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COMPARATIVE ASSESSMENT OF THE PATHOLOGY OF DENTAL HARD TISSUES AND PERIODONTITIS IN PATIENTS WITH CHRONIC RENAL FAILURE WITH CHRONIC PYELONEPHRITIS AND GLOMERULONEPHRITIS

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Abstract
Nasal bone fractures represent one of the most prevalent types of facial trauma, accounting for approximately 40% of all facial injuries. These fractures occur across all age groups, from young children to adults, and result from various traumatic mechanisms. The etiology of nasal fractures includes direct impact during physical altercations, sports injuries, traffic accidents, falls, and even unusual causes such as mobile phone impact. Accurate diagnosis of nasal bone fractures presents significant challenges for clinicians, particularly in emergency settings. While conventional radiography in lateral projection remains widely used, it often leads to missed diagnoses due to subtle fracture lines and overlapping anatomical structures. Computed tomography (CT) has emerged as the gold standard diagnostic method, providing detailed visualization of fracture patterns, displacement of fragments, and associated injuries to adjacent facial structures including the maxilla, zygomatic bones, and orbital walls.

Keywords: Chronic renal failure, renal replacement therapy (RRT), dialysis, dental pathology, oral mucosa.

INTRODUCTION

Despite the significant achievements of modern medicine, an urgent problem remains the improvement of diagnostics, comprehensive assessment of the severity of the course, and the selection of effective methods for the treatment of chronic kidney diseases. According to the

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available literature, in recent years in Russia and the CIS countries there has been an increase in the number of patients with chronic kidney diseases to 5-8% per year [1-3].

Chronic renal failure (CRF) refers to a severe pathology of the urinary system of the body. First of all, the excretory system is suppressed, as toxic substances of nitrogen metabolism accumulate in the patient's blood [4]. A sharp decrease in the excretory function of the kidneys leads to disruption of the activity of other organs and systems, which is accompanied by severe disorders in the body, often incompatible with life [5,6]. Chronic kidney diseases are accompanied by multiple pathological changes in the hard tissues of the teeth, periodontal and oral mucosa. Oral cavity is one of the possible sources of chronic infection [7, 10]. Dental diseases such as periodontitis, non-carious lesions, and premature tooth loss are common in patients with CRF and have a negative effect on the course of the underlying disease, worsening the quality of life of patients [8,9,11].

Dental problems in patients with chronic renal failure undergoing renal replacement therapy may develop against the background of the disease due to impaired mineral metabolism, toxic effects of uremic toxins, hypoxia associated with anemia and impaired cardiovascular system [5,7,8]. Along with this, the high incidence of caries in these patients is also explained by a violation of the function of the salivary glands and an increased content of urea and creatinine in saliva, a decrease in the immunological status [1,5,8].

However, despite the importance of this issue, many aspects of the clinic, etiopathogenesis, treatment and prevention remain poorly understood and controversial, and in the Republic of Tajikistan this issue has not been studied in general. There is also no unified program for providing practical dental care to patients with end-stage CRF. Therefore, the improvement of methods of complex diagnosis, treatment and prevention, taking into account the dental status in patients with chronic kidney disease, requires further research.

The purpose of the study:

To study the state of dental status and its comparative characteristics in patients with chronic renal failure with chronic pyelonephritis and glomerulonephritis.

Materials and Methods

The subject of the survey was 78 people aged 20 to 45 years. All the surveyed were divided into three groups.

The main group consisted of 34 patients with acute CRF with glomerulonephritis (the first group) and 24 patients with acute CRF with pyelonephritis (the second group). Work with these patients was carried out in the hospital of the nephrological department of the State Clinical Hospital No. 5 named after academician K.T. Tajiev. The control (third) group included 20 practically healthy patients who mostly underwent a medical examination at the Dental Training Center at the Abuali ibni Sino TSMU. A complete dental examination (external examination, assessment of the condition of the hard tissues of the teeth

and soft tissues of the oral cavity) was performed in all 78 people. The analysis of medical documentation in patients with chronic renal failure (58 case histories) was carried out: general

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analysis of urine, blood, biochemical analysis of blood, determination of urea, creatinine, electrolytes, Zimnitsky, Rehberg-Tareev samples, kidney ultrasound, ECG, if necessary, EchoCG. The condition of the oral cavity was assessed according to the following indicators: KPU (K-carious, N-filled, Y-removed teeth), prevalence index,

OHI-S (Green-Vermillion, 1964, simplified index of hyena of the oral cavity) and its components – the index of summer (DI-S) and the index of stone (CI-S), GI (Loe-Silness, 1963, index of gingivitis), PMA (Shour-Massler, 1948, papillary-marginal-alveolar index), McClure–Aldrich test (increased vascular and tissue permeability).

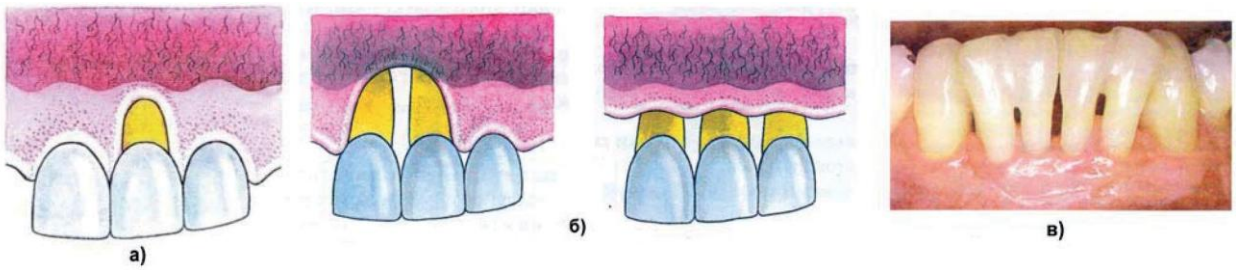
The degree of bone damage and the nature of the pathological process (osteoporosis, atrophy, resorption), as well as odontogenic foci of chronic infection, were determined by X-ray examination – orthopantomography.

Statistical data processing was carried out by the method of variational statistics using the t-Student criterion.

The Results and their Discussion

The study revealed a comparative prevalence of caries in three groups. It was noted that in the first and second groups, the rapid development of recurrent caries, the short service life of fillings (especially made of composite materials), and the painless course of the carious process, which hinders the likelihood of timely access to the dentist. The intensity of caries according to the CPI index was different in the compared groups. Thus, patients with CRF with pyelonephritis (the second group) had 17.10±1.07 teeth, in the first group (glomerulonephritis) - 12.9±0.4 teeth, and in the control group (practically healthy patients) - 8.76±0.65 teeth ($p<0.001$) (Table 1) An analysis of the structural elements of the CPI index showed that the average number of teeth removed in the compared groups was significantly different.

In patients with chronic kidney disease with pyelonephritis, an average of 6.45±0.89 teeth were removed per person, and in patients with chronic kidney disease with glomerulonephritis - 4.45±0.45, which is practically 1.4 times more. In the control group, this indicator was 1.5±0.45, which is 4.3 times less teeth extraction compared to the second group and 2.9 times less than in the first group.



PERIODONTAL CONDITION (INFLAMMATION AND DYSTROPHY) IN CRF: A) CLASS I – the edge OF THE GUM DOES not EXTEND BEYOND THE MUCOUS-GINGIVAL JUNCTION; B) CLASS III – IV – the edge OF THE GUM crosses the MUCOUS-GINGIVAL JUNCTION, THE BONE TISSUE OF THE interalveolar septa IS PARTIALLY lost; C) Exposure OF THE ROOT SURFACE AND marginal recession OF THE PERIODONTIUM DURING AN objective examination

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In the first group, the "deleted" component accounted for 29.4% (10 patients) of this indicator, in the second group this indicator is 58.3% (14 patients). In the group of healthy patients, the largest share of the CPI index was accounted for by "sealed" 70.0% (14 patients). The average number of carious teeth in the first group was 2.16±0.41, in the second – 4.26±0.31, in the control group – 1.06±0.25. This indicator indicates that in the second group, the average number of carious teeth exceeds 4 times those in the control group, which indicates a faster (almost constant) development of the carious process in patients with chronic kidney disease with pyelonephritis. The direct cause of the microbial-inflammatory process in pyelonephritis and urinary tract infection is the penetration of viral and microbial flora into the urinary tract. Infection penetration

It is possible to enter the kidney by hematogenous and lymphogenic routes, as well as by ascending pathways from the urethra and bladder, which is facilitated by vesicoureteral reflux. Hematogenous infection can spread in the presence of inflammatory foci in other organs: lungs, tonsils, odontogenic foci with poor oral hygiene, thereby showing an inverse relationship to the penetration of a secondary infection into the genitourinary system.

Thus, patients in the second group need dental treatment significantly more often than in the first group and the control group. Objectively, when examining patients of the second group, hyperemia and edema were noted on the part of the gum mucosa. In this group, 1/3 and 1/2 (64.3%) teeth were damaged due to the root, in particular, the anterior central incisors of the jaws, while in the first group – 32.0% and in the control group – 3.7% (Fig.1).

In patients of the first group, pathological tooth erasure is more often detected due to an increase in the urolytic activity of ammonia, a derivative of saliva urea, which, unequivocally, increases with chronic kidney disease with glomerulonephritis, amounting to 73.3%, in the second group - 22.4%, and in the control group (4.3%) – it was noted due to a short frenulum of the lower lip or anatomically incorrect bite. The presence of supragingival tartar and plaque is noted more in patients of the first group (62.8%) than in the second (35.0%) and in the control group (4.2%). This is due to the fact that glomerulonephritis increases the concentration of urea in saliva. In this case, there is a change in the composition and properties of saliva, a decrease in the rate of its secretion, which affects the accumulation of plaque. Dental plaque microorganisms produce ammonia from saliva urea. As a result, alkalinization of the surrounding environment and precipitation of stone components occur (Cowley and Macphee, 1969) (Fig.2).

inflammatory processes developed in the marginal recession of periodontal disease of class I (according to Miller), where the edge of the gum does not

it spreads beyond the mucous-gingival junction, is not accompanied by loss of the interdental gum and bone tissue of the interalveolar septum (Fig.1a). Subsequently, without timely dental care, it passes into class III - IV (Fig.1b), where the gum margin reaches the mucous–gingival junction, the bone tissue of the interalveolar septa is partially lost with the formation of multiple gaping interdental spaces with exposure. The hygienic condition of the oral cavity of patients in the first group showed that the values of the simplified Green-Vermillion index (OHI-S) ranged from 1.78 to 6.67, which indicates poor oral hygiene and the need for comprehensive dental treatment. In patients of the second group, this index was 6.82±0.18, which is 11.7 times higher than in the control group (0.58±0.1) (Table 1).

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It should be noted that good oral hygiene was detected only in the comparison group in healthy patients – in 47.58±3.43% of cases.

Poor hygiene was observed in patients of the first group in 40.2±3.4% of cases and in the second group in 31.4±3.6%. In the control group, this indicator was significantly lower – 1.5 ± 0.25%. Poor hygiene was also detected in the first group – 42.4±4.6%, and in the second – 48.4±3.4%, these indicators were significantly higher than in the control group – 2.46±0.62%.

A satisfactory index was observed in the first group in 26.2±3.3%, in the second group – in 11.4±6.7% and in the comparison group – in 48.46±3.4% of cases.

Thus, in patients with chronic renal failure with pyelonephritis, the OHI-S index was on average 11.7 times higher than in the comparison group ($p<0.001$). An individual analysis of this index showed that poor hygiene prevailed more in the group with pyelonephritis, as well as in the group with glomerulonephritis, and satisfactory in the comparison group ($p<0.001$). In addition, in the first and second groups, good oral hygiene was not observed in any patient, and in the comparison group – in 47.58±3.43% of cases. It follows that patients with CRF disease need motivation and personal hygiene training, as well as professional dental treatment of the oral cavity more often than patients in the control group. X-ray examination made it possible to determine the presence, nature, degree and prevalence of pathological changes in the bone tissue of the jaws. Orthopantomographic images were used, which gave images of both people in a state of occlusion, the jaw body, dentition, as well as reflecting the conditions of the spongy bone tissue substances and changes in the alveolar bone. In the main group, there was a uniform horizontal decrease in the height of the interalveolar septa, the absence of signs of inflammatory destruction of bone tissue, marginal periodontal recession and exposure of the roots of teeth from 1/3 to 1/2 of their length, as well as foci of osteosclerosis with a further change in bone structure resorption in the area of the anterior teeth.

In the second group (CRF with pyelonephritis), there is a mixed destruction of the bone structure, uneven inflammatory bone resorption in the vertical-horizontal direction and a decrease in its height relative to the length of the tooth root. There is no cortical plate at the top of the interalveolar septum, bony pockets are observed in the molar region, and an expansion of the periodontal fissure and a collapse of the periodontal structure are observed in the area of the anterior teeth. In the group of healthy individuals, there were no changes in the bone structure, with the exception of the mucosa of periodontal tissues.

Conclusions

Thus, according to the index assessments of oral hygiene, patients with chronic renal failure, with different development of glomerulonephritis and pyelonephritis have a characteristic feature of the course and complications of diseases in the oral cavity. In the case of glomerulonephritis, damage to the hard tissues of the teeth is more pronounced in the form of pathological abrasion of the crowns of the teeth, a wedge-shaped defect and dystrophic changes in the bone structure of periodontal tissues, in the form of a decrease in the height of the alveolar process. In chronic pyelonephritis, mucosal changes were more often observed in the form of edema and hyperemia, periodontal recession with exposure of the tooth root, formation of periodontal pockets with purulent contents, as well as combined dystrophic-inflammatory damage to periodontal tissues. It

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follows that patients with chronic kidney disease of various etiological character require the full implementation of comprehensive measures for oral hygiene and sanitation, taking into account the course and complications of this disease, using modern treatment methods.

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