Case Report *doi: 10.5455/medscience. 2015.04.8390*

Plasma 25-hydroxyvitamin D Status and Tooth Loss: A Case Report with Review of Literature

Ferit Celik, Fulden Sarac, Sumru Savas, Fehmi Akcicek

Department of Internal Medicine, Ege University Medical Faculty, Izmir, Turkey

Abstract

A 44 year old female was referred for an opinion regarding a six-months history of progressive tooth loss. Besides tooth loss, she had fever. She was a regular dental attender, and brushed her teeth twice daily using a suitable toothbrush and a dentifrice. However, there was no difference in the patient by antibiotics using. In this case, we thought that she had 25(OH)D deficiency In summary, this case report shows that tooth loss might be seen in patients with D vitamin deficiency. More expanded longitudinal studies are required to determine the potential of this relationship.

Keywords: 25-hydroxyvitamin D, calcium, deficiency, tooth loss

(Rec.Date: Aug 11, 2015 Accept Date: Nov 18, 2015)

Corresponding Author: Fulden Sarac, Department of Internal Medicine, Ege University Medical Faculty, Izmir, Turkey
E-mail: fuldensarac@yahoo.com

Introduction:

Vitamin D is needed for uptake of calcium from the gut and reabsorption of calcium from the kidneys and bone to maintain adequate plasma calcium concentrations for bone mineralization [1]. And also, vitamin D, an anti-inflammatory mediator, has potential benefits for physical and oral health [2]. Many studies [3-6] have investigated the association between vitamin D status and periodontal disease. Prevention of periodontal disease is important for oral health. Tooth loss may impede consumption of a nutritious diet [7-9], reduces quality of life and is associated with systemic diseases such as type 2 diabetes [10] and cardiovascular disease [11]. Recently, Third National Health and Nutrition Examination Survey (NHANES III, 1988–1994) reported that there was an inverse association between serum 25-hydroxyvitamin D concentrations [25(OH)D] and gingival inflammation [12] and periodontal clinical attachment level [13]. Likewise, Dietrich et al. [14] reported that there was an association between serum concentrations of 25(OH)D and gingival inflammation.

Maintenance of vitamin D intake near or above the recommendations, whether through diet or supplementation, could be a safe andeffective way of reducing periodontal disease prevalence [2]. Combined dietary supplements of vitamin D and calcium tended to have better periodontal health, with shallower probing depth, less attachment loss, and less alveolar bone loss [15]. However, in another study, plasma 25(OH)D levels were higher among individuals with aggressive periodontitis compared with control individuals [16].

Case Presentation:

A 44 year old female was referred for an opinion regarding a six-months history of progressive tooth loss. Besides tooth loss, she had fever. She was a regular dental attender, and brushed her teeth twice daily using a suitable toothbrush and a dentifrice. However, there was no difference in the patient by antibiotics using. The patient did not give the history of trauma. It was found that more molar and maxillary teeth were lost in this period [Figure 1-2]. The patient suffered from fatigue but did not have pain. In addition, patient did not use any medication affecting vitamin D levels or sunscreen. She also denies history of diabetes mellitus.

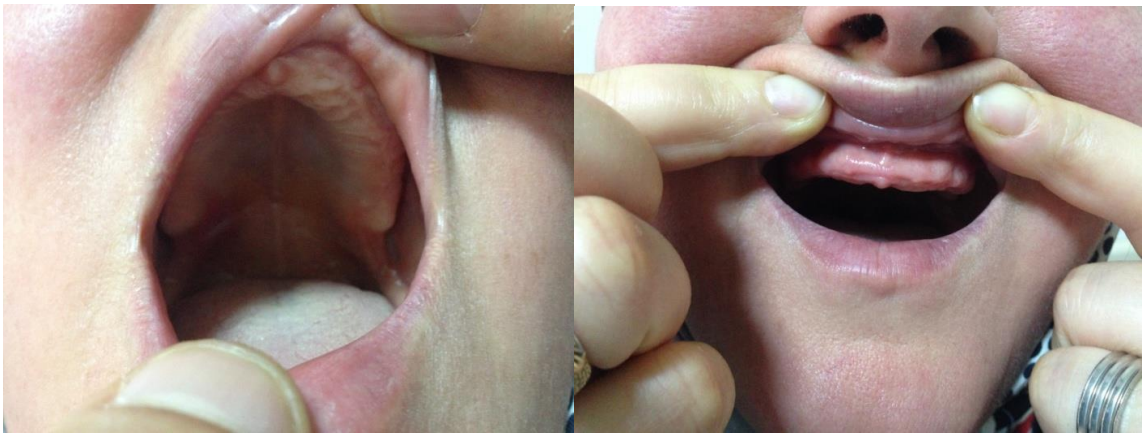

Figure 1-2. More molar and maxillary teeth lost

In the physical examination: Blood pressure: 130/80 mmHg, Body Mass Index: 23 Kg/m2, cranial nerves were intact. Examination of nerves system was within normal limits, and also, there was no proximal myopathy. Bone mineral density measurement was evaluated. Lomber T score (bone mineral density: 0.830 g/cm2) and femur T score were found -2.2 and 0.4, respectively.

Laboratory tests were as follows: With an oral glucose tolerance test, plasma fasting glucose and 2-hour glucose levels were found to be 90 mg/dL and 120 mg/dL, respectively. Complete blood count revealed a hemoglobin level of 10.3 g/dL, hematocrit 34%, white blood cell 7100/mm3 and a platelet count of 300000/mm3. Serum Ca level was 9.5 mg/dL (normal range, 8.6 to 10.2), serum phosphate 4 mg/dL (normal range, 2.3 to 4.5), alkaline phosphatase 79 U/L (normal range, 35 to 104), and magnesium 2.08 mg/dL (normal range, 1.5 to 2.6). C-reactive protein and erythrocyte sedimentation rate levels were found to be 0.4 mg/dL (normal range, 0 to 0.5) and 20 mm/hr, respectively. Antinuclear antibodies and rheumatoid factor levels were negative; the viral serologic testing for anti-hepatitis A virus, immunoglobulin M, and immunoglobulin G were negative, anti-hepatitis C virus was negative, group agglutination and Rose Bengal tests were negative, Epstein-Barr virus was negative, anti-cytomegalovirus immunoglobulin M was negative, anti-cytomegalovirus immunoglobulin G was positive, and parvovirus was negative. 25-hydroxy vitamin D [25(OH)D] levels, PTH, and calcium per 24 hours were 12.4 ng/ml, 72.2 pg/mL (normal range, 12 to 88), 93 mg/24 hr, respectively.

Vitamin D deficiency is defined as serum 25 (OH) D <20 ng/ml. A serum level between 21 and 29 ng/ml is insufficient and a 25 (OH) D greater than 30 ng/ml is considered sufficient [17]. And also, we thought that she had vitamin D deficiency and there was no any other systemic disease. Oral cholecalsiferol (D3) 50 000 IU per week was initiated for a period of 8 week. After this period, treatment was continued with 1500 IU/day D3 and 1000 mg calcium/day for 6 months. In control analyses serum 25 (OH) D level was in normal ranges and she recovered from fatigue and fever.

Discussion and Conclusion

In humans the main source of vitamin D is sunlight exposure [17]. However, vitamin D deficiency is one of the most common health problems in the world [18]. Protective associations of vitamin D with conditions such as hypertension, cardiovascular disease, diabetes, and cancer have been reported [19,20]. More recently, it has been suggested that vitamin D is a modulator of inflammatory responses. Elevated 25OHD may decrease the periodontitis [21], caries [22], and tooth loss [23].

In our case, we thought that she had 25(OH)D deficiency. There was no any other systemic disease such as inflamatuar diseases and malignancy. The relationship between systemic bone loss and worsening of dental health have been reported. Bone mineral density of this patient was found to be osteopenic at only lomber area. However, we initiated D3 vitamin to prevent of symptoms of deficiency.

There are not plenty of food sources containing vitamin D. As a result almost most of all vitamin D is obtained from exposure to sunlight [24]. It is demonstrated that many factors such as skin pigmentation, aging, seasonal variation, sunscreen usage and obesity decreased vitamin D production [25-27]. In the present patient, we didn't find any source of D vitamin deficiency.

Tooth loss is most commonly due to caries and/or periodontitis. In many studies [2-4] low 25(OH)D concentrations were associated with higher prevalence of periodontitis. However, Jimenez et al [28] reported that they found a suggestion of an association between predictors of vitamin D and lower incidence of tooth loss and periodontitis. In another study, Liu et al

[29] suggested that plasmatic 25OHD3 was not correlated but might be influenced by aggressive periodontitis.

Prevention effect of vitamin D on tooth loss acts through anti-inflammatory or antimicrobial mechanisms or both. Vitamin D has been shown to suppress the body's adaptive immune response [28-32], perhaps by reducing local inflammation in oral tissues. Vitamin D might influence periodontal health in the etiologic pathway of periodontal disease, by reducing overall pathogenic oral infection. The active hormone of 1,25 (OH)2D has been shown to induce anti-microbial peptide gene expression such as cathlecidin [33].

Calcium and vitamin D supplementation slow the rate of bone loss from various skeletal sites [34]. However no many studies related to intake of these nutrients affects tooth health. In a previous study, Miley et al. [35] suggested that there was a trend for better periodontal health with intake of vitamin D and calcium supplementation. Likewise, Krall et al. [36] reported that intake levels of calcium and vitamin D aimed at preventing osteoporosis have a beneficial effect on tooth retention. In another report, they found only calcium intake, and not vitamin D, to be significantly related to reduced periodontal disease progression and tooth loss in men [37].

In summary, this case report shows that tooth loss might be seen in patients with D vitamin deficiency. More expanded longitudinal studies are required to determine the potential of this relationship.

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