

Oral Manifestations of Chronic Kidney Disease-An Overview

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ABSTRACT

Kidney disease is a worldwide public health problem, with increasing incidence and prevalence, high cost, and poor outcome. Chronic Kidney Disease involves an irreversible loss of renal function. Chronic Renal failure can give rise to a large spectrum of oral manifestations, affecting the hard or soft tissues of the mouth. The majority of affected individuals have disease that does not complicate oral health care; nevertheless, the dental management of such individuals does require that the clinician understand the multiple systems that can be affected. The dental care of these patients can be complex, given the medications associated with the disease and the medical conditions that result from inadequately functioning kidneys. The present article aims to provide an overview, detailing the current knowledge of the oral and dental aspects of renal failure.

Keywords: Chronic, Renal, Dental Care, Oral manifestations.

INTRODUCTION

As technology and medicine advances, the oral health care professionals also have to attain a holistic approach to the management of patients with complex medical problems. Among all the systemic disorders, diseases of the renal system pose a major cause of morbidity and mortality worldwide,¹ as the kidneys are vital organs for maintaining a stable internal environment i.e homeostasis.² India, is now becoming a major reservoir of chronic diseases like diabetes and hypertension. This burden is expected to rise and thus, health care professionals need to take care of them, as 25 to 40% of these subjects may develop CKD and ESRD,³ CKD is the 12th leading cause of death and 17th cause of disability.³

Chronic Kidney Disease (CKD)

Chronic Kidney Disease is defined as structural or functional abnormalities of the kidney, with or without decreased GFR, manifested by pathological abnormalities or markers of kidney damage, including abnormalities in the composition of the blood or urine or abnormalities in imaging tests. (GFR <60ml/min/1.73m² for three months or more, with or without kidney damage).⁴

Based on mode of onset, renal diseases are classified as acute and chronic kidney disease. The principal renal condition that the dentists are likely to encounter is patient with CKD and occasionally nephrotic syndrome and renal transplant. Various causes for CKD include hypertension, diabetes, glomerular nephritis, interstitial nephritis, pyelonephritis etc.¹

Progressive loss of kidney function, ultimately results in clinical syndrome which is denoted as uremia. The systemic signs of renal failure and uremia such as hematologic changes, bone metabolism changes and alterations in immune status can be significant to the dental practitioner.⁵ (Table 1)

Stages of CKD

Among individuals with chronic kidney disease, the stage is defined by the level of GFR, with higher stages representing lower GFR levels (Table 2).⁶

Medical Management of Patient with Renal Failure

The treatment of renal failure comprises of dietary changes, correction of systemic complications and dialysis or renal graft receipt. Due to the chronic nature of the disease, the treatment is often a long time affair. Moderate amounts of proteins and carbohydrates should be included in the diet to minimize nitrogenous waste products. Fats should be re-

Signs	Symptoms
Peripheral edema	'Restless' legs
Rise in blood pressure (hypertension)	Leg cramps
Pericardial effusion	Ankle edema
Confusion, coma, lethargy	Loss of libido
Renal osteodystrophy	Feeling cold
Pallor due to anemia	Pruritus
Bruising due to platelet dysfunction	Insomnia

Table-1: Signs and symptoms of renal failure and uremia

CKD Stage	Definition
1	Normal or Increased GFR, some evidence of kidney damage reflected by microalbuminuria, proteinuria and hematuria as well as radiologic or histologic changes
2	Mild decrease in GFR (89-60ml/min per 1.73m ²) with some evidence of kidney damage reflected by microalbuminuria, proteinuria and hematuria as well as radiologic or histologic changes
3	GFR 59-30 ml/min per 1.73m ²
3A	GFR 59 to 45 ml/min per 1.73m ²
3B	GFR 44 to 30 ml/min per 1.73m ²
4	GFR 29- 15 ml/min per 1.73m ²
5	GFR < 15 ml/min per 1.73m ² , when renal replacement therapy in the form of dialysis or transplantation has to be considered to sustain life
The suffix p has to be added to the stage in proteinuric patients (proteinuria > 0.6g/24h)	

Table-2: Classification of CKD based on GFR

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stricted. Repeated blood transfusions are required to improve the anemia. By assessing the level of serum calcium and serum alkaline phosphatase at regular intervals, the development of hypercalcemia and its metastatic complications can be prevented. Massive doses of Vitamin D is required to treat Renal rickets osteomalacia. Hyperphosphatemia can be prevented by limiting phosphate containing foods (e.g. milk, cheese, eggs) and use of phosphate binding drugs, such as aluminum hydroxide gel (30-60 ml) given after meals. Intercurrent infection, if any, should be promptly treated with a suitable antibiotic. Anabolic steroids (e.g. nandrolone 25 mg intramuscularly once or twice a week) are useful and help to bring down the raised blood urea level. Hypertension and related cardiovascular complications should be treated on the usual lines, low doses of digoxin should be used in case of associated cardiac failure. Chlorpromazine can be used for control of nausea and vomiting. Gastric lavage with solution of sodium bicarbonate may be helpful. Uremic diarrhea should be treated by high bowel wash with plain water. Bland antidiarrheal drugs, such as pectin or kaolin, may be used. Renal failure is a debilitating disease carrying high mortality as well as morbidity. It needs long term treatment like continuation of life long renal replacement therapy in the form dialysis or the renal transplantation and thus keeping a huge economic burden as well social stress on patients and their families.⁷

Dialysis

Dialysis is a method by which waste products of metabolism are mechanically washed out of blood. Dialysis is of two types:

1. Extracorporeal or hemodialysis
2. Intracorporeal or peritoneal dialysis.⁷

ORAL MANIFESTATIONS

Oral cavity is the mirror of systemic health. Chronic renal failure (CRF) is one such disease which presents with a spectrum of oral manifestations, often due to the disease itself and treatment.⁸

The plethora of oral manifestations observed in chronic renal failure and associated therapies are like altered taste, gingival enlargement, xerostomia, parotitis, enamel hypoplasia, delayed eruption, various mucosal lesions like hairy leukoplakia, lichenoid reactions, ulcerations, angular cheilitis, candidiasis etc.⁹

With growing awareness about the inter-relationship between dental and medical problems, the role of dentist has become pivotal in overall health care of patients with CKD and also to render services for the oral findings of such diseases.⁹

Uremic Stomatitis

Uremic stomatitis can be seen due to presence of markedly elevated levels of urea and other nitrogenous wastes in the blood stream of chronic renal failure patients which can be abrupt in onset. It is clinically represents as white plaques distributed predominantly on the buccal mucosa, floor of the mouth and tongue.¹⁰ (Fig. 1). Patients usually complain of pain, unpleasant taste and burning sensation with the lesions, and the clinician may detect an odor of ammonia or urine in the patient's breath. The clinical appearance occasionally

mimic oral hairy leukoplakia.¹⁰ Uremic stomatitis can be of four types such as Erythromopultaceous, Ulcerative, Hemorrhagic and Hyperkeratotic.¹¹

Dry mouth

Xerostomia or dry mouth, is a frequent and important complaint among dialysis patients.¹² There are several reasons for the prevalence of dry mouth. The decreased salivary flow may be due to direct uremic involvement of salivary glands, chemical inflammation, dehydration, mouth breathing and also from the restricted fluid intake, irrespective of whether the patient is diabetic or not. The other conditions that may cause dry mouth in uremic patients are retrograde parotitis, metabolic abnormalities and use of diuretics.⁸

Taste change

The cause of metallic taste in uremic patients has been reported to be due to urea content in the saliva and its subsequent breakdown to ammonia and carbon dioxide by bacterial urease. The change in taste can also be due to metabolic disturbance, the use of medication, diminished number of taste buds and changes in the salivary flow and composition. Another study reports that high levels of urea, dimethyl and trimethyl amines and low levels of zinc might be associated with decreased taste perception in uremic patients.⁸

Mucosal Petechiae and Ecchymosis

This manifestation may be due to bleeding tendency because of abnormal thrombocyte function and a decrease in platelet factor III. It may also relate to the anticoagulants used during hemodialysis. The association between the prevalence of petechiae and ecchymosis and serum anticoagulant level require further studies.¹³

Renal Osteodystrophy

A frequent long-term complication of renal disease is renal osteodystrophy, a spectrum of bone metabolism disorders associated with different pathogenic pathways. These changes comprise bone demineralization with trabeculation and cortical loss, giant cell radiotransparencies or metastatic calcifications of the soft tissues. The patients are at increased risk of fracture during dental treatments, such as extractions.¹⁴ Diffuse involvements of the jaws occur with significant frequency and radiographic alterations of the facial skeleton may represent one of the earliest signs of the disease.¹⁵ In



Figure-1: Uremic Stomatitis

some patients, marked jaw enlargement and malocclusion may occur.

- Delayed eruption
- Enamel hypoplasia
- Loss of the lamina dura
- Widening of the periodontal ligament
- Severe periodontal destruction
- Tooth mobility
- Drifting
- Pulp calcifications

Candidiasis

Oral candidiasis will affect 20 to 30% transplant patients (Fig 2).¹⁶ Candidal infection may present as angular cheilitis, pseudomembranous or erythematous ulceration or chronic atrophic infection.¹⁷ Prevention is effective in the early post transplant period with antifungal lozenges or solutions. Treatment depends on severity; lozenges may cure mild infections, but oral antifungal (1% topical clotrimazole) may be required. Viral infection, such as herpes simplex virus used to be common in transplant recipients; the use of antiherpetic agents, such as acyclovir (5%) has significantly reduced the frequency of these infections.¹²

Mucosal Lesions

In renal patients who are receiving dialysis and renal transplant oral mucosal lesions, particularly white patches and ulceration have been noticed. In particular, lichenoid reactions and oral hairy leukoplakia can occur due to immunosuppressive drugs. Epstein-Barr virus (EBV) has also been detected with uremia, which can resolve with correction of the uremia. White patches of the skin are called as “uremic frost” can be seen patients with CKD due to deposition of urea crystals on the epithelial surfaces following perspiration.¹⁸ It can be occasionally seen intraorally, due to saliva evaporation.

Periodontal Disease

Gingival hyperplasia, increased levels of plaque, calculus, gingival inflammation and increased prevalence and severity of destructive periodontal diseases can be seen in patient's with CKD. Calcium channel blockers and calcineurin inhibitors, commonly used in treatment of renal disease can lead to gingival hyperplasia in CKD patients. Gingival overgrowth caused by these drugs can be severe, involving the interdental papilla, marginal and attached gingiva and treatment frequently involves surgical resection. However, improved oral hygiene has been reported to either decrease the incidence or delay the onset of gingival hyperplasia. Gingival bleeding, petechiae and ecchymosis, result from platelet dysfunction and due to the effects of anticoagulants in CKD patients. Periodontal problems with attachment loss, recession and deep pockets can also occur.¹⁹

Oral Malignancy

An increased susceptibility to epithelial dysplasia and carcinoma of the lip attributable to the treatment following renal transplantation has been postulated. The increased risk of malignancy in CRF probably reflects the effects of iatrogenic immune suppression, which in turn increases mucosal susceptibility to virus-related tumors, such as Kaposi's sarcoma or non-Hodgkin lymphoma.²⁰



Figure-2: Oral Candidiasis

DENTAL CONSIDERATIONS

The main management problems in renal failure include the following:

Bleeding Tendencies

Careful hemostasis should be ensured, if oral surgical procedures are necessary. Dental treatment is best carried out on the day after dialysis when there has been maximal benefit from dialysis and the effect of the heparin has worn off. The hematologist should be first consulted. Should bleeding be prolonged, desmopressin may provide hemostasis for up to 4 hours. If this fails, cryoprecipitate may be effective, has a peak effect at 4 to 12 hours and lasts up to 36 hours. Conjugated estrogens may aid in hemostasis: The effect takes 2 to 5 days to develop, but persists for 30 days.²¹

Infections

They are poorly controlled by the patient with renal failure, especially if the patient is immunosuppressed, and may spread locally as well as giving rise to septicemia. Infections are difficult to recognize as signs of inflammation are masked. Hemodialysis predisposes to blood borne viral infection, such as hepatitis virus.²¹

Antimicrobials consideration include erythromycin, cloxacillin, fucidin and can be given in standard dosage.

Penicillin, metronidazole and cephaloridine should be given in lower doses, since very high serum levels can be toxic to the central nervous system. Benzyl penicillin has significant potassium content and may be neurotoxic and therefore contraindicated. Patients should be considered for antimicrobials prophylaxis before extraction, scaling or periodontal surgery for those with polycystic kidney, those receiving peritoneal dialysis, since bacteremia can result in peritonitis. Aspirin and other nonsteroidal anti-inflammatory analgesics should be avoided, since they aggravate gastrointestinal irritation and bleeding associated with renal failure. Their excretion may also be delayed and they may be nephrotoxic, especially in the elderly or in renal damage or cardiac failure. Some patients have peptic ulceration, which is further contraindication to aspirin. Even COX-2 inhibitors may be nephrotoxic and are best avoided. Antihistamines or drugs with antimuscarinic side effects may cause dry mouth urinary retention. Fluorides can safely be given topically for caries prophylaxis. Systemic fluorides should not be given,

because of doubt about fluoride excretion by damaged kidney. Antacids containing magnesium should not be given as there may be magnesium retention. Antacids containing calcium or aluminium bases may impair absorption of penicillin and sulphonamides.²¹

Hypertension

Many renal patients are on antihypertensive therapy, digoxin and diuretics which may also complicate management.

Local Anesthesia and Conscious Sedation

Local anesthesia is safe unless there is severe bleeding tendency.

Conscious sedation: Relative analgesia may be used. Midazolam is preferable to diazepam because of the lower risk of thrombophlebitis.²²

General Anesthesia

Renal failure is complicated by anemia, which is the contraindication to general anesthesia, if the hemoglobin is below 10gm/dl. Some of the difficulties with general anesthesia are the patients with chronic renal failure which are highly sensitive to the myocardial depressant effects of anesthetic agents and may develop hypotension at moderate levels of anesthesia. Isoflurane and sevoflurane are safer. Induction with thiopentone followed by very light general anesthesia with nitrous oxide is generally the technique of choice.

To reduce dry mouth, recommended use of alcohol-free mouthwashes or saliva substitute is advocated.

All universal precautions should be followed as incidence of Hepatitis B and C are higher among dialysis patients.²³

CONCLUSION

A proper examination of the oral cavity in patients with CKD is invaluable to diagnosis at an early stage of multi-system disease. Therefore, these patients should be routinely evaluated for oral lesions and treated accordingly. The dental management of patients with renal disease is complicated by systemic consequences of renal failure particularly anaemia, bleeding tendency, cardiovascular or endocrine diseases, but with the use of proper treatment protocols, the dental management in these patients can be effective and safe. A simple routine examination of the oral cavity should become the norm for all clinicians caring for renal patients.

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