



Oral Cavity Considerations for the Patient with Renal Disease

Dr. Amit Kumar Verma

Dental Surgeon, M.Sc in Dialysis

Pt. Jawahar Lal Nehru Memorial Medical College, Raipur, Chhattisgarh, India

ABSTRACT

Chronic renal disease (CRD) is the renal disease that manifests oral consequences most frequently, and it is defined as a progressive and irreversible decline in renal function associated with a reduced glomerular filtration rate (GFR). The most frequent causes of CRD are diabetes mellitus, arterial hypertension and glomerulonephritis. CRD is classified in 5 stages – from kidney damage with normal or increased GFR to renal failure.

The importance of CRD for the dental practitioner lies in the fact that an increasing number of patients with this disease will probably demand dental treatment and that up to 90% of them will show oral signs and symptoms related to this systemic disease. Dental management must be adapted to these patients' special conditions, as a greater bleeding tendency, hypertension, anaemia, drug intolerance, increased susceptibility to infections and the presence of several oral manifestations associated with either the disease or its treatment.

Good dental health isn't just about preventing cavities and keeping your gums healthy. Both tooth decay and gum disease can lead to infections that can cause problems for people with kidney disease

Keywords: *Kidney Dialysis Dental Sign Symptoms Conclusion Renal Failure*

INTRODUCTION

Chronic renal disease (CRD), a progressive and irreversible decline in renal function, is the renal disease with the most implications in dentistry, so this paper is focused on this pathology. Kidneys have the following functions: filtering waste metabolic products, preservation of the electrolytic composition and the volume of the extracellular liquid, regulation of the acid- base balance and endocrine function

(synthesis of prostaglandins, erythropoietin, rennin, vitamin D,- involved in bone metabolism- and others)

As this process develops and the number of functional units of the kidney or nephrons diminishes, the glomerular filtration rate (GFR) falls, while serum levels of urea rise, until approaching the stage of renal failure if the patient is not treated. The signs and symptoms in patients with renal failure are known as "uremic syndrome". Normal GFR values are approximately 120- 130ml/ minute/ 1.73 m², and vary according to age, gender and body size

MATERIAL AND METHODS

In order to do an update on oral manifestations and dental considerations for these patients, Medline database using the following key words: "chronic kidney disease", "renal failure", "renal disease", combined with: "antibiotic use", "cyclosporine", "dental", "dental management", "detection", "epidemiology", "neurological manifestations", "oral health", "oral manifestations", "periodontal disease", "tacrolimus", "uremic stomatitis", "xerostomia"; "dialysis", combined with "oral manifestations" "renal osteodystrophy"; and, finally, "kidney transplant" with "malignant tumors", "Kaposi sarcoma" and "supplemental corticosteroids".

RESULTS

Oral manifestations

Up to 90% of patients with renal insufficiency show oral signs and symptoms in soft and hard tissues, some of them being a cause of the disease itself and others deriving from the treatment of the pathology. The diminished function of the kidneys results in an increase in the levels of urea in the blood and also in the saliva, where it will turn into ammonia. For this reason, uremic individuals have a characteristic halitosis (*uremic fetor*), which also occurs in about

one-third of hemodialyzed patients. This halitosis is related to another manifestation: the perception of an unpleasant, metallic taste. Apart from urea, other factors possibly implied are the increase in the concentration of phosphates and proteins and changes in the pH of saliva. Also, these patients can refer sensitive disturbances, like altered taste sensations – especially, sweet and acid flavors-. These can be due to the high levels of urea, the presence of dimethyl- and trimethyl- amines, or low zinc levels (due to the malabsorption derived from gastrointestinal disorders). There can also be a burning sensation in the lips and tongue, of a neuropathic origin or even a sensation of an enlarged.

Sometimes these individuals are afflicted by anemia due mainly to the decrease in the synthesis of erythropoietin, which can be clinically observed as a skin and mucosa paleness delayed eruption in children with CRD has been reported. Another sign frequently found in children is the presence of enamel hypoplasias, due to alterations in calcium and phosphorus metabolism. In adults with CRD, narrowing or calcification of the pulp chamber can occur.

There is no consensus between authors whether dental caries are more prevalent in patients with CRD; however, there is no firm evidence to suggest that there is. Sometimes an antibacterial effect has been attributed to the increase of the pH (due to urea hydrolyzation by saliva), which suggests a protective function against caries. However; non- carious tooth tissue loss is more prevalent in individuals with CRD than in the general population. Loss, recessions and deep periodontal pockets.

Other oral manifestations of the CRD are related to renal osteodystrophy. This is a late sign of renal disease due to alterations in calcium and phosphorus metabolism, abnormal metabolism of vitamin D and the compensatory hyperactivity of parathyroid glands (secondary hyperparathyroidism).

Changes in maxillary bone, secondary to renal osteodystrophy. These changes comprise bone demineralization with trabeculation and cortical loss, giant cell radio transparencies or metastatic calcifications of the soft tissues. The patients are at increased risk of fracture during dental treatments such as extractions. Tooth mobility, malocclusion,

crowding, pulp chamber calcifications and temporomandibular joint problems are also observed.

It is characterized by the following signs: bone demineralization, decreased trabeculation, decreased thickness of cortical bone, ground- glass appearance of bone, metastatic soft- tissue calcifications, radiolucent fibrocystic lesions, radiolucent giant cell lesions, lytic areas of bone, jaw fracture (spontaneous or after dental procedures), abnormal bone healing after extraction, and, sometimes, dental mobility as a consequence of loss of substance in the bone.

Xerostomia (dry mouth), as a result of the restriction in fluid intake, the side effects of drugs (fundamentally antihypertensive agents), possible salivary gland alteration, and oral breathing secondary to lung perfusion problems

Bleeding tendency in these patients may be due to factors depending on the disease itself, like alterations in platelet aggregation and renal anemia (secondary to deficient erythropoiesis) and to dialysis, which diminishes platelet recount due to mechanical damage and heparin anticoagulation during this process. For that reason, it can be concluded that hemodialysis predisposes to ecchymosis, petechiae and hemorrhage in the oral mucosa. Gingival bleeding , petechiae and ecchymosis , resulting from platelet dysfunction and the effects of anticoagulants

Oral hygiene of patients receiving hemodialysis is usually poor, so deposits of calculus and plaque may be increased. Periodontal problems with important attachment loss, recesses and deep pockets.

Gingival overgrowth (GO) secondary to the immunosuppressive therapy is the most studied oral manifestation. An estimated 30% of dentate patients medicated with cyclosporine alone experience clinically significant gingival overgrowth (GO). When patients are medicated with a combination of cyclosporine and nifedipine, the prevalence of gingival overgrowth increases to 50%.

Enamel hypoplasia secondary to alterations in calcium and phosphorus metabolism , which can affect both the primary and permanent dentition . The severity of such hypoplasia is related to patient age at the time of presentation of these metabolic disorders, the duration of renal failure, and dialysis

Many antibiotics are actively removed by the kidney, so and adjustment of the dosage by amount or by frequency is required. Penicillin (and its derivatives, such as amoxicillin), clindamycin and cephalosporins are the preferred antibiotics for these patients. In the case of non-narcotic analgesics, paracetamol is the best choice. It is preferable to avoid the remaining non-steroidal anti-inflammatory drugs (ibuprofen, naproxen and sodium diclofenate), as they produce hypertension. Benzodiazepines can be prescribed without dose adjustment. Narcotic analgesics (codeine, morphine, phentanyline) do not need a dose adjustment either. Table 1 shows dose adjustment of some of the most used drugs in dentistry, depending on creatinine clearance.

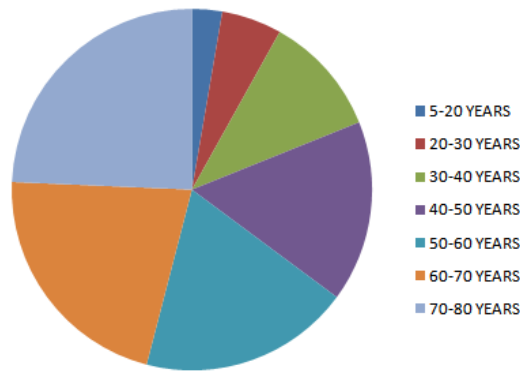
A. *Patient with renal disease in conservative medical treatment.* For the dental treatment of these patients, good communication with their nephrologist is highly recommended, in order to be aware of the stage of the pathology suffered and the treatment prescribed. Before any invasive

dental procedure, possible hematologic problem in the patient should be studied. When prescribing drugs, those that are nephrotoxic must be avoided (tetracyclines, aminoglycosides),

B. *Patient with renal disease in peritoneal dialysis. Dental management.* These patients do not require special measures with regard to dental treatment, apart from the considerations already mentioned. These patients do not require special measures with regard to dental treatment, apart from the considerations already mentioned.

C. *Patient with renal disease in hemodialysis. Dental management* During the process of hemodialysis, the patient's blood is anticoagulated with heparin to facilitate blood transit. For this reason, dental treatments with a risk of bleeding must not be performed the day of hemodialysis. If an emergency dental treatment must be performed, protamine sulphate (heparin antagonist) can be administered to block the anticoagulant effect.

DENTAL MANAGEMENT OF THE PATIENT RECEIVING HEMODIALYSIS	
SITUATION	ATTITUDE
Patient with medical problems treated by other Professionals	- Consultation with the nephrologist - Accurate medical history (medication prescribed)
High prevalence of arterial hypertension	Monitorization of blood pressure pre and postoperatively
Platelet dysfunction and anemia (bleeding tendency)	- Request hemostatic study before planning the surgery (time of bleeding, platelet recount, hematocrite, hemoglobin) - Local hemostatic measures
Heparin anticoagulation	Perform dental treatment the day not receiving dialysis, to be sure that there is no heparin in the blood (mean life of 4 hours)
Vascular access for hemodialysis	Avoid compression on the arm with the vascular access and never use it to measure blood pressure nor administering drugs intravenously
Disturbances in the metabolism and removal of Drugs	Some drugs must not be prescribed and some need dose adjustment. Request the CC to estimate the GFR
Renal osteodystrophy due to secondary hyperparathyroidism (late sign of chronic renal insufficiency)	- Bone more susceptible to fractures - Careful dental extraction technique to avoid fractures

RENAL PATIENT MENIFESATE ORAL SYMPTOMS

AGE	CALCULUS	BLEEDING GUM	POCKET	BONE LOSS	HALITOSIS	DETAL CARIES
5-20	No	NO	NO	NO	NO	NO
20-30	Grade-1	NO	NO	NO	NO	NO
30-40	Grade-1	YES	YES	NO	NO	NO
40-50	Grade-2	YES	YES	YES	NO	YES
50-60	Grade-2	YES	YES	YES	YES	YES
60-70	Grade-3	YES	YES	YES	YES	YES
70-80	Grade 3	YES	YES	YES	YES	YES

CONCLUSIONS

The most important renal pathology in dentistry is CRD. Up to 90% of patients with CRD show oral signs and symptoms, such as bleeding tendency, greater susceptibility to infections and gingival overgrowth produced by cyclosporine. As for dental considerations and management strategies for these patients, we should take into account that the drug dose adjustment must be done using creatinine clearance; before invasive dental procedures, a blood test must be requested (including hemostasia and blood recount). In transplant patients, the need of supplemental corticosteroid has to be considered. Hemodialysis and peritoneal dialysis do not indicate the need for an antibiotic prophylaxis. In hemodialyzed patients, dental treatment has to be performed the day they are not receiving hemodialysis.

REFERENCES

- <https://www.medscape.com/viewarticle/826105>
- https://www.kidney.org/sites/default/.../ckd_evaluation_classification_stratification.pdf
- <https://www.dentistryiq.com/articles/gr/print/volume-2/issue-3/original-article/oral-health-and-chronic-kidney-disease-building-a-bridge-between-the-dental-and-renal-communities.html>
- De Rossi SS, Glick M. Dental considerations for the patient with renal disease receiving hemodialysis. *J Am Dent Assoc.* 1996; 127:211-9.
- Jover Cerveró A, Bagán J V, Jiménez Soriano Y, Poveda Roda R. Dental management in renal failure: patients on dialysis. *Med Oral Patol Oral Cir Bucal.* 2008; 13:419-26.
- Proctor R, Kumar N, Stein A, Moles D, Porter S. Oral and dental aspects of chronic renal failure. *J Dent Res.* 2005; 84:199-208.
- Garcez J, Limeres Posse J, Carmona I T, Feijoo J F, Diz Dios P. Oral health status of patients with a mild decrease in glomerular filtration rate. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009; 107:224-8.
- Davidovich E, Davidovits M, Eidelman E, Schwarz Z, Bimstein E. Pathophysiology, therapy, and oral implications of renal failure in children and adolescents: an update. *Pediatr Dent.* 2005; 27:98-106.
- Kerr AR. Update on renal disease for the dental practitioner. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2001; 92:9-16.
- De Francisco AL, Otero A. Occult chronic renal failure: EPIRCE study. *Nefrologia.* 2005; 25:66-71.
- De la Rosa García E, Mondragón Padilla A, Aranda Romo S, Bustamante Ramírez MA. Oral mucosa symptoms, signs and lesions, in end stage renal disease and non-end stage renal disease diabetic patients. *Med Oral Patol Oral Cir Bucal.* 2006; 11: 467-73.