Dental management of isolated growth hormone deficiency: a case report

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In case of growth hormone deficiency, periodontal problems may accompany due to the abnormal formation of teeth making plaque accumulation easier. The purpose of this report is to describe dental management of a 14-year old female patient with isolated growth hormone deficiency. She was referred to the Department of Periodontology for treatment of severe gingival inflammation. Periodontal treatment was done by means of scaling and root planning and the patient as well as her father was instructed on better oral hygiene. Following completion of the initial periodontal treatment and improvement of oral hygiene, the dentin carious lesions in the upper incisors were restored. Orthodontic treatment as well as treatment with human growth hormone supplementation was planned.
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INTRODUCTION

Growth hormone deficiency (GHD), as the name implies, is the absence or deficiency of growth hormone produced by the pituitary gland to stimulate the body to grow. The mechanisms regulating growth and development are complex interactions between genes, hormones, nutrients and epigenetic factors, while any disturbances may result in a deviating growth pattern.[1]

GHD in conventional terms is defined as failure of the somatotrophs in the pituitary gland to produce and secrete growth hormone (GH) in order to increase the serum GH concentration over an arbitrarily defined cut-off value during provocative pharmacological tests. GHD is a major cause of delayed growth and may occur during infancy or later in childhood. The primary symptom of GHD is a noticeable slow rate of body growth (less than 2 inches per year), although the body has normal proportions. The child with GHD may also have an immature face, meaning they look much younger than the biological age and a chubby body build may be observed. The incidence of GHD is highly associated with perinatal insult including prolonged or precipitous labour or births, breech presentation, and caesarean birth.

Growth hormone has a strong effect on bone growth including the bones of the upper and lower jaws.[1] It is common in children with GHD to keep the primary teeth longer than average, which can cause problems with the eruption of the permanent teeth. Moreover, GHD may cause growth disorders of jaws. Such a disorder is commonly seen as a small lower jaw or chin, since the lower jaw seems to be more dependent than the upper jaw on normal growth hormone levels.

The teeth of children with GHD may be softer than normal or not formed normally, making them more susceptible to cavities. Severe periodontal disease is uncommon in children and adolescents and pronounced periodontal problems are usually associated with systemic diseases in the background.[2] In case of growth hormone deficiency, periodontal problems may accompany due to the abnormal formation of teeth making plaque accumulation easier and also from the emotional distress of the child arising from the short stature and ignorance of oral hygiene.

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Figure 1. The body height of the patient at first examination. Note the face with an expression of a child younger than her chronological age.

Figure 2. Oral findings in this 14-year old girl with isolated growth hormone deficiency. Note the heavy accumulation of calculus and severe gingival inflammation.

The purpose of the present report is to describe a case of isolated growth hormone deficiency with severe dental problems and to document the dental management of this patient.

CASE REPORT

A 14-year old Caucasian female patient was referred by her pediatrician to the Department of Periodontology, School of Dentistry, Ege University, Izmir. She seemed to be about 5-years old both with her body height and with her expression on the face (Figure 1).

At the initial dental examination severe gingival inflammation and pronounced marginal erythema were observed and all her teeth were covered with thick layers of calculus (Figure 2). Medical and dental history was obtained and it was learned that the girl was the second child of a family of three children and low socioeconomic level. None of the family members had a specific disease. She was born at term and with normal delivery, but her birth weight was not recorded. Her growth pattern was normal for the first three years and growth retardation was noticed when she was three-years old. There was no history of nutritional deficiencies. Informed consent of the patient's parents was obtained both in the oral and written forms before documentation of the case.

From her past medical records, it was learned that she had been diagnosed to be growth hormone deficient when she was 10 years old (December, 1999). At that time her height age had been determined as 3 years and 9 months and her bone age had been determined as 5 years and 9 months, although her chronological age was 10 years 11 months. Thyroid function tests had revealed normal results indicating no deficiency. Growth hormone stimulation tests had been carried out by insulin and L-dopa stimulation and finally she had been diagnosed with an isolated growth hormone deficiency. In this case, the patient had not exhibited any signs or symptoms suggesting that the condition was a syndrome. The diagnosis had been based on the basis of the clinical presentation, the family history, and the laboratory analyses. The follow-up of the patient had shown that her body growth rate was less than 4cm per year. Thereafter, she had been prescribed growth hormone supplementary treatment. However, due to the low socio-economic level of the family, the economical burden of the hormone replacement therapy could not be overcome and she could not start to receive the treatment until she was 14 years old. Soon after the start of hormone supplementation, she was referred by her pediatrician to the Department of Periodontology, School of Dentistry, Ege University for the treatment of pronounced gingivitis.

At her first visit (June 2003), complete oral examination was undertaken and plaque index (PI)[3], papilla bleeding index (PBI)[4], probing pocket depth (PPD) and probing attachment level (PAL) were recorded at six sites per tooth (Table 1). Radiographic examination was done by means of panoramic radiography. Furthermore, cephalometric analysis was also done. The lateral cephalograph revealed that the posterior facial height was smaller than the anterior facial height and the anterior lower facial height was larger than the anterior upper facial height (Table 2). Both of the jaws were retropositioned regarding the anterior cranial base. The mandibular plane inclination and the gonial angle were increased significantly and the facial convexity was increased. Therefore, the cephalometric analysis suggested a facial retrognathia, Pirinen *et al.*[5] In respect to these cephalometric findings, orthodontic treatment of the patient was planned.

Table 1. Mean values of clinical periodontal measurements.

PI (0-3)	PBI (0-4)	PPD (range)	PAL
2.1	3.3	2.05 (2-5)	0.96

PI : Plaque Index (Silness & Löe)
PBI: Papilla Bleeding Index (Saxer & Mühlemann)
PPD: Probing pocket depth (mm)
PAL: Probing attachment level (mm)

Table 2. Cephalometric measurements obtained from the lateral cephalography.

Cranial	
N-s-ba	149
N-s-ar	124
S-n	64 mm
S-ba	61 mm
Facial upper	
S-n-ss	89
NL/NSL	8
N-sp	42
Sp-pm	38
Facial lower	
S-n-sm	77
S-n-pg	77
ML/NSL	47
ML/NL	46
Gn-tgo-ar	134
Sp'-gn	60
Tgo-ar	41
Gn-tgo	58
Ar-gn	78
Facial upper and lower	
Ss-n-sm	11.5
S-ar-tgo	145
N-ss-pg	160
N-gn	109
Tgo'-tgo	60
N-sp'/sp'-gn	38.5
Tgo'-tgo/n-gn	54.1

The patient and her father were instructed for daily plaque control. Nonsurgical periodontal treatment in terms of scaling was also performed. After the thick layers of calculus were removed, deep dentin caries lesions in her upper central and lateral incisors were detected (Figure 3). In order to restore the dentin cavities, it was decided to apply direct composite resin restorations on teeth 11, 21 and 22. The teeth were prepared for direct composite resin veneers. Hypocalcified enamel was removed by means of a diamond bur and a sharp excavator used to remove the soft dentin and caries on the surface. Phosphoric acid gel (3M, Scotchbond) was applied for 20 seconds. The etchant was thoroughly washed from surface and smear layer removed. After gently dried, the primary component (3M, Multipurpose) was applied to the surface, remained for 30 seconds and gently dried for 5 seconds according to the manufacturer's instructions. The adhesive (3M, Multipurpose) was applied to the surface, remained for 10 seconds and light cured for 20 seconds. Micro-hybrid composite material (3M Valux™ plus, 3M Dental Products, St. Paul, MN 55144) was replaced as 2 mm layers and each layer was cured for 40 seconds. Abrasive discs (Hawe-Neos Dental, Bioggio Switzerland) and silicone polishers (Kenda AG, Vaduz) were used for finishing the restorations. The restorations of the cavities improved her smile significantly (Figure 4). The patient is now on a regular maintenance programme with one-month intervals and 3-month follow-up of the patient revealed good maintenance with no sign of recurrence of gingivitis. No more bleeding on probing, no major sign of oedema and redness were detected (Figure 5). The patient was also in a better psychological situation.

Figure 3. Oral tissues after scaling was performed and her oral hygiene was improved. Note the dentin cavities in the upper front teeth.

Figure 4. Oral tissues after completion of the initial phase of periodontal treatment and application of composite resin veneers.

Figure 5. Oral tissues 6-months after completion of the nonsurgical periodontal treatment.

Figure 6. Oral tissues and application of composite resin veneers after 1.5 years.

DISCUSSION

The assessment of growth is an important part of paediatrics and community child health. Poor growth may be a side effect of many local and systemic conditions and the identification acts as a useful early warning of a possible problem.

Infants with GHD have facial features that may be described as "cherubic" in appearance. The forehead is prominent (bossing) and the eyes appear large. The nasal bridge is underdeveloped, and the nose is infantile. The cheeks are full and the chin is petite. Older children have similar qualities as the infants. Specific treatment for GHD should be determined with the child's physician basing on the child's age, overall health, medical history, and the child's tolerance for specific medications and procedures.

Previously cases have been reported describing orthodontic treatment and growth hormone therapy,[7] gingival fibromatosis and growth hormone deficiency syndrome,[8,10,11] and low growth hormone in adults with periodontal disease.[9]

To our knowledge, this is the first report describing dental management of a case of isolated growth hormone deficiency in a child, which is associated with severe gingivitis and dentinal carious lesions. Previously, a case of monogenesis imperfect with growth hormone deficiency has been reported, Dündar *et al.*[6] However, dental management of that patient has not been defined. Success in dental management of patients with periodontal disease is closely related with compliance. In the presented case the improvement of aesthetics of the patient by periodontal treatment as well as the cavity restorations showed a significant positive effect on the mood of the patient. Even more, better compliance has been achieved after these dental treatment procedures.

As a conclusion, we emphasise the importance of cooperation between dentists and pediatricians in specific cases and suggest systemic evaluation of children with prominent periodontal findings as well as dental treatment of children with such systemic diseases.

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