ejpmr, 2023,10(8), 504-506

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Case Report

ISSN 2394-3211

EJPMR

ISOLATED GROWTH HORMONE DEFICIENCY – A CASE REPORT

Shanki Kaundal[1]*, Vatika Gupta[2] and Umang Thakur[3]

[1]Medical officer Specialist (MD Pediatrics) Civil Hospital Taunidevi, Hamirpur, Himachal Pradesh.
[2]Medical officer Specialist (MD Pediatrics) District Hospital Mandi, Himachal Pradesh.
[3]Medical officer Specialist (MS Ophthalmology) District Hospital Mandi, Himachal Pradesh.

***Corresponding Author: Shanki Kaundal**

Medical officer Specialist (MD Pediatrics) Civil Hospital Taunidevi, Hamirpur, Himachal Pradesh.

Article Received on 17/06/2023 **Article Revised on 07/07/2023** **Article Accepted on 27/07/2023**

ABSTRACT

Growth hormone deficiency (GHD) is one of the most common pituitary hormone deficiency in children and can be isolated or in combination with other pituitary hormones deficiency. Isolated growth hormone deficiency is rare and patient presents exclusively with and short stature. Diagnosis involves measurement of pituitary hormone levels and CT or MRI to detect structural pituitary anomalies or brain tumors. All children diagnosed with GH deficiency should be treated with recombinant human growth hormone as soon as diagnosis is made as treatment response is greater when initiated at a younger age.

KEYWORDS: Growth hormone (GH), Growth hormone deficiency (GHD), growth hormone releasing hormone (GHRH), insulin-like growth-factor I (IGF-I), Isolated GH deficiency (IGHD).

INTRODUCTION

Growth hormone (GH) secreted in pulsatile manner from somatotroph cells in the anterior pituitary gland. Opposing actions of growth hormone releasing hormone (GHRH) which has a stimulatory effect, and somatostatin which has a inhibitory effect.[1] GH acts through binding to the GH receptor, inducing either direct effects or initiating the production of insulin-like growth-factor I (IGF-I), which is the most important mediator of GH effects. GH promotes growth in nearly every tissue and organ in the body. However, it is primarily known for its growth-promoting effect on cartilage and bone, especially in the adolescent years. Growth hormone is responsible for longitudinal growth in children and adolescents.

GH deficiency can present either in isolation (isolated GHD - IGHD) or in combination with other pituitary hormone insufficiencies. In the neonatal period MPHD typically presents with reduced penile size, episodes of hypoglycemia, and prolonged unconjugated hyperbilirubinemia.[2] Isolated GH deficiency (IGHD) is rare with deficiency only in GH; therefore, patients present exclusively with short stature. GH deficiency results in normal growth at birth. Growth retardation become apparent by the age of one year. Adult final height is severely compromised, if untreated. Other clinical features are crowding of mid facial structures, round facies, depressed nasal bridge, single incisor, micropenis, undescended testis etc. facial features are 'doll like' and they appear much younger than their actual age. Dentition and bone age is also delayed. Diagnosis of GHD requires pharmacological stimulation test. The common provocative agents are insulin, glucagon, clonidine, or GHRH. GHD is suspected when the peak level of GH is less than 10 ng/ml following stimulation.[3]

CASE REPORT

12 year old male, presented to child OPD with complaints of not gaining height. His parents reported short stature as compared to his siblings and peers and growth arrest noted from last 5-6 years. There was no history of perinatal insult, any history suggestive of systemic cause of short stature or delayed dentition or however patient had crowding of teeth, depressed nasal bridge and mid-face hypoplasia. His voice was also high-pitched. There was no developmental delay. Pubertal timing of parents and siblings was normal. Examination revealed stable vitals and no abnormality detected on systemic examination. The anthropometric measurements showed weight 12 kgs and height of 113 cms. His height for age was below -3SD and weight for age was also below -3SD. His upper segment and lower segment ratio was 1:1.2 and arm span was 114 cms which was suggestive of proportionate short stature. Mid-parental height was 142 cms (target height 133.5-150.5 cms). He was in prepubertal stage (SMR 1). Routine blood and urine examination revealed normal blood glucose level, normal renal and liver function test. Thyroid function tests were also within normal range and urine routine and microscopic examination was normal. X-ray wrist showed his bone age was delayed (bone age-8 years) figure 1

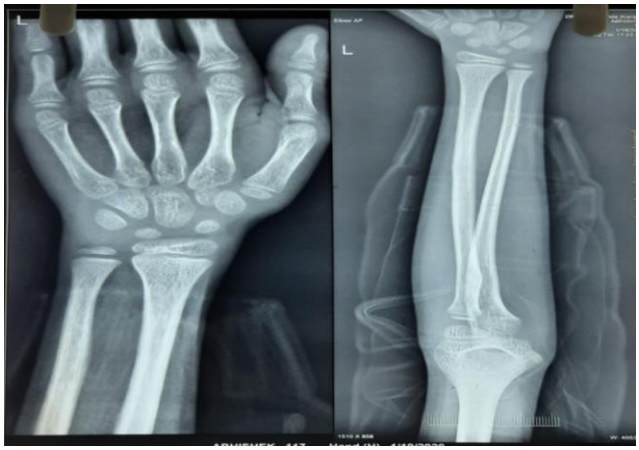

Figure 1: Plain X-ray of right Hand and Wrist.

Morning Cortisol levels were 22 mcg/dl (normal 5.27-22.45 mcg/dl). LH and FSH levels were 0.1IU/L and 0.33 IU/L respectively. Growth hormone assay was consistent with GH deficiency. GH stimulation test using insulin as provocative agent revealed growth hormone deficiency with baseline levels of 0.12 ng/dl, levels at 30 minutes,60 minutes,90 minutes were 0.22 ng/ml, 0.23 ng/ml and 0.15 ng/ml respectively (level <10 ng/mL indicative of GH deficiency). In addition patient also had low-normal serum GF1 levels of 85ng/ml (normal 68-316 ng/ml).

MRI brain showed decreased cranio-caudal span of pituitary which measures upto 3.1mm which is less than normal for the patient with normally visualized posterior pituitary bright spot. (Figure 2) Hypoplasia of the pituitary stalk and/or pituitary gland is supportive of a diagnosis of GHD.

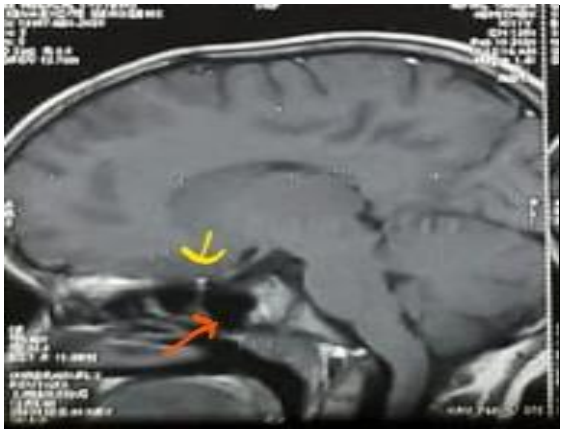

Figure 2: MRI brain showing small size of sella Turcica and Decreased cranio-caudal span of pituitary which measures up to 3.1mm.

DISCUSSION

Growth hormone (GH), also known as somatotropin, is a 191 amino acid single-chain polypeptide produced by somatotropic cells within the anterior pituitary gland.GH is secreted from the anterior pituitary in a pulsatile manner under hypothalamic regulation and other physiologic regulators.[4] The primary regulation factors are growth hormone-releasing hormone (GHRH) produced in the hypothalamus, somatostatin, produced in various tissues throughout the body, and ghrelin, which is produced in the gastrointestinal tract. Around 50% of the circulating GH is bound to Growth hormone binding protein (GHBP). GH acts on the liver, muscle, and bone, and mediates the production and release of insulin-like growth factor (IGF) 1from these organs. Stimulation of linear growth in children is chiefly mediated by IGF1.Hepatic IGF1 circulates in blood almost completely bound to IGF binding proteins (IGFBPs), a group of six structurally related proteins that bind IGFs with high affinity. Of these, IGFBP3 binds 75% to 90% of the circulating IGF1. This complex is stabilized by Acid Labile Subunit (ALS), which increases the half-life of IGF.[5]

Normal GH secretion and functional integrity of the growth hormone (GH) and insulin growth factor (IGF)-I axis are essential for linear growth.[6] With the onset of puberty, there is a large increase in the concentration of circulating sex steroids, which augment GH secretion. Pediatric growth disease can be secondary to growth hormone-insulin-like growth factor-I (GH-IGF-I) axis disorders, such as GH deficiency (GHD) or GH insensitivity (GHI), both characterized by serum low levels of IGF-I[7]. The GH-IGF-I axis should be assessed

in conditions of severe short stature (< -3 SD), severe growth deceleration (height velocity < -2 SD) or less severe short stature (height between -2 and -3 SD) combined with growth deceleration (height velocity < -1 SD).[8]

In evaluation of GH deficiency, other causes of growth failures like long-standing systemic illness, inflammatory disorders, nutritional deficiencies, malabsorption syndromes should be ruled out. Other endocrine causes affecting height like primary hypothyroidism and pseudohypoparathyroidism need to be investigated.

In our case peak growth hormone levels were less than 10 µg/L which were consistent with GH deficiency and the levels of the remaining anterior pituitary hormones were normal. MRI imaging of the brain with a focus on the hypothalamus and pituitary gland shows hypoplasia of the pituitary stalk and pituitary gland are supportive of a diagnosis of GHD.

After obtaining parental and patient consent, patient started on once daily subcutaneous administration of synthetic Growth hormone 0.24 mg/kg/weekdivided into daily injections. There was a significant increase in his height on follow up after a year and the height velocity was 8 cms following growth hormone therapy. Regular follow-up was advised so that potential side effects of GH therapy like idiopathic intracranial hypertension , slipped capital femoral epiphysis, insulin resistance, hypothyroidism etc. could be monitored.

REFERENCES

1. Hartman, M.L.; Iranmanesh, A.; Thorner, M.O.; Veldhuis, J.D. Evaluation of pulsatile patterns of growth hormone release in humans: A brief review. Am. J. Hum. Biol, 1993; 5: 603–614. [Google Scholar] [CrossRef
2. Murray PG, Hague C, Fafoula O, Patel L, Raabe AL, Cusick C, Hall CM, Wright NB, Amin R, Clayton PE. Associations with multiple pituitary hormone deficiency in patients with an ectopic posterior pituitary gland. Clinical endocrinology, 2008; 69: 597–602. [PubMed] [Reference list]
3. Wilson DM, Frane J. A brief review of the use and utility of growth hormone stimulation testing in the NCGS: do we need to do provocative GH testing? Growth Horm IGF Res, 2005; 15: S21-25.
4. Petronella N, Drouin G. Gene conversions in the growth hormone gene family of primates: stronger homogenizing effects in the Hominidae lineage. Genomics, 2011; 98(3): 173–181. [PubMed] [Reference list]
5. Domené HM, Bengolea SV, Martínez AS, Ropelato MG, Pennisi P, Scaglia P, et al. Deficiency of the circulating insulin-like growth factor system associated with inactivation of the acid-labile subunit gene.
6. Savage MO, Hwa V, David A, Rosenfeld RG, Mether-ell LA. Genetic Defects in the Growth Hormone-IGF-I Axis Causing Growth Hormone Insensitivity and Im-paired Linear Growth. Front Endocrinol (Lausanne), 2011; 2: 9.
7. M. O. Savage, C. P. Burren, and R. G. Rosenfeld, "The continuum of growth hormone-IGF-I axis defects causing short stature: diagnostic and therapeutic challenges," Clinical Endocrinology, 2010; 72: 721–728.
8. Richmond EJ, Rogol AD. Growth hormone deficiency in children. Pituitary, 2008; 11(2): 115-120.
9. N Engl J Med, 2004; 350: 570-7.