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Abstract

Most of the patients with chronic renal failure experience oral symptoms as a consequence of body systems alterations. Treatment methods for patients with renal failure include dietary changes, dialysis and renal transplant. Both general practitioner and dentist must have the basic knowledge to deal with renal patients. Since the oral health status may have in impact on the health status of the patients with renal disease, preventing odontogenic inflammation must be started in the early stages, in the pre-dialysis period. This article reviews the oral and dental disease manifestations before and after renal transplantation.

Key words: chronic renal failure, oral involvement, renal transplantation

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Introduction

Chronic renal failure (CRF), a systemic disease with an increasing incidence worldwide, is defined as a progressive decline of the kidney’s functional capacity associated with a reduced glomerular filtration rate [1]. Some of the common causes are: chronic glomerulonephritis, hypertensive nephropathy, metabolic disease (e.g., diabetes mellitus), congenital and hereditary renal processes (e.g., renal polycystic disease) [2].

The progressive deterioration of the renal function leads to a state of intoxication as a result of the accumulation of metabolic waste products, known as uremia. It affects most body systems, the clinical features being dependent upon the stage of renal failure and the systems involved (heart and blood vessels, the skeleton, endocrine and reproductive functions, gastrointestinal tract, central and peripheral nervous systems) [3]. As a result of these alterations most of the patients have a wide spectrum of oral manifestation, affecting the hard or soft tissues of the oral cavity.

The proper treatment for chronic renal failure aims to correct the metabolic modifications and preserve the remaining renal function. This includes dietary changes such as reduced protein consumption, fluid restrictions, high carbohydrate diet and of course vitamin D supplements, lipid lowering agents and antihypertensive treatment. Despite of this conservative management, most patients progress to end-stage renal failure, requiring renal replacement therapy: dialysis or even transplantation [2, 3].

The present article reviews the oral and dental changes before and after transplantation in renal patients.

Before transplantation

In this stage, 90% of the patients [4] with damaged renal function present different hematologic and metabolic disorders involving both the bone and soft tissues structures [1].

Uremic patients may have an ammonia-like oral odor and metallic taste as a result of increased concentration of urea in saliva and its transformation into ammonium [3, 5]. Even if the total amount of saliva is decreased [6], high urea concentration leads to an alkaline pH which could contribute to increase the buffer capacity and partially explain the low caries incidence [7, 8, 9, 10] but although important tartar formation.

If the CRF begins earlier in life may appear delays or alterations in eruptions [11, 12], enamel hypoplasia secondary to disturbances in calcium and phosphorus metabolism [11], which can affect both the primary and permanent dentition [2, 3, 6, 11]. The severity of hypoplasia is associated with the patient age at the time of presentation of these metabolic disorders and the length of time on dialysis [12]. Related to the same disturbance in calcium and phosphorus metabolism can be observed pulp narrowing and obliteration [11] and pulp chamber calcification. During the conservative dental and prosthetic treatment of patients with chronic renal failure the intact dentin was found to be much softer than that of the healthy individuals. Pulp narrowing may be observed incidentally or if the softer and thicker predentin layer is not handle with care when the dentist is preparing the tooth for restoration the pulp may be exposed [13]. Routine follow-up is required to diagnose at an early stage any complication related to the obliteration. Severe erosions on the lingual surfaces of the teeth may appear, being produced by frequent regurgitation and vomiting induced by uremia and medication [2, 14]. Tooth mobility [3, 9], malocclusion, crowding can be also observed. Because of the changes in maxillary bone, secondary to renal osteodystrophy, periapical radiolucencies and root resorption are associated with mobile teeth [2]. Painful responses to thermal and electrical tests and percussion can appear [4].

“Renal osteodystrophy”, common in patients with chronic renal failure, is a skeletal modification caused by disorders in calcium and phosphorus metabolism, increased parathyroid activity and abnormal vitamin D metabolism [15]. The kidneys’ inability to secrete phosphate initiates secondary hyperparathyroidism characterized by increased osteoblastic and osteoclastic activity [16]. Radiographic features of renal osteodystrophy in the maxilla and mandible are loss of lamina dura, ground-glass appearance, loss of trabeculation, abnormal post-extraction bone healing, radiolucent giant cell lesions, metastatic calcifications of the soft tissues [7, 17]. Cortical bone’s decrease or even loss can be seen in areas such as: the mandibular angle, around the maxillary sinus, mental foramen and mandibular canal. The abnormal bone metabolism may lead to resorption and deposition of sclerotic bone after dental extractions called “socket sclerosis”. Temporomandibular joint problems are also observed [18]. Pathologic fractures of jaw bones may occur which complicate dental extractions and periodontal surgical procedures [19].

Due to anemia, the gingivae in patient with CRF can
be pale and the demarcation of the mucogingival junction can be lost [5, 11]. The altered platelet aggregation in uremia, added to the anticoagulants used in hemodialysis, predisposes to ecchymosis, petechiae and hemorrhages in the oral cavity [2, 9, 15].

Xerostomia, another common manifestation with a prevalence of 73.2%, is caused by the restriction in fluid intake, the side-effects of medicaments, probably salivary gland deterioration and/or oral-breathing [5]. Long-term xerostomia may predispose to caries and gingival inflammation and can give rise to difficulties with speech, denture retention, dysphagia, sore mouth and even loss of taste [20].

Four types of uremic stomatitis have been described clinically in renal failure: erythemo-pustulaceous, ulcerative, hemorrhagic and hyperkeratotic [2, 5, 7, 21]. These painful lesions usually appear on the ventral surface of tongue and on the anterior mucosal surfaces [14] and are resistant to treatment as long as the urea levels remain high but heal spontaneously within 2-3 weeks when the disease has been resolved [21]. Common observations in CRF are lichenoid reactions, often arising (but not always) as a consequence of the associated drug therapy (beta-blockers, diuretics) [3]. Candidiasis has been described in patients before and after renal transplant [3, 9].

There is a controversy in the literature related to gingival inflammation in patients with CRF because some studies reported low frequency of periodontal disease due to immune suppression and uremia [11, 19] while other studies show higher frequency of gingivitis especially in children [22].

After transplantation

Immunosuppressant therapy is required to minimize the risk of allograft rejection. The most commonly used agents are: azathioprine, prednisolone, cyclosporine and more recently, tacrolimus.

The most reported oral manifestation of kidney disease is gingival enlargement secondary to drug therapy. Gingival hyperplasia can be induced by cyclosporine (with a prevalence of 22 to 58% in different reports) and/or calcium channel blockers such as nifedipine, amlodipine, diltiazem, verapamil and principally affects the labial interdental papillae [3, 5, 11, 23, 24]. When is extended it also involves the gingival margins and lingual and palatal surfaces [25]. Deficient oral hygiene aggravates gingival enlargement [4, 23, 24, 26]. Children and adolescents may be more prone to this drug-induced gingival hyperplasia than adults but if oral hygiene is poor older people are also affected. Some studies have been suggested that using a combined therapy (cyclosporine and calcium channel-blocker) leads to an increased incidence and severity of gingival enlargement [27, 28].

The cytomegalovirus infection (CMV) is a common opportunistic infection in the immunocompromised transplant patients [29, 30, 31] with an incidence of 50 to 70 % of them [32]. CMV infection usually occurs within the first few months after the transplant procedure [11, 31, 33, 34, 35] and may be primary or secondary, as a result of reactivation of a latent form of virus or re-infection with a new virus strain [9, 30, 32, 35]. This virus is regarded also as being involved in the etiology of mucosal membrane and gingival overgrowth, ulcerative gingivitis, lichen planus, periodontal abscess, juvenile and aggressive periodontitis [33, 37, 38]. In immunocompromised transplant patients, some studies have described the CMV infection as atypical ulceration and focal necrosis in the mucosal membrane, sometimes co-infected with Candida species, with various localizations. The lesions were single or multiple, medium deep, with hard raised edges, covered with a yellowish coating or pseudomembrane [36, 39, 40].

Oral candidiasis has been reported to be associated with a great risk for systemic infection in patients after renal transplantation, infections that can be fatal if neutropenia persists [41]. A recent study in transplant patients showed that the majority of patients who developed fungal infections were orally colonized with Candida albicans [42], while other studies found Candida glabrata isolated with increasing frequency in these patients [43].

Occasionally, hairy leukoplakia, secondary to immunosuppressant therapy, is associated with Epstein-Barr virus and develops in lateral borders of the tongue [3, 26].

A number of studies suggested that the drug-therapy used posttransplantation may lead to epithelial dysplasia and carcinoma of the lip [3, 26]. The frequency of posttransplantation tumors is 2-4 folds compared to non-transplanted population and even the localization of the tumors is also different [44]. In renal transplanted patients the most frequent tumors are: Kaposi’s sarcoma, non-Hodgkin lymphoma [2], oral cancer and anogenital tumors associated with various types of papilloma virus [45, 46]. Some studies have found tumors in head and neck region like skin, lip, oral and thyroid cancers [47]. Risk factors for posttransplant malignancies are: genetic
factors, advanced age, gender, smoking. Some viral infections predispose transplanted patients to specific types of malignancies: Epstein-Barr virus frequently associated with lymphoma and human herpes virus 8 associated with Kaposi sarcoma [48].

Another rare possibility to be considered in the differential diagnosis of malignancy after renal transplantation is transmission of a tumor via (micro)metastases of an undiagnosed malignancy in the donor [49].

The oral and dental management of chronic renal failure patients requires a detailed medical history, a clinical examination and consultation with a nephrologist. The dentist must know the degree of CRF, the medical conditions associated (hypertension, diabetes) and the different repercussions of the associated drug therapy upon the oral cavity because a comprehensive risk assessment facilitates the treatment plan. Dental health of this kind of patients seems to be an area lacking of attention. Promoting good dental hygiene decreases the risk of oral infections that may influence the general health status of renal patients before and after transplantation.

Because of the relatively high frequency of oral manifestations of the CRF, the protocols from many transplant centers may recommend or even require a dental evaluation, identification and treatment for the existing problems, knowing that infection is the major complication of the renal transplant patients.

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