time and other biological constants, additional haemostatic methods can be employed, if necessary. The selection and dosage of anaesthetic substance are made with the consent and following the nephrologist instructions. It is the same with postoperative therapy.

The influence of general conditions in the emergence of dental pathology as well as the influence of the dental lesion on the evolution of the underlying disease has been the topic of study for specialists in the last decade. The results of the studies have led to the conviction that, currently, in order to properly manage dental disorders, medical team work is necessary, which has been tested by clinical activity. The dental practitioner is not able to cope with all the clinical situations generated by the patient general health condition. Therefore, it is obvious the need for a multidisciplinary approach to cases by delegating certain responsibilities to competent, well trained medical staff, as well as by cooperating with the general practitioner who has the patient under supervision and treatment.(8)

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The lesions that are specific to oral cavity are various in terms of expression and sometimes they may have an essential role in early diagnosis of a general condition or in assessing its evolution towards worsening, to which an improper dental treatment can also contribute. Patients with compromised general health status are confronted with problems that need to be addressed considering the underlying disease and its manifestations at the level of all the structures and functions of the affected organ.(8)

In this regard, the literature in recent years provides a vast amount of data in papers, textbooks, treatises, on a syndrome that has a great impact on the health of the entire body, namely chronic kidney disease, which, by severely decreasing the renal function, generates a wide range of disorders, due to the body impossibility of maintaining the normal composition of the internal environment and of regulating blood pressure, as well as to the endocrine and metabolic response to it and the serious changes in the patient biological constants. The dental practitioner is interested in all these aspects and especially in the changes in the digestive tract, predominantly those in the oral cavity.(1,2,12)

The lesions caused by CKD in the oral cavity depend on the stage in the evolution of the disease. The subjective symptoms that are present in the oral cavity are often multiple and complex, being noticed in all its structures: teeth, mucosa, salivary glands, etc. They can be easily included in the category of disorders generated by the decrease in the body defence capability.

### Conclusions:

Chronic kidney disease, by severely decreasing renal functions, generates a wide range of disorders, following the impossibility to maintain a normal composition of internal environment and to regulate blood pressure, as well as the endocrine and metabolic echo it has, all altering the patient biological constants. The dental practitioner is interested in all these aspects and especially in the changes in the digestive tract, particularly in the oral cavity.

The ways of expression and the severity of the lesions associated with CKD syndrome depend on the stage in the evolution of the disease. The subjective symptoms of the oral lesions are quite well represented and generally well known by the dental practitioner, and the lesions that occur on the lingual, labial, jugal and gingival mucosa, although not specific to CKD only, can be easily subsumed under the disorders determined by the low immunity of the affected body. The negative effects of the syndrome become evident in the dental hard tissues and pulp.

The treatment of oral pathology in CKD is firstly preventive, and the curative treatment often requires teamwork, the dosage of medication depending on the nephrologist recommendations, the stage in the evolution of the disease, and the patient biological constants.

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