Review Article

Current Trends in Dental Management of Patients with Chronic Renal Disease

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Abstract

The kidneys perform a wide range of important functions, the prime function of which is to maintain a stable composition of the fluid-bathing cells by selective retention and elimination of water, electrolytes, and other solutes. Chronic renal disease is defined as the presence of kidney damage, or a reduction in the GFR (<90ml/min/1.73m^2), for 3 or more months. Consultation with the nephrologist is essential before any dental treatment is carried out, in order to determine the condition of the patient, define the best moment for dental treatment, introduce the necessary pharmacological adjustments, or to establish other important aspects for preventing complications in the dental clinic.

Key Words: GFR, CKD, Drugs modification, Hemostasis, Infection

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Introduction

The kidneys are essential organs in the urinary system and maintain homeostasis of the body by regulation of electrolytes, maintenance of acid–base balance, and regulation of blood pressure (via maintaining salt and water balance). They serve the body as a natural filter of the blood, and remove water soluble wastes, which are diverted to the urinary bladder. In producing urine, the kidneys excrete wastes such as urea and ammonium, and they are also responsible for the reabsorption of water, glucose, and amino acids. The kidneys also produce hormones including calcitriol, erythropoietin, and the enzyme renin[1].

The glomerular filtration rate (GFR) can be calculated from creatinine clearance, insulin clearance or clearance of isotopes, such as ^{125}I-iothalamate, ^{51}Cr-EDTA or ^{99}mTc-DPTA, or plasma creatinine levels.

In healthy individuals, GFR is around 120ml/min per 1.73m^2 for female and 130ml/min per 1.73m^2 for male[1] (Table 1).

According to the part of renal anatomy involved, kidney diseases can be classified as:-

1.Vascular – diseases of large vessels (e.g. bilateral renal artery stenosis) or small vessels (e.g. ischemic nephropathy, haemolytic –uraemic syndrome and vasculitis)
2. Glomerular – primary (e.g. focal segmental glomerulosclerosis and immunoglobin A nephritis) or secondary (e.g. diabetic nephropathy and lupus nephritis)
3. Tubulointerstitial – polycystic kidney diseases, drug- and toxin- induced chronic tubulointerstitial nephritis and reflux nephropathy.
4. Obstructive – renal and bladder stones and prostate diseases

Table 1: Stages of chronic kidney disease

Stages	Renal Health	GFRml/min/1.73m^2	Features
-	Normal	130	-
1	Diminished renal reserve (early CRF)	>90	Abnormalities in blood or urine test or imaging studies but few overt symptoms
2	Mild CRF (azotaemia)	60-89	Abnormalities in blood or urine tests or imaging studies
3	Moderately severe	30-59	Abnormalities in blood or urine tests or imaging studies
4	Severe CRF	15-29	Uraemic symptoms
5	End stage renal failure(ESRF) or chronic renal failure (CRF)	<15	Life threatening and requires some form of renal replacement therapy

General management of patients with CKD

The progress of CKD is measured by eGFR (estimated GFR ; calculated by taking into account age, gender, serum creatinine level), raise in BUN, rise in serum creatinine. The main treatment goal should be to stop the progress of CKD to stage 5, reduce the cardiovascular risk and thereby reducing the mortality rate. A normal diet with potassium restriction and salt or water control is advocated.

The dosage of drugs excreted renally should be reduced according to the existing kidney function. The least nephrotoxic drugs are preferred. The drugs with active metabolites compromising existing renal function should be avoided.

Table 2: Drug modification in patients with chronic kidney disease

	Usually safe (no dosage change usually required)	**Fairly safe (dosage change only in severe renal failure)**	**Less safe (dosage reduction indicated even in mild renal failure)**	**Avoid (best avoided in any patient with renal failure)**
Antimicrobials	Azithromycin Cloxacillin Doxycycline Flucloxacillin Fucidin Minocycline Rifampicin	Ampicillin Amoxicillin Benzylpencillin Clindamycin Co-trimaxazole Erythromycin Ketoconazole Lincomycin Metronidazole Phenylmethyl penicillin	Acyclovir Cephalosporins Ciprofloxacin Etafloxacin Fluconazole Levofloxacin Ofloxacin vancomycin	Aminoglycosides Carbenicillin Cefadroxil Cefalexin Cefixime Cephalothin Gentamycin Imipenem/cilastatin Itraconazole Sulfonamides Tetracyclines valaciclovir
Anesthetics	Lidocaine	Prilocaine, articaine	-	-
Analgesics	Paracetamol/acetaminophen	Codeine	Aspirin NSAIDs	Dextropropoxyphene opioids, Meperidine, morphine, Pethidine, Tramadol
Anticonvulsants			Carbamazepine Gabapentin Lamotrigine	
Sedatives	Diazepam, Midazolam			

Dental management of CKD

Hemostasis and infection control are the important aspects to be considered in patients with chronic renal disease undergoing dental treatment. The dental procedures like periodontal procedures, minor oral surgeries and dental extractions should be carried out on the day after dialysis, when there is maximal benefit from dialysis and the effect of heparin has worn off. Hemostasis can be achieved in case of prolonged bleeding by-

Desmopressin (DDAVP)	Upto 4hrs
Cryoprecipitate	Peak effect at 4-12hrs and lasts upto 36hrs
Conjugated oestrogen	2-5 days to develop and persists for 30 days

Patients with CKD are more prone for infections and may lead to septicaemia if immunosuppressed. Risk of extrapulmonary tuberculosis is also high. Drugs like tetracyclines which worsen nitrogen retention and acidosis are best avoided. However, doxycycline and minocycline are usually safe. Benzylpenicillin may be neurotoxic due to its high potassium content (Table 2).

Antimicrobial prophylaxis should be considered in patients undergoing dental extractions, scaling or periodontal surgery, especially those with polycystic kidneys (may have mitral valve prolapse), with renal transplants, on PD (peritoneal dialysis) or HD (hemodialysis) with prosthetic bridge grafts of PTFE or tunnelled cuffed catheters. Teicoplanin 400mg may be given intravenously during dialysis, which gives cover for a day[2,3].

Dosage of drugs excreted through kidney should be lowered. Generally prescription of drugs for dental procedures should be considered after consultation with nephrologist. Aspirin and other NSAIDs should be avoided since they aggrevate GI bleeding associated with CKD. Long term use of NSAIDS is associated with risk of acute renal failure, nephrotic syndrome with interstitial nephritis and chronic renal failure[4]. Sodium excretion is reduced and can lead to peripheral oedema, elevated blood pressure and exacerbation of heart failure. Antihypertensive effects of beta-blockers, ACEi (angiotensin converting enzyme inhibitors) or ARBs (Angiotensin II receptor blockers) can be decreased. Short term NSAID use is well tolerated if the patient is well hydrated and has good renal function

and no heart failure, diabetes or hypertension. Serum creatinine should be checked every 2-4 weeks in early treatment.

Topical fluorides can be safely administered for caries prophylaxis. Systemic fluorides are generally avoided due to questionable excretion through damaged kidneys. Antihistamines may cause dry mouth or urinary retention. Antacids with magnesium are avoided as there is risk of magnesium retention. Antacids with calcium or aluminium bases may affect absorption of penicillin V and sulfonamides[5].

In patients on hemodialysis requiring intravenous sedation or withdrawal of blood for investigations, veins of the forearms and saphenous veins are avoided because of risk of fistula infection or thrombophlebitis. Midazolam is preferable to diazepam due to low risk of thrombophlebitis. Local anesthesia is generally safe unless there is severe bleeding tendency.

Conclusion

Patients with chronic renal Disease require special care in relation to dental treatment, not only due to the conditions inherent to the disease but also because of the side effects and characteristics of the treatment they receive. Renal disease influence the use of drugs in dentistry, particularly NSAIDs and some antimicrobials. An appropriate and safe dental care can be provided to these patients with the working knowledge of renal disorders and related problems and in close coordination with the Nephrologists or the patients' physician.

References

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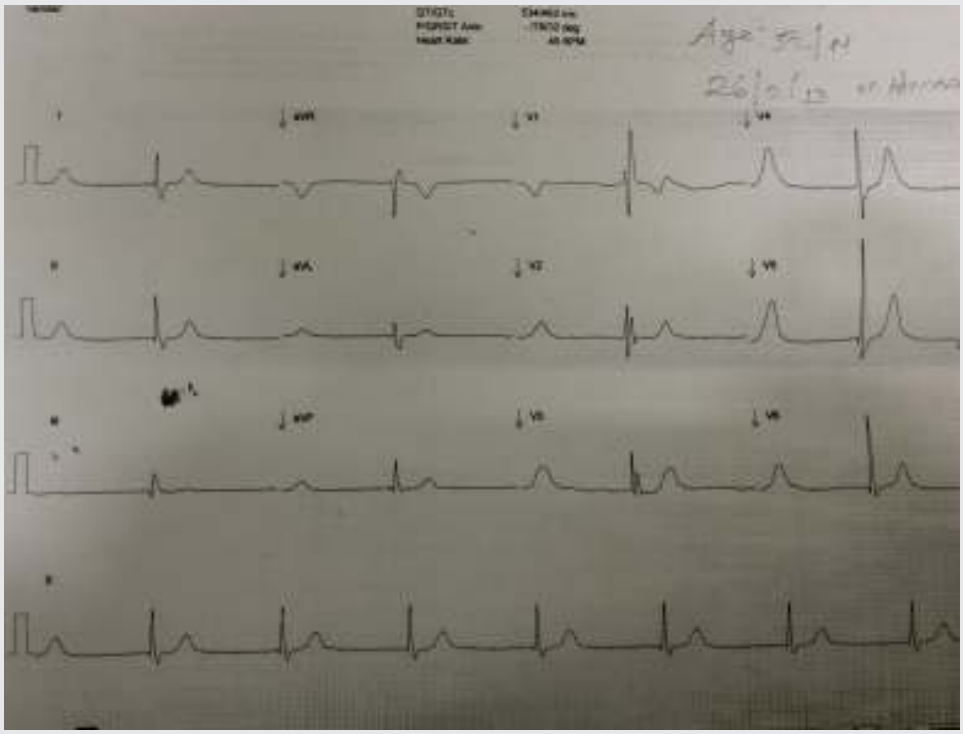
Diagnose the condition

52 year male admitted with history of recurrent syncope.



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