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International Journal of Current Research
Vol. 8, Issue, 12, pp.42933-42935, December, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

OROFACIAL MANIFESTATIONS OF GROWTH HORMONE DEFICIENCY – A CASE REPORT

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ARTICLE INFO

Article History:
Received 03rd September, 2016
Received in revised form
15th October, 2016
Accepted 19th November, 2016
Published online 30th December, 2016

Key words:
Dental age, Dental features, Dental radiography, Growth hormone deficiency.

ABSTRACT

Growth hormone deficiency (GHD) is a medical condition, which occurs due to insufficient production of growth hormone by the anterior pituitary gland. The GHD is associated with retarded growth on brain, bones, muscles and gonads affecting the person physically and emotionally. The goal of a dental professional in this regard is to identify the dentofacial manifestations that commonly occur due to GHD, perform a radiographic examination which will not only aid in confirming the clinical features but also simultaneously screens for growth or tumours in parasellar region. Elimination of social stigma and associated psychological factors by counselling is needed for complete monitoring of the patients growth along with hormonal therapy and provision of planned dental care. This article describes a case report of a child with dentofacial manifestations of GHD highlighting importance of various dental radiographs.

Citation: Santosh Palla, Dr. Vishwanath Rangdhol, Sitra, G. and John Balaiah, 2016. "Orofacial Manifestations of Growth Hormone Deficiency – A Case Report", *International Journal of Current Research*, 8, (12), 42933-42935.

INTRODUCTION

Growth hormone (somatotropin) is a polypeptide hormone secreted by the anterior pituitary gland and it stimulates growthand cell reproduction**.** Growth hormone deficiency has markedly different clinical presentations in children and adults (Shafer *et al.,* 1994). In children, reduced height, weight, poor mental ability, retarded development of gonads can occur. In adults, although rare, has diminished body mass, poor bone density, poor memory, social withdrawal, and depression (Neville *et al.,* 2010).

CASE REPORT

A 9 years old male patient reported with the chief complaint of unerupted upper front teeth, since two months. The parents of the child gave medical history of evaluation and investigations done for his short stature since birth. The reports showed decreased values of Growth hormone-0.98ngm/L (State of art automated chemiluminesence method) and that of serum alkaline phosphatase-216 IU/L. They also gave history of consanguineous marriage, normal delivery, no delay in achieving developmental mile stones and normal social behaviour at school. On general examination, the patient's weight and height were 7.5 Kg and 84 cm respectively with reduced BMI of 8.92 (Normal range 18-22).

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Extraoral examination revealed frontal bossing of skull, sparse hair on the scalp, undescended testis and micro penis were observed.On intraoral examination, constricted maxillary arch with crowding of maxillary anterior teeth and class I molar relation on both sides were present. Both mandibular and maxillary arches showed retrognathism with over multiple retained deciduous and decayed teeth. Based on the clinical features of growth retardation with class I skeletal malocclusion having retrognathic maxillary and mandibular arches, a provisional diagnosis of growth hormone deficiency was considered. Pituitary dwarfismand hypohydrotic variant of ectodermal dysplasia were considered in the differential diagnoses. Panoramic radiographs, Lateral Skull view and Hand wrist radiographs were made to evaluate orofacial manifestations of growth retardation and dental age. The results of age estimation are shown in Table 1.The complete hemogram revealed no significant findings. The biochemical investigation revealed a decrease in growth hormone and increase in alkalinephosphatase as given in table 2, confirmed growth retardation due to hormone deficiency. The patient was promptly referred to an endocrinologist to plan hormone therapy. Treatment for malocclusion will be planned after the hormone therapy.

DISCUSSION

Growth hormone deficiency (GHD) is a term used to indicate reduced secretion of growth hormone (GH) by the pituitary gland. GHD occurs due to unknown eitiology in children (Atreja *et al.,* 2012).

Table 1. Dental radiographs – Importance in GHD

Dental Radiographs	Implications	Dental age	Chronological age
1. Panoramic view	- Eruption delays - routine dental findings	5-6years (Nolla's method)	9 years.
2. Hand-wrist Radiograph	- Fusion of bones - Age and treatment planning	5-6 years (Hagg and Taranger Method)	
3. Lateral skull view	- Para-Sellar region assessment and Arch relationships	- Not applicable	

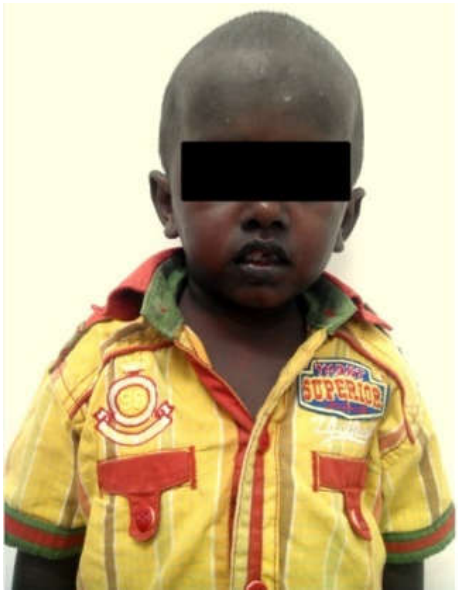

Fig. 1. Facial view of patient

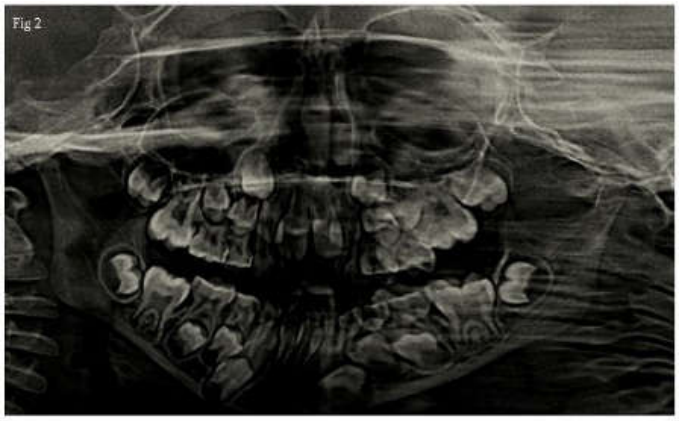

Fig. 2. Panoramic radiograph

The diagnosis of GHD in children is accomplished primarily by combination of clinical signs of poor growth and biochemical test to measure hormone levels. The values of growth hormone in normal adults and children in specified in table no 3.The diagnosis becomes difficult in adults and obese people over 30 years, just by clinical stature or retarded growth signs alone (Shalet *et al.,* 1998). The cardinal clinical features of GHD in children include low velocity of growth and short stature, with negative familial history which were invariably noted in our case. The history of malnourishment must be ruled out before confirming these clinical signs. These clinical signs are also synonymous with those that occur in 'hypopituitarism' (pituitary dwarfism) (Rudman *et al.,* 1978; Rappaport *et al.,* 1977) but, a parental history, presence of hypoglycaemia in the neonatal period, septo-optic dysplasia, midline facial defects and solitary central incisor suggesting the possibility of hypopituitarism, are not seen in this case.

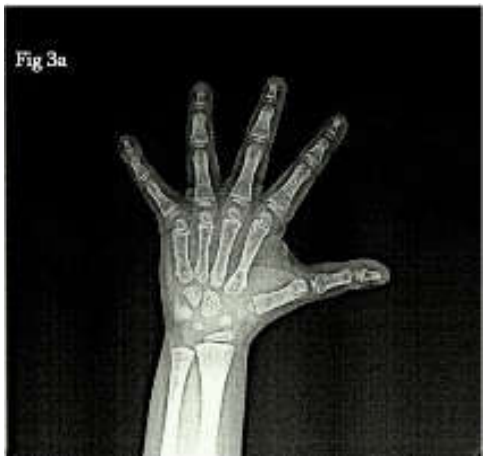

Fig. 3 (a). Hand Wrist radiograph-ossification of capitate, hamate, triquetral, lunate, scaphoid and trapezium, trapezoid and pisiform. Incomplete ossification - lower end of radius, ulna

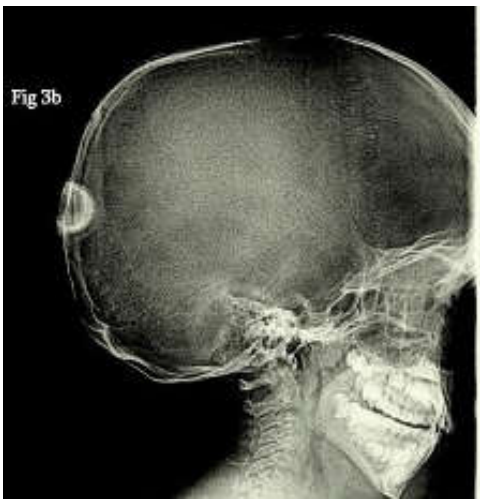

Fig. 3(b) Lateral skull view -open anterior fotenellae, retrognathic jaws, ill-defined margins of sellatursica

The other features of children affected with GHD are reduced pubertal growth findings such as undescended testicles and micro penis which were present in this case. The features of stunted growth of facial bones, retrognathic maxilla and mandible, poor mid face development, delayed exfoliation / eruption of teeth, constricted arches and malocclusions (crowding) are common for both GHD and hypopituitarism (Shalet *et al.,* 1998). However, complete absence of tooth bud, microdontia, shorter root size is observed mostly in hypopituitarism while eruption delay or retained deciduous teeth are seen in the GHD (Rosen *et al.,* 1997). The importance of radiographs in such children is to assess the growth and bone density, screen out for tumours in pituitary region, age estimation and to plan orthodontic therapy. Bone mineral density values are show to be low in case of GHD individuals compared to normal adults taken as controls who had increased incidence of pathological vertebral fractures (Carroll *et al.,* 1988).

Table 2. Biochemical tests

Investigations	Result	Normal Range
1. Growth Hormone	0.98 ngm/L	0-20 ng/mL
2.Serum alkaline phosphatase	216 IU/L	44 to 147 IU/L
3. Serum calcium	9.4 mg/dl	9-11 mg/dl
4. Serum phosphorus	3.5 mg/dl	2.4-4.1 mg/dl

Table 3. Random Growth hormone levels in healthy individuals

1.	Men	< 5 ng/mL or < 226 pmol/L
2.	Women:	< 10 ng/mL or < 452 pmol/L
3.	Children	0-20 ng/mL or 0-904 pmol/L
4.	New born	5-40 ng/mL or 226-1808 pmol/L

The hormone therapy with analogues of human growth hormone have given best results in terms of increasing lean body mass, height, bone density and general psychological symptoms (Buduneli *et al.,* 2005). Dentalcase reports on GHD with oral manifestations are rare in literature. Buduneli*et al* reported a case report on management of 14 years child who had GHD (Funatsu *et al.,* 2006) studied growth rates in children who were on hormone therapy and concluded that standard cephalometric analysis in untreated group were less than standards in terms of the anterior cranial base, total facial height, maxillary length, mandibular total length, mandibular body length and ramus height (Herring, 2002). Growth hormone therapy may be required in cases where GHD is acquired due to surgical treatment in adults who had carniopharyngiomas (Growth Hormone Deficiency, 2009) or syndromes like Turner's syndromes (Random growth Hormone in healthy individuals, 2013). However, as stated earlier, the idiopathic GHD cases, occurring in children are routinely found not due to an established cause. Clinical evaluation and biochemical tests are gold standard to confirm GHD, and need growth hormone therapy. It must be understood that hormone therapy is a multi-speciality approach which requires supervision of endocrinologists as it may affect the body metabolism, bone density and eventually heart functions on long terms use (Rai *et al.,* 2008). Dental age was estimated by Nolla's method using panoramic radiograph (Hägg Taranger, 1980). Panoramic radiography revealed multiple retained deciduous teeth and uneruptedfirst permanent mandibular molars estimated to a dental of 5-6 years (Fig 2). This was confirmed by evaluation of hand wrist radiograph, as per Hagg and Taranger method (Nandlal *et al.,* 2014) as shown in Fig 3a. Dental age can be calculated from lateral skull (Fig 3b) views as per Rai *et al.* (2008), however is not indicated in this case, due to presence of GHD and severe skeletal malocclusion.

Conclusion: A role of dentist in regard to the scenario is timely diagnosis of GHD by evaluating all clinical, biochemical and radiographic features. Counselling the patient is necessary, prior to planning an appropriate endocrinal, dental and orthodontic treatment. Hormone therapy shows benefits in terms of growth progress and bone density, thus should be planned prior to orthodontic interventions. A constant supervision of endocrinologist is needed while hormone therapy is given to avoid any complications and interaction of dentist with medical specialist aids in compressive growth monitoring and timely planning of dental treatments.

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