

Spectrum of Orofacial Manifestations in Renal Diseases

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ABSTRACT

An increasing number of Indians are living with renal disease. This disease has many implications for, in terms of oral manifestations and management of afflicted patients. Renal failure can give rise to a large spectrum of oral manifestations, affecting the hard or soft tissues of the mouth. 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. Thus, the role of dentist is pivotal in overall health care of patients with renal disease. The authors present relevant information to help dentists in treating patients who exhibit the oral and systemic manifestations of renal disease. The present article reviews, in detail, the current knowledge of the oral and dental aspects of renal failure.

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INTRODUCTION

Diseases of kidney that alter normal functions may be reversible or irreversible (acute and chronic renal failure ends stage renal disease). Chronic kidney disease (CKD) and end stage renal disease (ESRD) are associated with increased morbidity and mortality.¹ In United Kingdom, the annual incidence of ESRD has doubled over the past decade to reach about 100 new patients per million of population. These trends are similar in other developed countries and are expected to rise at an annual rate of around 5 to 8%. Two factors are imperative. The first is the ageing of the population; the incidence of ESRD is higher in elderly people than in the general population. The second factor is the global epidemic of type 2 diabetes mellitus; the number of people with diabetes worldwide (currently about 154 million) is predicted to double within the next 20 years. This increase will be most notable in less developed countries, where the number of diabetic patients could rise from 99 to 286 million by 2025.² The population of India exceeds 1 billion and is expected to become a major reservoir of chronic diseases like diabetes and hypertension. Since 25 to 40% of these subjects may develop CKD and ESRD, the burden will rise and health care professionals need to take care of them.³ The exact prevalence of CKD and ESRD in India is not clear in the absence of countrywide registry data.³ The

therapy of CKD and ESRD is very expensive and it is out of reach of 90% patients in India.⁴ There are many more people undergoing dialysis treatment and kidney transplants than there were only a decade ago.⁵ The dental care of these patients can be complex, given the medications associated with the diseases and the medical conditions that result from inadequately functioning kidneys. Renal diseases have many implications for dentistry, in terms of oral manifestations and management of patients. The authors present relevant information to help dentists treat patients who exhibit the oral and systemic manifestations of renal diseases.

Renal Failure

Kidney function has deteriorated to the point of chronic abnormalities in the internal environment, including azotemia, metabolic acidosis, hypocalcemia and hyperphosphatemia as well as isosthenuria and nocturia.⁶

Chronic renal failure is an irreversible deterioration in renal function which classically develops over a period of years. Initially, it is manifest only as a biochemical abnormality. Eventually, loss of the excretory, metabolic and endocrine functions of the kidney leads to the development of clinical symptoms and signs of renal failure, which are sometime referred to uremia.⁷ The systemic signs of renal failure and uremia can be important to the dental practitioner, particularly hematologic changes, change in bone metabolism and alterations in immune status (Table 1).

End Stage Renal Disease

ESRD is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life.⁸

Table 1: Signs and symptoms of renal failure and uremia⁹

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 ¹⁰	Insomnia

Medical Management of Patient with Renal Failure

The treatment of renal failure includes dietary changes, correction of systemic complications and dialysis or renal graft receipt. Since the condition is chronic, the treatment schedule is bound to be a long time affair. Diet should therefore contain a moderate amount of proteins except during periods of acute exacerbations. Rest of the calories should be derived from carbohydrates. Fats should be restricted. Anemia should be corrected by repeated pack cells transfusions. Renal rickets osteomalacia is treated by massive doses of vitamin D. Serum calcium and serum alkaline phosphatase levels should be estimated frequently in order to avoid development of hypercalcemia and its metastatic complications. Hyperphosphatemia may be prevented by restricting 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.¹¹ Hypertension and associated cardiovascular complications should be treated on the usual lines. The dose of digoxin in case of associated cardiac failure should be low. Nausea and vomiting may be controlled by chlorpromazine. Hiccups may at times be difficult to control. Gastric lavage with a weak solution of sodium 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 required.¹¹ Renal failure is a devastating medical, social and economic problem for patients and their families. The availability and quality of dialysis programs largely depend on the prevailing economic conditions, overall health care facilities and the health care funding strategies of various countries.

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.

Recent Advances in Dialysis

Hemofiltration: This is the most recent technique of dialysis, where the cannula is inserted into a major artery (usually the radial) and another cannula into the vein (to form an AV shunt). The advantages of this technique is that it serves

the purpose of IV feeding as well as is less likely to cause hypotension in patients with gross septicemia or myocardial disease (as it likely to happen with hemodialysis).¹¹

Renal Transplant

In recent years, attempts have been made to change the kidneys altogether, if these are damaged permanently and irreversibly. The damaged kidneys are replaced by kidneys obtained from a person having an identical genetic background, such as identical twins (isograft) or from a person having a different genetic background (allograft). Renal transplant is being tried as a means of treating an irreversibly damaged bilateral renal patients.¹¹

ORAL MANIFESTATIONS

Xerostomia, or dry mouth, is a frequent and important complaint among dialysis patients.¹² Methods to improve xerostomia might include recommending chewing gum, or a saliva substitute. Patient with chronic xerostomia require regular dental checkup as it predisposes to sialadenitis, caries, oral inflammation and infection.¹³ Xerostomia also may give rise to the bad taste and ammonia-like odor, altered taste sensation or a metallic taste.¹²

Uremic Stomatitis

Patients who have chronic renal failure typically show markedly elevated levels of urea and other nitrogenous wastes in the blood stream. Uremic stomatitis represents a relatively uncommon complication of renal failure. The onset may be abrupt, with white plaques distributed predominantly on the buccal mucosa, tongue and floor of the mouth (Fig. 1).¹⁴ Patients may complain of unpleasant taste, oral pain or a burning sensation with the lesions, and the clinician may detect an odor of ammonia or urine on the patient's breath. The clinical appearance occasionally has been known to mimic oral hairy leukoplakia.¹⁴

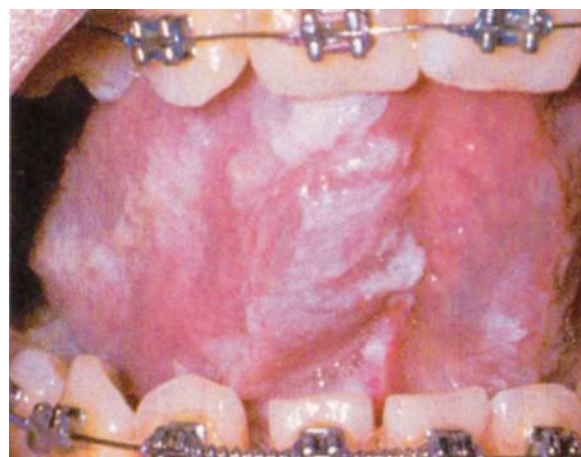


Fig. 1: Uremic frost

Uremic stomatitis and uncommon clinical observation associated to uremia. As many as four types of uremic stomatitis have been described: Erythromopultaceous, ulcerative, hemorrhagic hyperkeratotic.¹⁵

Renal Osteodystrophy

A frequent long-term complication of renal disease is renal osteodystrophy, a spectrum of bone metabolism disorders associated with different pathogenic pathways.¹⁶ 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.¹⁷ 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.¹⁶ In some patients, marked jaw enlargement and malocclusion may occur.

- Delayed eruption
- Enamel hypoplasia (Fig. 2)¹⁴
- Loss of the lamina dura
- Widening of the periodontal ligament
- Severe periodontal destruction
- Tooth mobility
- Drifting
- Pulp calcifications
- Pulp narrowing

Dental anomalies associated with renal failure, tooth and periodontium.

Fungal Infections

Oral candidiasis will affect 20 to 30% transplant patients.^{18,19} Candidal infection may present as angular cheilitis, pseudomembranous or erythematous ulceration or chronic atrophic infection.¹¹ Prevention is effective in the early post-transplant period with antifungal lozenges or solutions.



Fig. 2: Enamel hypoplasia

Treatment depends on severity; lozenges may cure mild infections, but oral antifungal 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 has significantly reduced the frequency of these infections.¹²

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

Mucosal Lesions

A variety of oral mucosal lesions, particularly white patches, ulceration has been noted in individuals receiving dialysis and renal transplant. In particular, lichen planus-like lesion (lichenoid disease), oral hairy leukoplakia can occur secondary to drug-related immunosuppression (e.g. diuretics, beta-blockers). Epstein-Barr virus (EBV) has been observed with uremia, this lesion may resolve with correction of the uremia.¹⁰ White patches often related with the skin, called 'uremic frost,' can occasionally be seen intraorally. This uremic frost results from remaining urea crystals left on epithelial surfaces following perspiration and saliva evaporation.⁶

Periodontal Disease

Effects of chronic renal disease and renal transplant on periodontal tissues include gingival hyperplasia and increased levels of plaque, calculus and gingival inflammation and possible increased prevalence and severity of destructive periodontal diseases.²¹

Gingival hyperplasia secondary to calcineurin inhibitors and calcium channel blockers are the most reported effect of renal disease on periodontal tissues. Gingival overgrowth with these drugs can be severe and treatment frequently requires surgical resection. Hyperplasia mainly affects the labial surface of the interdental papilla, though greater extensions can be affected, including the gingival margins and lingual and palatal surfaces⁹ (Fig. 3).¹⁴ Improved oral hygiene has been reported to decrease the incidence or delay the onset of gingival hyperplasia; gingival bleeding, petechiae and ecchymosis, resulting from platelet dysfunction and the effects of anticoagulants;²² periodontal problems with important attachment loss, recesses and deep pockets.²¹



Fig. 3: Drug-induced gingival enlargement

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 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.²³

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.

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.^{23,24}

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.²⁵

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.^{23,24}

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.²⁴

CONCLUSION

The goal of dental treatment in patients with renal disease should be early and frequent evaluation of the oral cavity for the source of infection. Early detection of oral pathologies will permit swift correction without the need

of extensive treatment. The dentist must be aware of the ramifications of renal disease and hemodialysis on dental treatment. The dental management of renal failure is complicated by some systemic consequences, such as anemia, bleeding tendencies and cardiovascular or endocrine disease. The renal disease patients having dental problems may compromise his/her general health and hinder medical treatment. Thus, the role of dentist is pivotal in overall health care of patients with renal diseases.

Source of pictures: Neville BW, Damm DD, Allen CM. Oral manifestation of systemic diseases. Textbook of Oral and Maxillofacial Pathology (2nd ed). USA: WB Saunders Company 2002;705-36.

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