Dental Treatment of Patients with Kidney Diseases-review

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Abstract

In their practice every dentist is brought into a situation to treat patients with grossly impaired kidney function. Kidney diseases, whether acute or acquired, imply a number of body dysfunctions such as prolonged bleeding, high blood pressure, infection tendency etc. which, in turn, pose a threat involving serious complications in cases of dental interventions in these patients. The aim of this article is to provide a review of current dental practice in patients with kidney disease. This implies dental intervention and preparations of patients with chronic renal disease, nephritic syndrome, patients on dialysis, and patients with kidney transplants. Certainly, cooperation between the dentist and nephrologist is an imperative for the appropriate dental treatment of patients with grossly impaired renal function.

KEY WORDS: kidney disease, dialysis, transplantation, dental treatment

Introduction

Kidney is an organ responsible for a set of complex functions in the body and they are as follows:

- excretion of metabolic waste products,
- regulation of the salt and water in the body,
- preservation of acid balance,
- excretion of different hormones and organic substances.

Kidney diseases are as complicated as the organ itself. They can be divided into developmental anomalies and inherited diseases or acquired diseases. With respect to the further course of illness they can be divided into acute and chronic kidney diseases. In the practice every dentist is placed into a situation to treat patients with a grossly impaired renal function. Familiarity with the nature of the disease in question and possible complications that may develop in these patients is indispensable prior to any dental treatment, particularly of invasive nature as it is the case in oral surgical interventions (1). Also, we should note that dental infections may cause acute glumerulonephritis or progression of this disease into chronic failure. Experiments have shown that pyelitis or pyelonephritis can be caused by a bacterial infection which is inoculated into the kidney from any chronic dental infection. Experimental evidence support a connection between kidney calucus and oral infection. The aim of this article is to present current dental practice in patients with kidney diseases. This implies the dental treatment and preparations of patients who suffer from chronic kidney disease, nephrotic syndrome but also the patients who use dialysis and those with kidney transplants.

Nephrotic syndrome

Nephrotic syndrome (syndroma nephroticum) is a clinical disease which comprises of the following stages:

- proteinuria (3g per 24 hours)
- hypoproteinemia
- hyperlipidemia
- appearance of characteristic edemas in face (lids) and lower extremities (knees)

The most common causes of nephritic syndrome are SLE, diabetes and amilodosis while among the primary kidney diseases the most important are the diseases involving immune deficiency, i. e. glomerulonephritis. The nephrotic syndrome commonly appears in children 2-6 years old. They show characteristic tendency to infection (1). So-called **Epstein's syndrome** is well described in literature. It is an idiopathic nephritic syndrome with typical changes in oral mucus of newborns in the form of salty, pseudo-diphteric layers stretching over the soft palate in the shape of butterfly. We can also detect wounds in mucus in the form of Bednar's acnes (1). With respect to dental treatment we should bear in mind that patients with necrotic syndrome are prone to infection and therefore, the endodontic treatment of deciduous teeth and multi-root teeth can show counter-indications. In any case, prophylactic antibiotics protection is a must prior to invasive dental treatment (1). Therefore, we should always bear in mind that dental intervention is not to be undertaken in patients with renal insufficiency unless in urgent cases, and this should be done only after consulting either the nephrologist or urologist.

Patients with chronic kidney diseases

Chronic kidney diseases are results of progressive deterioration of kidney nephrons and dysfunction of glomerular filtration. As a result, the kidney function is impaired followed by high loss of fluids from the body due to the increased excretion of urine (polyuria).Besides, in patients who have not been treated properly, the concomitant effects are also polydipsia, tremor and hematuria. In a more severe form of the disease we can see edemas in the face, particularly on lids as a result of fluid retention and the impaired balance of electrolytes. With chronic renal deficiency we should pay attention to the following:

1. The immune system of patients is grossly weakened, and consequently, there is greater tendency to infection. Candidiasis and ulcers are common in the oral cavity. Soft tissues in the oral cavity are pale due to anemia. As a result, excretion of saliva is reduced, food retention in the mouth is increased and halitosis is an ultimate outcome. In extreme cases stomatitis uremica may develop. In fact, uremia is invariably followed by stomatitis. This stomatits is characterized by thickening and redness of the bucal mucus and the presence of pseudo-membranes that cover oral mucus, gingiva, soft palate and pharynx. We can rarely encounter surface and deep ulcerations smaller than 1 cm in radius without a specific localization (2). The bottom of these ulcerations does not bleed easily. The histological lesions indicate inflammatory process accompanied by necrosis. A similar

form of stomatitis can appear with nephritis without azotemia. Vincent's microorganisms are commonly the cause of secondary infection of uremic stomatitis.

2. Absorption of medications administered per os is reduced due to reduced absorption capacity of the gastrointestinal tract.
3. Forms of B and C hepatitis are frequent, and as a result, there is a tendency to bleeding.
4. Anemia is a result of the reduced erythropoietin production. As yet, the standard for assessing the value of hematokryte in patients with renal dysfunction who have to undergo the operation has not been ascertained. A study has shown an increase in intraoperative complications for hematokryte values of 20-26%(3). The acceptable value of hematokryte is 36 % which can be achieved by administering erythropoietin for several weeks prior to the operative procedure. Fresh blood transfusion should be avoided whenever possible, primarily because it reduces the chances of a successful transplantation in case of need. In other words, every transfusion is the introduction of new antigens into the body, and the latter can, in turn, react by producing anti-bodies (3,4).
5. Tendency to bleeding is increased because of platelets dysfunction. Consequently, APTT and INR have to be monitored very carefully(3)
6. There is also a tendency to hypertension and hypotension. Pre-operative and intra-operative tension is quite common in patients with chronic renal disease. This is attributed to fear, increased kateholamine secretion and hypertension caused by renal dysfunction (5).
7. In patients with more severe renal disease there changes appear on paradontium. Thus, in patients with uremic dystrophy a loss of lamina dura and trabecular build of jaw bones occurs (5).
8. Secondary hyperparatireoidism is also very common. It is a result of phosphate retention and their influence on hyper production of paratireoid hormone resulting in the increased loss of calcium in bones. In children with more severe chronic disease retardation in teeth development and jaw malformation may occur, but also changes in the tooth structure and porcelain abnormalities, precocious loss of teeth etc (6).
9. Acid- base disorders. Acidosis in patients with chronic renal disease may reduce the effectiveness of local anesthetics (3,7).
10. Hyperalcemia. General anaestitic is to be avoided in patients with chronic renal disease whose potassium level is over 5.5 mmol/l. Otherwise, there is an increased risk of aritmia (3).

Dental treatment

Since kidney diseases may be more or less severe, there is no uniform dental treatment. Nevertheless, an invasive dental treatment requires consultation with the nephrologist who administers prophylactic antibiotic therapy (8). Penicillin or cephalosporin are usually administered. Tetracycline and streptomycin should be avoided because they are nephro-toxic. Patients should be asked if they suffer from allergies because allergy to penicillin is quite common. Due to poor gastrointestinal resorption, antibiotics should be administered i.v. I.m. administration may show counter-indications because of kreatinine increase.In patients with chronic kidney disease the endodontic treatment of the deciduous and multiroot teeth should be avoided at all costs because of increased infection risk. We should also avoid treatments of gangrenous teeth and those with apical parodontitis because they can later develop into an inflammatory focus. Extractions should be done with local anesthetic. As for anesthetics, anesthetics of amidic type should be applied such as lydocain, xylocain because of their reabsorption potential in the liver. Analgetics of almost any kind may be administered and also codeine-based medicaments that are also metabolized in the liver. Since these patients often suffer from hepatitis B or C a dentist must undertake all the precautionary measures (protective glasses, mask, cap, gloves, and inoculation against B hepatitis). If the dental intervention must be done with a total anesthetic consultations with the nephrologist or anesthetist prior to the intervention are obligatory (7).

Patients who use dialysis

There are two possible therapies for patients with kidney dysfunction:

1. dialysis (hemodialysis, peritoneal dialysis)
2. kidney transplants

The level of kreatinine in serum should be 600-800 μmol/l if a patient is to use dialysis. Dialysis represents the perfusion of the patient's blood and the dialysis solution on either side of the membrane. At this, it is necessary to note that in the course of dialysis the patient is given heparin in order to prevent blood coagulation outside the body. The majority of patients undergo dialysis three times a week in the duration of 4 hours. Heparin is an anti-coagulant agent for parenteral administration and its effect is prevention of activated coagulation factors Xa and trombone, and thus prevention of coagula-

tion. It is retained in the circulatory system 4-6 hours upon administration. This fact is important because of proper timing of dental intervention. Accordingly, since heparin prolongs the bleeding time, the tooth extraction should be done a day after dialysis when the anticoagulent agent's presence is reduced to the minimum while the dialysis effect is maximal. APTT and INR should be checked prior to the surgical intervention. Heparin can also bring about mild trombocitopeny (4).

Prevention and therapy against bleeding should include the following:

1. K vit amp. i.v.
2. Etamsylatum amp. i.v.
3. Protamine sulphate (1:5)

The nefrologist should undertake all the preparatory measures prior to sending the patient to his/her dentist. In addition to bleeding, the patients who undergo dialysis are also very sensitive to infection. Because of possible bacterial infection the prophylactic administration of antibiotics of broad specter is strongly recommended. We can administer cefalosporines. Penicillin should be administered in the dosage of 2 mg after dialysis. Surgical interventions should be made with local anesthetic. The total anesthesia is to be avoided because of concomitant hypertension, arteriosclerosis and anaemia (7).

Patients with kidney transplants

In general, kidney transplants involve the risk of transplanted organ rejection. In order to prevent this, patients who have undergone an organ transplant operation, are given huge doses of immunosuppressants such as corticosteroids, azatioprin, cyclosporine A and antilymhocite globulin (8,9). These patients are extremely sensitive to infection. After tooth extraction the wound healing is significantly impaired. The immunosuppressant therapy may involve many side effects that, in turn, may largely affect oral surgical intervention. The side effects are hypertension, increased bleeding, diabetes (5,8).Accordingly, in patients who underwent kidney transplant operations prophylactic antibiotics should be administered in consultation with the patient's physician. Because of potential adrenalin crisis risk it is necessary to alter steroid therapy. If the stress suffered during the oral surgical intervention is minimal, the therapy should not be altered. If the stress is insignificant, it is recommended to increase the steroid dosage twice a day two days prior and following the oral surgical intervention. If the stress is great, 100g of hydrocortisone should be administered i.m. prior to the operation, gradually reducing dosage by 50 % on a daily basis for three days after the intervention until the dosage of 20mg which should be administered twice a day for the subsequent 7 days. In any case, steroid dosage is administered by the expert physician after consultations with the dentist and the expected stress assessment (9). The patients who are getting prepared for kidney transplantation should be treated with regard to the following:

1. Comprehensive treatment of the oral cavity should be done (including prophylactic measures, treating the teeth with caries, doing the necessary extractions, particularly of the gangrenous, pulpal and parodontopathic teeth and the remaining roots) (1,10).
2. Advise the patient on the importance of oral hygiene since oral infection may bring about the rejection of the organ transplant.
3. Mouth rinsing with hlorhexidine solution (0.2%) is recommended one day prior to the organ transplant operation in order to prevent candidiasis and bacterial infection.
4. The effect of immunosuppressant therapy (cyclosporin A) may induce gingival hyperplasia similar to dilantine gingivitis in epileptic patients (11).
   Prior to gingivectomy it is necessary to clean the salivary calucus and remove any signs of infection (rinsing with hlorhexidine solution) but also to motivate the patient to maintain a regular oral hygiene. It is indispensable to administer antibiotics with these patients (1,8).

Conclusions

1. Patients with kidney diseases are an extremely delicate group of patients.
2. They have tendency to infection and therefore, prophylactic antibiotics treatment is a must prior to surgical interventions.
3. They are also prone to bleeding and therefore surgical interventions should be undertaken in the days when the patient does not use dialysis.
4. We should always bear in mind that patients with kidney transplants are prescribed immunosuppressant therapy.
5. Dental treatment of such patients implies close cooperation between the dentist and the nephrologist.

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