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Dental Considerations and Management of Children with Renal Diseases–An Overview

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Abstract

Kidneys are vital organs for maintain a stable internal environment, prevalence of renal disease is increasing universally. Nephritic syndrome is a clinical manifestation of any glomerular lesion that causes more than 35 g of proteinuria/day. Chronic renal disease is defined as a progressive and irreversible decline in renal function associated with a reduced glomerular filtration rate. Common renal disorders seen in children include congenital nephropathies, nephrotic syndrome, chronic renal failure (CRF), glomerulonephritis, hydronephrosis, and multicystic renal dysplasia, which ultimately lead to end-stage renal disease (ESRD). Children usually show growth retardation, bleeding tendency due to capillary fragility and thrombocytopenia is positive, pale and anaemic. This article discuss about the etiology, clinical features and dental management of children with renal diseases.

Keywords

Children; Dental management; Oral health; Renal diseases

Introduction

Kidneys play an important role in sustain physiologic balance; regaining homeostasis and fluid electrolyte acid-based balance, drug metabolism and elimination, blood pressure control through the renin-angio-tensin system, red blood cell production through erythropoietin production, and vitamin common renal disorders seen in children are nephritic syndrome, chronic renal failure, chronic pyelonephritis, chronic glomerulo nephritis which ultimately leads to end stage of renal failure [1].

Nephrotic Syndrome (Nephrosis)

Nephritic syndrome: it is a condition that indicates exogenous or endogenous glomerular injury. Acute nephritic syndromes occur most frequently in children and are classically associated with post streptococcal glomerulo nephritis, commonly preceded by a beta-hemolytic streptococcal oropharyngitis. Typically l-2 weeks after the pharyngitis. Since the advent of penicillin therapy, acute nephritic syndrome has been observed less frequently streptococcal pharyngitis [2].

The aetiology of this syndrome is unknown but there is a reasonable possibility that it is an autoimmune disease. The onset is often at the age of about 2 to 3 years and the duration may be months or years. There are glomerular changes and a loss of protein. Oedema is an important feature which recurs during the course of the disease and secondary anaemia may be present. These children are very susceptible to infection and upper respiratory infections are common. Exacerbations of the renal condition may occur on these occasions [3,4].

Clinical features over 50% cases are subclinical or mild, usually producing slightly abnormal renal function that lasts less than a week. Sudden onset characterized by fever malaise. Children are ill with concurrent findings of oedema, oliguria, azotemia, and dark or coffee ground color urine (hemnturia). The hypertension is usually mild to moderate and elevates the systolic blood pressure about 20 to 40 mmHg. When the blood pressure as markedly elevated and the oedema and electrolyte imbalance become persistent, nephritic syndrome can lead to convulsions. Congestive heart failure or cardiac arrythmias. Progressive cardio-respiratory symptoms include cough, dyspnea. orthopnea, edema, rules, and gallop rhythm [5].

Treatment by corticosteroid therapy has greatly changed the course of this disease. Its duration is much reduced and chances of complete recovery considerably improved. This therapy is likely to be intensive and prolonged and may be continuous or interrupted. The use of antibacterial agents has reduced the number of deaths due to infection.

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Oral condition

Enamel hypoplasia occurs in some of the children with this condition, and there may be some degree of discoloration of the teeth by tetracyclines [6].

Dental treatment

In view of the prolonged nature of the disease and its relationship to infection, maintenance of dental health is of importance. In remission periods the patient leads a relatively normal life and dental treatment should be carried out regularly at that time. Dental sepsis should be eliminated including any teeth which are doubtful. Root canal therapy is contraindicated. All extractions should be done with suitable antibiotic cover and consultation with the physician in charge will be necessary to establish the existing state of the corticosteroid therapy and whether to supplement it General anaesthesia must be an in-patient procedure. Enamel hypoplasia is treated as necessary and the patient may seek improvement of the appearance of the permanent incisors when they are badly discoloured by frequent tetracycline therapy during the early years [7].

Oral manifestation and dental considerations

They develop persistent oropharyngitis that involves the tonsillar tissues, uvula, and 501% palate. lntensely painful pharyngeal erythema and areas of necrosis may be observed. Healing occurs 1 to 2 weeks after the initiation of penicillin therapy.

Dental care for the patient with nephritic syndrome should be delayed until acute symptoms resolve. Consultation with the physician is advised prior to commencing dental treatment, to determine the patient's renal status [8].

Chronic Pyelonephritis

Though most cases appear to be due to an ascending infection, there are some which are caused by a blood-borne infection of the coccal type from a distant focus. Recurrent or persistent infection results in scarring and loss of function of the kidney, but in some there is also a pre-existing obstructive lesion. Treatment is usually by prolonged courses of antibiotics or sulphonamides. Hypertension may be a feature.

Oral condition

There are no special dental features associated with this condition.

Dental treatment

This should be directed towards the elimination of septic foci and the maintenance of dental health.

• Extractions should be done under prophylactic cover, the choice of which should take into account previous or current therapy preferably in consultation with the patient's physician [9].

• Postoperative bleeding may be a problem in cases with hypertension. General anaesthesia is generally contraindicated unless the patient can be admitted to hospital for it, but local anaesthesia is acceptable.

• Root canal therapy in a non-vital tooth is best avoided, though a vital extirpation may be acceptable if routine follow-up is certain [10].

Chronic Glomerulonephritis

This condition may follow either the acute type or the nephrotic syndrome in children or may have an insidious onset without demonstrable cause. There are often acute exacerbations following upper respiratory infections of B haemolytic streptococci and each attack causes further renal damage. Many of the glomeruli may be damaged, the tubules atrophic or cystic, and extensive scar tissue and other degenerative changes present. There may be complete failure at the time of puberty. The condition produces a significant state of fatigue and anaemia may be present. The prognosis is a downward one and death may follow cerebral damage or heart failure. Current types of treatment do not materially alter the prognosis, but modern development in transplant surgery may well change this. These patients are highly susceptible to infections and any measures which prevent this will prolong life and keep the patient in a better mental state [11].

Oral condition

There are no special dental features associated with this condition [12].

Dental Treatment

• Elimination of dental sepsis must be the first consideration and in view of the susceptibility to infection, any doubtful teeth are better removed. This must be done under antibiotic cover and consultation with the physician in charge is advisable.

• Local anaesthesia would be the method of choice and general anaesthesia should only be used as an in-patient procedure [13].

• Once the septic and doubtful teeth have been removed, dental health should be maintained.

• Treatment plans should be simple and not prolonged in view of the prognosis, but the patient should not be denied simple orthodontic treatment if desired.

• Such measures not only maintain good oral conditions but help to promote a hopeful attitude in the patient and root canal therapy is contraindicated [14].

Chronic Renal Failure

It is also known as chronic kidney disease as it develops slowly, with few initial symptoms and is a long term result of irreversible acute disease or untreated disease progression. CRF is characterized by gradual reduction in the number of functional nephrons sufficient

S.NO	Localised
1.	Proliferative membranous glomerulone-phrothy
2.	Chronic pylonephritis
3.	Tubercular pylonephritis
4.	Renal caliculi
5.	Congenital nephritis
6.	Polycystic disease
7.	Medullary cystic disease
8.	Renal hypoplasia
9.	renal tubular hypoplasia
S.NO	**Obstructive**
1.	Upper respiratory tract obstruction
2.	Hydronephrosis
3.	Retroperitoneal fibrosis
4.	Neoplasm
5.	Adenoma
6.	Urethral stricture
7.	Urethral valves
8.	Bladder neck obstruction
9.	Neurogenic bladder
S.NO	**Systemic**
1.	Benign/malignant
2.	Polyarteritis nodosa
3.	Dessiminated lupas erythematosis
4.	Primary and secondary amyloidosis
5.	Potassium deficiency
6.	Hypercalcemia
7.	Oxalosis
8.	Thrombiotic thrombocytopenic purpura
9.	Lead poisoning diabetes

Table 1: Etiology of CRF

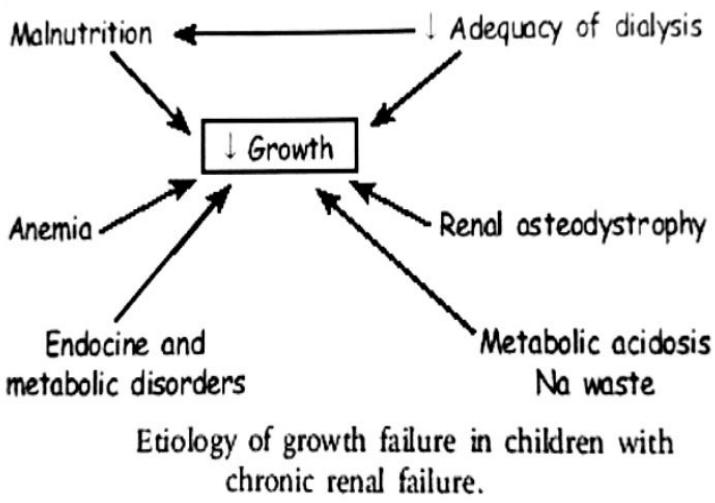

Figure 1: Etiolology of growth failure in children with chronic ranal failure

to produce alterations in the well-being and hampering the organ function. GRF rate falls less than 60 ML/min. Failure of kidney failure depend upon the degree of intoxication. Children nephritic syndrome is often caused by minimal change glomerulonephritis, that is, nephritic syndrome with minimal glomerular changes as seen by light microscopy [15-19] (Table 1). Etiolology of growth failure in children with chronic ranal failure in Figure 1 [20].

Clinical manifestations

Oedema is the most frequent complaint of patient seeking medical treatment, is usually localized to the lower extremeties, peri-orbital region, and abdominal wall, but infrequently [21-24]. It can involve the pericardial sac. left untreated edema may cause patients to complain that their legs feel cold, heavy, numb, and swollen. Lethargy, tiredness, muscle wasting, and hypertension. Frothy urine due to proteinuria and lipiduria. Reduced urine volume and increased thirst. "Muerke's lines", a transven white bands of the finger nails and toe nails are noted. Spontaneous thromboses due to increased platelet adhesion and aggregation as well as decreased levels of antithrombin III.

Oral manifestations

In children the periorbital edema can be severe enough to prevent the eyelids from opening. Although these features may be dramatic, after a short course of corticosteroid therapy, the oedema usually wanes [13,14].

Symptoms of CRF

General Symptoms of CRF include [25]:

Increased level of urea in the blood may lead to

- Nocturnal urination
- Frequent urination in smaller amounts
- Pale urine
- Foamy for bubbly urine
- Difficulty in urinating
- Weight loss
- Nausea
- Vomiting
- Blood in urine

Increased levels of phosphates may cause

- Muscular cramps
- Itching
- Bone damage

S.NO	Clinical
1.	Candidiasis and oral petechiae
2.	Mucosal pallor
3.	Extrinsic discoloration of teeth
4.	Enamel hypoplasia
5.	Decreased rate of dental caries
6.	Mobility of teeth leads to Premature loss of teeth
7.	Uremic stomatitis with painful ulcers
8.	Intraoral hematoma with tendency to bruise
9.	Chronic marginal gingivitis
10.	Uremic odour
Radiographic	
S.NO	**JAWS**
1.	Total or partial loss of lamina dura
2.	Demineralisation of boner
3.	Localised radiolucent lesions
4.	Loss of distinct cortical border of hard palate
5.	Oral calcification
6.	Arterial calcifications in facial artery and carotid artery.
S.NO	**TEETH**
1.	Pulpal narrowing
2.	Pulp calcification
3.	Dentinal bridging
4.	Intra dentinal radiolucency
5.	Root resorption
6.	Hypercalcemia
7.	Oxalosis
8.	Thrombiotic thrombocytopenic purpura
9.	Lead poisoning diabetes

Table 2: Clinical and radiographic findings of renal disorders

1. Patients with a history of penicillin therapy within the previous six months	• Cephaloridine by intramuscular injection 30 minutes before operation followed by erythromycin orally 6- hourly for 3 days.
	• Erythromycin orally commencing 12 hours before operation and taken 6-hourly for 4 days.
2. Patients who are sensitive to penicillin should be given erythromycin or tetracycline (not Cephaloridine)	• Tetracycline orally commencing 12 hours before operation and taken 6 hourly for 4 days. (children under 8 years of age should be given oxy tetracycline rather than any of the others in view of the dental side effects).
3. Patients without a history of penicillin therapy	• Triplopen in a single intramuscular injection 30 minutes before operation
	• procaine penicillin and benzyl penicillin by intramuscular injection 30 minute before , operation followed by oral penicillin V taken 6 hourly for 3 days
	• Oral penicillin V commenced 12 hours before operation and continued 6 hourly for 4 days.

Note: In each group the type of antibiotic cover are given in order of preference, the first being the most effective

Table 3: Types of antibiotic therapy

Antibiotic	Route	presentation	Upto 1 year	1-5 years	6-12 years	Adult	Frequency
Penicillin-procaine	IM injection	Injection suspension 300 mg per ml	150 mg	300 mg	600 mg	300-900 mg	Maintain single injection of both followed by oral penicillin, Combined preparation of fortified procaine penicillin BP
Penicillin- Benzyl	IM injection	Injection suspension 150 mg per ml	62.5 mg	150 mg	300 mg	Up to 1.5 G	
Penicillin-V	Oral	Capsules or tablets 125 mg, 250 mg	---	125 mg	250 mg	250 mg	6 hourly for at least 4 days
Penicillin-V	Oral	Mixture 125 mg per ml	62.5 mg	125 mg	----	----	6 hourly for at least 4 days
Penicillin-Triploen	IM injection	Vials containing Benethamine pen 250 mg Sodium penicillin G 300 mg	1 Vial	1 Vial	1 Vial	1 Vial	2 doses at 48- hour interval
Cephaloridine	IM injection	Vials 250 mg 500 mg 1G	---	125 mg	250 mg	0.5-1 G	Single initial dose followed by oral erythromycin for 3 days
Erythromycin	oral	Tablets 100 mg, 250 mg	---	100 mg	200 mg	250 mg	6 hourly for at least 4 days
Erythromycin	oral	Mixture 100 mg per 5 ml	50 mg	100 mg	200 mg	250 mg	6 hourly for at least 4 days
Oxytetracycline	oral	Tablets 100 mg, 250 mg	---	100 mg	150 mg	250 mg	6 hourly for at least 4 days
Oxytetracycline	oral	Syrup 125 mg per 5 ml	62.5 mg	125 mg	150 mg	250 mg	6 hourly for at least 4 days

Table 4: Pediatric dosage of antibiotics

Accumulation of potassium may lead to

- Hyperkalemia
- Muscular paralysis
- Disturbed heart rhythm

Increased production of erythropoietin ultimately resulting in anaemia that causes

- Weakness
- Loss of memory
- Dizziness
- Hypotension
- Difficulty in concentrating

Failure to remove excess fluids results in-

- Shortness of breaths due to overload on lungs
- Edema of face, eyelids, ankle and feet

Polycystic kidney disease may give pain in the back or side due to accumulation of large, fluid cyst on kidney, Other symptoms include:

- Metallic taste in the mouth
- Loss of appetite due to altered taste
- Hyper pigmentation of skin
- Difficulty in sleeping
- Gingival inflammation has been reported, due to plaque accumulation and poor oral hygiene habits.

Dental management

1. As these patients are likely to have hematologic alterations, CBC and coagulation test should be done: Before attempting any invasive procedures. Prophylactic antibiotic therapy as these patients a very prone to infection. Penicillin, clindamycin and cephalosporin are usually indicated. History should be taken regarding the allergies of penicillin

2. Due to poor GI resorption antibiotic should administer by IM route.

3. Local anaesthesia used should be of amide typo: such as lidocaine xylocaine because of their resorption potential of the liver

4. Paracetamol la the drug of choice [28,29]

- Make locis haemostatic agents available in the clinic
- Desmopressin controls severe bleedings.
- Conjugated oestrogen achieves longer haemostasis.
- Tranexamic acid for oral rinse
- Gingivectomy for gingival overgrowth (30-31).

Conclusion

Renal disease patients present a complex clinical problem with multi-system involvement, including several oral disturbances. Paediatric and general dentists should be aware of the severity of clinical manifestations related to CRF as well as the modem treatment possibilities and their repercussions on the lives of these children. Since the number of CRF children is constantly increasing, the need for dental treatment as an integral part in managing the CRF child is also rising. It is important for dentists to be familiar with this complex clinical problem, and its effect on the dental treatment, for provision of optimal dental care.

References

1. Glodny B, Unterholzner V, Taferner B, Hofmann KJ, Rehder P, et al. Normal kidney size and its influencing factors-a 64-slice MDCT study of 1.040 asymptomatic patients. BMC Urol. 2009 Dec;9:19.
2. Johnathan B, Peter V, Woolf AS. The Kidney: From Normal Development to Congenital Disease. Boston: Academic Press. 2003 Mar;154.
3. Olivas-Escárcega V, Rui-Rodríguez Mdel S, Fonseca-Leal Mdel P, Santos-Díaz MA, Gordillo-Moscoso A, et al. Prevalence of oral candidiasis in chronic renal failure and renal transplant pediatric patients. J Clin Pediatr Dent. 2008 Summer;32(4):313-317.
4. Bagga A, Mantan M. Nephrotic syndrome in children. Indian J Med Res. 2005 July;122:13-28.
5. Warady BA, Chadha V. Chronic kidney disease in children: the global perspective. Pediatr Nephrol. 2007 Dec;22(12):1999-2009.
6. Hamid MJ, Dummer CD, Pinto LS. Systemic conditions, oral findings and dental management of chronic renal failure patients: general considerations and case report. Braz Dent J. 2006;17(2):166-170.
7. Proctor R, Kumar N, Stein A, Moles D, Porter S. Oral and dental aspects of chronic renal failure. J Dent Res. 2005 Mar;84(3):199-208.
8. de Francisco AL, Otero A. [Occult chronic renal failure: EPIRCE study]. [Article in Spanish]. Nefrologia. 2005;25 Suppl 4:66-71.
9. 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 Mar-Apr;27(2):98-106.
10. Cerveró JA, Bagán JV, Soriano JY, Roda PR. Dental management in renal failure: patients on dialysis. Med Oral Patol Oral Cir Bucal. 2008 Jul;13(7):E419-E426.
11. Leão JC, Gueiros LA, Segundo AV, Carvalho AA, Barrett W, et al. Uremic stomatitis in chronic renal failure. Clinics (Sao Paulo). 2005;60(3):259-262.
12. Antoniades DZ, Markopoulos AK, Andreadis D, Balaskas I, Patrikalou E, et al. Ulcerative uremic stomatitis associated with untreated chronic renal failure: report of a case and review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006 May;101(5):608-613.
13. Kerr AR. Update on renal disease for the dental practitioner. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2001 Jul;92(1):9-16.
14. De Francisco AL, Otero A. Occult chronic renal failure: EPIRCE study. Nefrologia. 2005; 25:66-71.
15. de la Rosa García E, Padilla MA, Romo AS, Ramírez BMA. Oral mucosa symptoms, signs and lesions, in endstage renal disease and non-end stage renal disease diabetic patients. Med Oral Patol Oral Cir Bucal. 2006 Nov 1;11(6):E467-E473.
16. De Rossi SS, Glick M. Dental considerations for the patient with renal disease receiving hemodialysis. J Am Dent Assoc. 1996 Feb;127(2):211-219.
17. Kho HS, Lee SW, Chung SC, Kim YK. Oral manifestations and salivary flow rate, pH, and buffer capacity in patients with end-stage renal disease undergoing hemodialysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1999 Sep;88(3):316-319.
18. Marinho SJS, Carmona TI, Loureiro A, Posse LJ, Caballero GL, et al. Oral health status in patients with moderate-severe and terminal renal failure. Med Oral Patol Oral Cir Bucal. 2007 Aug 1;12(4):E305-E310.
19. Meyer TW, Hostetter TH. Uremia. N Engl J Med. 2007 Sep 27;357(13):1316-1325.
20. Al-Nowaiser A, Roberts GJ, Trompeter RS, Wilson M, Lucas VS. Oral health in children with chronic renal failure. Pediatr Nephrol. 2003 Jan;18(1):39-45.
21. Saini R, Sugandha, Saini S. The importance of oral health in kidney diseases. Saudi J Kidney Dis Transpl. 2010 Nov;21(6):1151-1152.
22. Seymour RA, Thomason JM, Nolan A. Oral lesions in organ transplant patients. J Oral Pathol Med. 1997 Aug;26(7):297-304.
23. Lima RB, Benini V, Sens YA. Gingival overgrowth in renal transplant recipients: a study concerning prevalence, severity, periodontal, and predisposing factors. Transplant Proc. 2008 Jun;40(5):1425-1428.
24. Marshall RI, Bartold PM. Medication induced gingival overgrowth. Oral Dis. 1998 Jun;4(2):130-151.
25. Hernández G, Arriba L, Frías MC, de la Macorra JC, de Vicente JC, et al. Conversion from cyclosporin A to tacrolimus as a non-surgical alternative to reduce gingival enlargement: a preliminary case series. J Periodontol. 2003;74:1816-1823.
26. Ciavarella D, Guiglia R, Campisi G, Di Cosola M, Di Liberto C, et al. Update on gingival overgrowth by cyclosporine A in renal transplants. Med Oral Patol Oral Cir Bucal. 2007 Jan 1;12(1):E19-25.
27. Molpus WM, Pritchard RS, Walker CW, Fitzrandolph RL. The radiographic spectrum of renal osteodystrophy. Am Fam Physician. 1991 Jan;43(1):151-158.
28. Martins C, Siqueira WL, Guimarães Primo LS. Oral and salivary flow characteristics of a group of Brazilian children and adolescents with chronic renal failure. Pediatr Nephrol. 2008 Apr;23(4):619-624.
29. Nakhjavani YB, Bayramy A. The dental and oral status of children with chronic renal failure. J Indian Soc Pedod Prev Dent. 2007 Mar;25(1):7-9.
30. Nunn JH, Sharp J, Lambert HJ, Plant ND, Coulthard MG. Oral health in children with renal disease. Pediatr Nephrol. 2000 Sep;14(10-11):997-1001.
31. Management of chronic renal failure patients: general considerations and case report. Braz Dent J. 2006; l7(2):166-70.