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CASE REPORT

Orthodontic treatment for a mandibular prognathic girl of short stature under growth hormone therapy

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This report presents a case of a 12-year-old girl with maxillary deficiency, mandibular prognathism, and facial asymmetry, undergoing growth hormone (GH) therapy due to idiopathic short stature. Children of short stature with or without GH deficiency have a deviating craniofacial morphology with overall smaller dimensions; facial retrognathism, especially mandibular retrognathism; and increased facial convexity. However, a complete opposite craniofacial pattern was presented in our case of a skeletal Class III girl with idiopathic short stature. The orthodontic treatment goal was to inhibit or change the direction of mandibular growth and stimulate the maxillary growth of the girl during a course of GH therapy. Maxillary protraction and mandibular retraction were achieved using occipitomental anchorage (OMA) orthopedic appliance in the first stage of treatment. In the second stage, the patient was treated with a fixed orthodontic appliance using a modified multiple-loop edgewise archwire technique of asymmetric mechanics and an active retainer of vertical chin-cup. The treatment led to an acceptable facial profile and obvious facial asymmetry improvement. Class I dental occlusion and coincident dental midline were also achieved. A 3½-year follow-up of the girl at age 18 showed a stable result of the orthodontic and dentofacial orthopedic treatment. Our case shows that

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the OMA orthopedic appliance of maxillary protraction combined with mandibular retraction is effective for correcting skeletal Class III malocclusion with midface deficiency and mandibular prognathism in growing children with idiopathic short stature undergoing GH therapy.

Introduction

Growth hormone (GH) is a polypeptide hormone, secreted by the anterior part of the hypophysis, and plays a major role in craniofacial and skeletal growth.[1] Since biosynthetic human GH obtained by genetic recombination became widely available in 1985,[2] clinicians have been working to extend the use of recombinant human GH for short-stature children with classic GH deficiency to as many categories of short-stature children as possible. Therefore, its application in children was widened to various diseases such as Turner or Noonan syndromes, chronic renal failure, children born small for their gestation age, Prader—Willi syndrome, and idiopathic short stature.[1,2] Cephalometric studies of children with GH deficiency have shown the following craniofacial characteristics: small anterior and posterior cranial base dimensions, steep mandibular plane angle, and small mandibular sizes including the total mandibular length and smaller ramal height.[3,4] Orthodontists should understand the characteristics of craniofacial morphology in idiopathic short-stature children and the effects of GH therapy on these patients prior to beginning orthodontic treatment. The main purpose of this case report was to present an orthodontic case of skeletal Class III girl, undergoing GH therapy due to idiopathic short stature.

Case report

A 12-year-old girl came to our hospital with a protruded mandible and everted lower lip as the chief complaint. She had been diagnosed as having idiopathic short stature at age 10. The patient had a normal birth height and weight for her gestational age. However, she showed a slow postnatal growth rate and short stature. The hand-wrist radiograph showed that her skeletal age was delayed by 1 year 2 months compared with the chronologic age of 10. Clinical or laboratory evidence revealed no systemic disease of dysmorphic features. She received GH treatment at a medical center in Kaohsiung for 4 years, starting at age 10. The GH treatment was effective, and she had prominent somatic growth until her menstruation commenced at age 13. The patient was initially 126 mm below the fifth percentile of body height for Taiwanese girls of age 10[5]; during the GH therapy, she moved up 135.5 mm into the 15th percentile at age 11; and 146 and 151.2 mm at age 12 and 13, respectively; and 154 mm into the 20th percentile when GH therapy ended at age 14, which was maintained through age 15—18 (Fig. 1). The patient's weight, initially 22.2 kg, increased to 26.5 kg below the fifth percentile of body height for Taiwanese girls of age 10 and 11, respectively, and increased to 32, 35.6, and 37.2 kg around the fifth percentile, and then to 38.5, 39.5, and 41 kg which were below the fifth percentile of age 14, 15, and 18, respectively (Fig. 2).[5]

Orthodontic examination showed that the girl had anterior crossbite and skeletal Class III malocclusion (T1) (Fig. 3 and Table 1). She had a concave facial profile with maxillary deficiency and mandibular prognathism, and facial asymmetry with the mandible deviated to the right

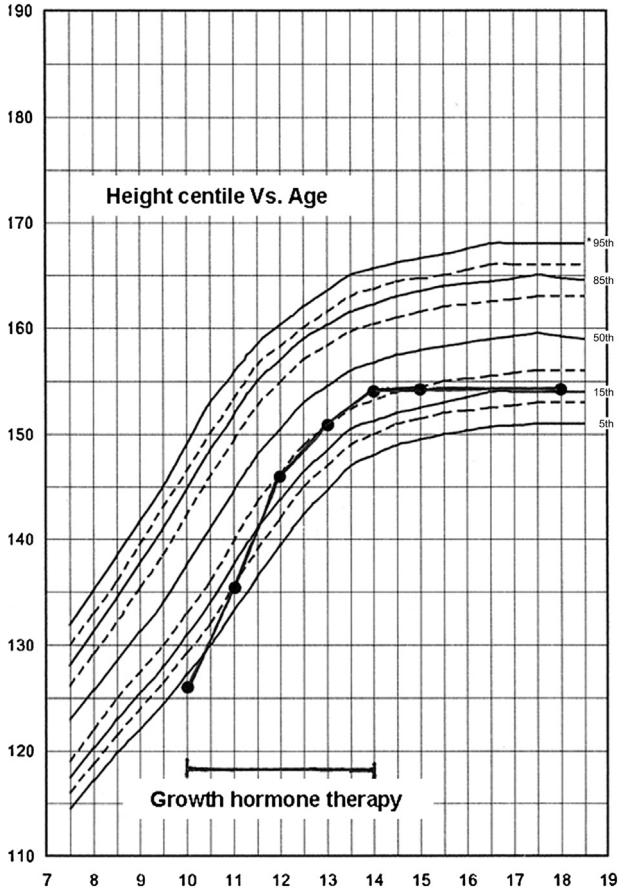

Figure 1 Height growth curve[5] for patient.

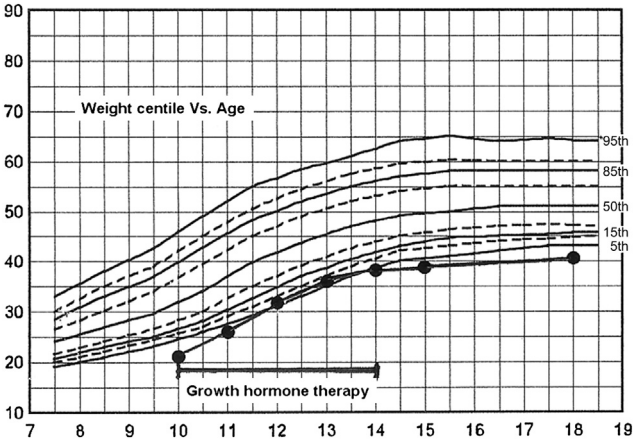

Figure 2 Weight growth curve[5] for patient.