

## Dental Management of Patients with Nephrotic Syndrome- A Report of 2 cases

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### Abstract

*Nephrotic syndrome is a nonspecific kidney disorder characterized by three signs of disease: large proteinuria, hypoalbuminemia, and edema. This syndrome has many causes, including primary kidney diseases such as minimal-change nephropathy, focal glomerulosclerosis and membranous nephropathy. It can also result from systemic diseases that affect other organs in addition to the kidneys, such as diabetes, amyloidosis, and lupus erythematosus. It may affect children and adults of both sexes and of any race. It may occur in typical form or in association with nephritic syndrome. The latter connotes glomerular inflammation with haematuria and impaired kidney function. In the dental practice, every dentist is brought into a situation to treat patients with impaired kidney function. A multidisciplinary approach between the dentist, paediatrician, and nephrologist is imperative for appropriate dental treatment of patients with kidney disease.*

**Keywords:** *Nephrotic syndrome, Nephrologist, Paediatric Dentist, Paediatrician*

### Introduction

According to the criteria of the International Study of Kidney Disease in Children (ISKDC), Nephrotic Syndrome (NS) is defined as urinary protein excretion of  $>40$  mg/m<sup>2</sup>/h and hypoalbuminemia of  $<25$ g/L and edema.<sup>[1]</sup> It is recognized as a common chronic illness in childhood.<sup>[2]</sup> The constellation of features that characterize NS develops from primary alterations of the selectivity barrier of the glomerular capillary wall which is no longer able to restrict the loss of protein to less than 100 mg/m<sup>2</sup> body surface per day.<sup>[3]</sup> The aetiological causes of nephrotic syndrome are miscellaneous, ranging from primary renal

diseases to systemic illnesses with various histopathological presentations.<sup>[4]</sup> The most common form of the NS in childhood is primary idiopathic nephrotic syndrome, with an incidence of 2–7 cases per 100,000 children and prevalence of 16 cases per 100,000.<sup>[2]</sup>

Intensive monitoring of blood pressure control is critical to renal function preservation in all cases of proteinuric renal diseases aiming at upper systolic and diastolic values of 125 mm Hg and 75 mm Hg respectively. It should also be mentioned that low blood pressure likewise appears to be detrimental and lowering blood pressure below 110 mm Hg systolic should be avoided.<sup>[5]</sup> Angiotensin conversion enzyme (ACE) inhibitors and angiotensin type 1 receptor antagonists are recommended as first line treatment in proteinuric diseases even in the absence of hypertension.<sup>[6]</sup> Non-steroidal anti-inflammatory drugs (NSAIDs) reportedly decrease proteinuria and<sup>[7]</sup> calcium channels blockers are potent antihypertensive drugs. They are therefore useful in meeting blood pressure targets and hence decrease proteinuria.<sup>[8]</sup> Sodium intake should

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imperatively be reduced to less than 6 g/day in order to minimise oedema and hypertension and to potentiate the effect of ACE inhibitors. Protein intake has been a subject of debate in nephrotic syndrome. Various studies have demonstrated that a high protein diet (to correct for the urinary losses) was ineffective in correcting hypoalbuminaemia.<sup>[9]</sup> The increased protein intake tends to further increase proteinuria and glomerular hyperfiltration and is therefore probably deleterious. Conversely, low protein diets (<0.8 g/kg/d) have a slight anti-proteinuric effect which might be valuable. A nutritionist consultation is recommended for every nephrotic patient.<sup>[10]</sup>

There are various complications of nephrotic syndrome such as edema, which has two theories in the field, the first is that decreased osmotic pressure and relative hypovolaemia are the triggers for renal water and sodium retention due to subsequent activation of vasopressin systems. The second theory is in favour of primary renal dysfunction with inappropriate sodium retention by the cortical collecting duct.<sup>[11]</sup> Dyslipidaemia may be marked with an increase in total cholesterol, LDL, triglycerides and lipoprotein which contributes to the increased cardiovascular mortality in these patients and may also be involved in renal disease progression. NS is a risk factor for thromboembolic events mainly in young patients and at the beginning of the nephrotic syndrome. Anaemia of chronic renal disease is related to inadequate erythropoietin production by the kidneys (endocrine failure). This can be aggravated by urinary losses of erythropoietin, transferrin and iron. In nephrotic patients this can be aggravated by urinary losses of erythropoietin, transferrin and iron. The association of NS with anaemia in the absence or renal dysfunction is still a subject of debate.<sup>[12]</sup> Renal failure is associated with secondary hyperparathyroidism and hypovitaminosis D. In nephrotic patients this may be further complicated by urinary loss of albumin and globulins that are vitamin D transporters.<sup>[13]</sup>

### Dental Considerations

Dental management of children with NS begins with prevention of dental disease and thus maintenance of a caries-free dentition because children with NS are at high risk of developing poor gingival health which is a consequence of neglected or insufficient tooth brushing (Table 1). There are several confounding factors such as

**Table 1-Symptoms/Etiology**

| Symptoms  | Etiology  |
|---|---|
| Oral symptoms -90%                                  |   |
| Gingival inflammation                               |   |
| Plaque accumulation                                 | Poor oral hygiene   |
| Poor oral hygiene.                                  | Low salivary flow rate,<br>Long-term medication use                     |
| Disease related debilitation,<br>Hypoplastic enamel | Disruptions during stages<br>of tooth development                       |
| Increased Risk of caries                            | A Carbohydrate Rich Diet<br>(necessary to reduce the<br>renal workload) |

lifestyle differences, oral hygiene practices, biological determinants like difference in underlying susceptibility.<sup>[14]</sup>

**Soft tissue-** Oral symptoms are observed in 90% of patients with renal disease as the disease itself and treatments have systemic and oro-dental manifestations. Reduced erythropoietin and the resultant anemia lead to pallor of the oral mucosa. Gingival inflammation has been reported to be due to plaque accumulation and poor oral hygiene.<sup>[15]</sup>

**Hard Tissue-** Abundant calculus formation is rarely seen in healthy children; however, children with chronic renal failure demonstrate an elevated level of calculus. Alterations in salivary Ca, P, Mg, oxalate (Ox), urea and pH levels is seen in patients suffering from chronic kidney disease. Ca-P and Ca-Ox precipitation and dental calculus formation is seen mainly due to elevated salivary pH, in addition to decreased salivary Mg and a higher concentration of salivary urea and phosphorus. Lingual surface of lower incisors are the most prevalent site for calculus formation, due to their proximity to the submandibular glands orifices which act as a reservoir of Ca and P ions. However, abundant calculus formation may also be observed in other parts of the oral cavity.<sup>[16]</sup> Disruptions during the histodifferentiation, apposition and mineralization stages of tooth development result in tooth structure abnormalities.<sup>[17]</sup> In patients with renal disease, the risk of caries formation is increased by poor oral hygiene and a carbohydrate-rich diet (necessary to reduce the renal workload) in addition to disease related debilitation,

hypoplastic enamel, low salivary flow rate, and long-term medication use.<sup>[18]</sup>

In this article, we have presented a report of two cases regarding the dental management of patients with nephrotic syndrome along with its review and recommendations.

### Case 1

A three year old female patient along with her parents reported to the Department of Paediatric and Preventive Dentistry, RDC, Loni, with a chief complaint of decayed teeth in the upper and lower front and right and left back region of jaw since four months. History revealed that the patient was suffering from nephrotic syndrome and undergoing treatment and taking medications for the same. Extraoral examination revealed puffiness of face (Fig. 1.a). Intraoral examination revealed deep occlusal caries with 54,64,75,84,85, root piece with 51,52,61,62, proximal caries with 53, 71,72,81,82 and smooth surface caries with 53 and 63 (Fig.1.b-1.d) IOPAs revealed radiolucency involving pulp with 54,64,74,75, 84 and 85. Based on the history, clinical and radiographic evaluation and investigations a full mouth rehabilitation was formulated, the treatment plan was explained to the parents and their written consent was obtained.



Fig.1.a-Extraoral Preoperative



Fig.1.b-d-Intraoral Preoperative

### Management of Case and Outcome

After gaining a proper written medical consent from the paediatrician and nephrologist, the dental treatment was started. Two days prior to the start of the dental treatment, the patient was advised to take Amoxicillin and Metronidazole IV.

Pulpectomy with calcium hydroxide and iodoform paste followed by stainless steel crown cementations were performed with 54,64,74,75,85 (Fig.1.h-i). Lesional



Fig.1.g-i- Intraoral Postoperative

sterilization tissue repair was performed using triple antibiotic paste with 84 because of poor prognosis followed by GIC. Pulpectomy with calcium hydroxide and iodoform paste followed by glass ionomer cement restoration with 62 and pulpectomy with calcium hydroxide and iodoform paste followed by omega loop placement and core build up with composite were performed with 51,52,61 (Fig.1f-g). GIC were performed with 53,63,71,72,81,82. Patient was advised to take the routine medications during the entire course of treatment. Patient was recalled for follow-up and it was noticed that the puffiness of face had subsided. (Fig. 1.e)



Fig.1.f- Mid-Treatment-Placement of custom made omega loop posts



Fig.1.e- Extraoral Postoperative

### Case 2

A five year old male patient along with his parents reported to the Department of Paediatric and Preventive Dentistry, RDC, Loni with chief complaint of decayed teeth in the lower right and left region of jaw since two months.

History revealed that the patient was suffering from nephrotic syndrome since two years and undergoing treatment and taking medications for the same.

Extraoral examination revealed periorbital edema and swelling of face (Fig.2.a) Intraoral examination revealed intraoral swelling present in 74,75 region Deep occlusal caries with 74,75,84, root piece with 85 and occlusal caries with 54,55,64,65 (Fig.2b-c). Peripheral edema was seen in both the legs. IOPAs advised revealed radiolucency involving pulp with 74,75 and 84 and root piece with 85. Blood investigations were advised which revealed high total leucocyte count and renal function test revealed low serum urea and high serum creatinine level.



Fig.2.a-Extraoral Preoperative



Fig.2.b-c-Intraoral Preoperative

Based on the history, clinical and radiographic evaluation and investigations a treatment plan was formulated, explained to the parents and their written consent was obtained.

Distal shoe space maintainer was not planned with 85 region because of the risk of infection.

### Management of Case and Outcome

After gaining a proper written medical consent from the paediatrician and nephrologist, the dental treatment was started. Patch test for local anaesthesia was done. Local anaesthesia (Lignocaine 2% without adrenaline) was used. After the negative result of the patch test the dental treatment was started. Two days prior to the start of the

dental treatment, the patient was advised to take Amoxicillin and Metronidazole IV. Pulpectomies with calcium hydroxide and iodoform paste followed by stainless steel crown cementations were performed with 74,75 and 84 (Fig.2.f). Inferior alveolar and lingual nerve block were administered and extraction was carried out with 85 followed by a gauze pack application. Haemostatic agents were kept ready if needed. Patient was advised to continue his routine medications. Patient was recalled after a week when completely healed extraction socket was noticed with 85. GIC were performed with 54,55 and 64,65 (Fig.2e). Patient was recalled for follow-up and it was noticed that the infraorbital edema and swelling of the face and extremities had subsided (Fig.2d).



Fig.2e-2f- Intraoral Postoperative



Fig.2d-Extraoral Postoperative

### Discussion

The treatments are either complementary to a specific treatment or the sole therapy available to lower proteinuria. Nephrotic patients present a high risk of infection. Diuretics are an integral part of the treatment of nephrotic syndrome, given the presence of edema.<sup>[4]</sup>

Precautions to be taken during Dental treatment (Table 2) -Any invasive dental treatment in patients suffering from kidney diseases requires consultation from the nephrologist and administration of prophylactic antibiotics because of high risk of infection. Due to poor gastrointestinal absorption, antibiotics to be administered IV. IM should be avoided because of creatinine increase.<sup>[19]</sup>

**Table 2-Dental Consideration and Recommendations**

| Dental Considerations   | Precautions/Recommendations   |
|---|---|
| Invasive dental treatment   | Prophylactic antibiotics  |
| Antibiotics   | IM should be avoided -Poor GIT absorption   |
| Excessive stress  | Antianxiety medication  |
| Nephrotoxic drugs   | Avoided   |
| If on Corticosteroids<br>Anaesthetic of amide type –Due to reabsorption potential in liver. | Corticosteroid cover  |
| Electrolyte disturbances complicate-General Anaesthesia                                     | Treat under local anaesthesia   |
| While administering nerve block   | Bleeding tendency should be excluded  |
| Infiltration analgesia – Not Contraindicated  |   |
| Nerve block   | Bleeding tendency should be excluded<br>Haemostatic agent ready during extraction |
| Electrolyte disturbances- Complicate general anaesthesia                                    | Treat under local anaesthesia   |
| Hypertensive  | Antihypertensive drugs  |
| Moderate renal impairment is likely to lead to fluoride retention                           | Additional fluorides-contraindicated  |
| There is creatinine increase  | Intramuscular injections should be avoided  |
| Moderate renal impairment is likely to lead to fluoride retention                           | Additional fluorides should be avoided  |

Dental treatment, especially for children, is often a source of anxiety and fear. Dentists should avoid excessive stress that could elevate the systolic blood pressure. Antianxiety medications should be given to fearful patients, and blood pressure monitoring before, during, and after the procedure is recommended. Dentists should avoid excessive accumulation of drugs in patients by lengthening the interval between doses according to the degree of elimination impairment. Oral diseases and dental procedures create bacteremia, which may lead to morbidity and potential mortality in patients with renal failure or on dialysis. Carious teeth, oral ulcers, plaque, and calculus can be points of entry for microorganisms into the bloodstream. Anaesthetic of amide type should be preferred because of reabsorption potential in liver.<sup>[20]</sup> Any bleeding tendency should be excluded prior to administering a nerve block. Most patients are best treated under local anaesthesia, as the anaemia and potential electrolyte disturbances would complicate general anaesthesia. These patients are often hypertensive and this should be considered prior to any

form of treatment. The mildest form of dental infection should be treated with caution. Good home oral care supplemented with aggressive in-office oral health maintenance should be employed to reduce the risk of dentally induced infections. Long-term effective plaque control measures should be employed. Prescription of additional fluorides (other than fluoridated water and toothpastes) is contraindicated because even moderate renal impairment is likely to lead to fluoride retention.<sup>[20]</sup>

### Conclusion

Nephrotic syndrome has its impact on dental treatment and hence the management becomes difficult but with the consultation and co-operation of Paediatrician and Nephrologist the dental treatment can be carried out with ease. Regular follow-up of the patient is needed

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