PITUITARY STALK INTERRUPTION SYNDROME: A CASE REPORT

Shahabuddin Siddiqui,[1] Sheeraz Ahmed,[1] Qaiser Ali,[1] Asma Javed[2]

[1] Department of Radiology, Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan.
[2] Department of Radiology, Shifa International Hospital, Islamabad, Pakistan.

PJR April - June 2020; 30(2): 138-140

ABSTRACT

Pituitary stalk interruption syndrome is a rare congenital abnormality that arises during embryogenesis as a result of defective neuronal migration. It is one of the common cause of pituitary dwarfism. A 17 years old male patient from Pakistan who presented with short stature and absence of secondary sexual characteristics. On physical examination, the height and weight of the patient was below than standard. The hormonal profile showed significantly reduced levels of anterior pituitary hormones and increased prolactin levels. The bone age was less than the chronological age of the patient. MR findings of patient showed hypoplasia of anterior pituitary, total absence of the infundibulum (pituitary stalk), absence of the posterior pituitary bright spot in its normal location and an ectopic posterior pituitary seen at the median eminence exhibiting high signal on T1WI and T2WI. The findings were consistent with the diagnosis of pituitary stalk interruption syndrome.

Keywords: Anterior Hypopituitarism, Pituitary Stalk Interruption Syndrome, Short Stature.

Introduction

Pituitary stalk interruption syndrome is one of the rare congenital anomalies with reported incidence of 0.5/100,000 live births.[1] Disease usually shows male preponderance.[2] It is an important cause of hypothalamic/pituitary axis malfunction. The important features of this disease include hypoplastic anterior pituitary, absent or hypoplastic pituitary stalk and ectopic posterior pituitary.[3] Short stature is the most common presentation of patients with this disease. It is also associated with other anomalies including heterotopia, optic nerve hypoplasia, corpus callosum dysgenesis, and olfactory nerve abnormalities.[4] MRI is the imaging modality of choice for the diagnosis of pituitary stalk interruption syndrome in patients with anterior hypopituitarism.[5] Timely recognition and management of the disease can lead to significant improvement in the growth stature of the patients. Most of the data on pituitary stalk interruption syndrome is published in western countries. There is paucity of data on pituitary stalk interruption syndrome in our country. We present a rare case of pituitary stalk interruption syndrome of a young boy who presented with growth retardation and failure of development of secondary sexual characteristics.

Case Presentation

A 17-year-old young boy presented in OPD with short stature and underdeveloped secondary sexual characteristics without any genetic history of dwarfism. There were no pre, peri and postnatal complication. In early childhood he developed visual disturbances and had growth retardation, however no significant abnormality or chronic disease was recognized during childhood. There was no history of head injury and diabetes insipidus during childhood.

On physical examination, his height, weight, and body mass index were 132 cm, 23 kg, and 13.02 kg/m^2 respectively. BMI was lower than normal (16.3-17.2 kg/m^2). He had no pubic hair. The volumes of both testes were calculated using ultrasound. The volume

Correspondence : Dr. Asma Javed
Department of Radiology,
Shifa International Hospital,
Islamabad, Pakistan.
Email: dr.asmajdq@hotmail.com

Submitted 28 April 2020, Accepted 20 May 2020

of right testis was 2.3 mL and the volume of left testis was 2.4 mL (Normal: 15-20 ml).

Lab investigations showed; increased prolactin levels: 34.96 ng/mL (4.0 to 15.2) and low levels of cortisol i.e. 65 umol/L (171 to 536), insulin like growth factor (IGF-1) levels:19.48 ng/mL (134 to 836), adrenocorticotropic hormone (ACTH) levels 9.84 pg/ml (9 to 52), Growth hormone (GH) level: 0.717 ng/m (< 6), testosterone <0.025ng/mL (<0.025 0.227 Tanner Stage 1), follicle stimulating hormone (FSH): 0.345uIU/mL (1.5to 12.4), and luteinizing hormone (LH) <0.1uIU/mL (1.7 to 8.6). Thyroid profile was normal.

His bone age was 8 years according to the Greulich and Pyle method. His MRI, findings were; Hypoplasia of anterior pituitary with anterior pituitary measuring 5.7 x 8.8 x 4.1 mm in AP x T x CC, Total absence of the infundibulum (pituitary stalk), Absence of the posterior pituitary bright spot in its normal location and an ectopic posterior pituitary measuring 2.3 mm x 3.8 mm x 2.8 mm in AP x T x CC seen at the median eminence exhibiting high signal on T1WI and T2WI. The findings were consistent with the diagnosis of pituitary stalk interruption syndrome.

Discussion

Pituitary stalk interruption syndrome is a congenital midline central nervous system anomaly which is rare but one of the important causes of pituitary dwarfism. It results from the genetic mutations which encode transcription factors resulting in defective neuronal migration during embryogenesis. Mutations of HESX1 (homeobox gene), PIT1, PITX2, LHX3, LHX4, PROP1, SF1, and TBX19 (TPIT) genes have been associated with pituitary stalk interruption syndrome.[5] The reported incidence of the disease is 0.5 in 100,000 births.[6] The clinical presentation varies with the age at the time of presentation. Patient usually presents in childhood with early growth failure and multiple anterior pituitary hormonal deficiencies including the non-development of secondary sexual characteristics. Common symptoms at time of presentation are short stature, polyuria and/or polydipsia, headache, abnormal puberty, hypothyroidism and gait disturbances.[5] Anosmia, poor vision, seizures, neonatal hypoglycemia or jaundice and single central incisor may also constitute the clinical profile of such patients.[6] Anomalies of the forebrain, eyes, olfactory bulbs, lobar holoprosencephaly, septo-optic dysplasia and Joubert syndrome could be associated with this disease.[7] Our patient had growth retardation and underdeveloped secondary sexual characteristics. On examination, micropenis was evident. No axillary/pubic hair were noted.

Multiplanar T1WI MR is the best imaging tool to identify pituitary stalk interruption syndrome and the advised protocol include sagittal and coronal T1WI of hypothalamic/pituitary axis. The patients with significantly reduced growth hormone levels (peak growth hormone levels < 3 g/L) are more likely to show abnormal MR findings.[8] Our patient s growth hormone levels were crucially low. The MR study of our patient on T1WI sequence showed small anterior pituitary gland, absent pituitary stalk and posterior pituitary ectopia appearing as the bright spot. The hyperintense neurohypophysis was located along the median eminence of tuber cinereum in the floor of third ventricle, consistent with classic triad of this disease.[9] On T2WI, the ectopic posterior pituitary shows variable signal, usually hyperintense and in our study, the ectopic neurohypophysis also showed hyperintense signal.

The prognosis of the disease varies with the severity of hormone deficiencies which in turn depend on the degree of anterior pituitary gland and stalk hypoplasia. Assessment and treatment of the endocrine mal-

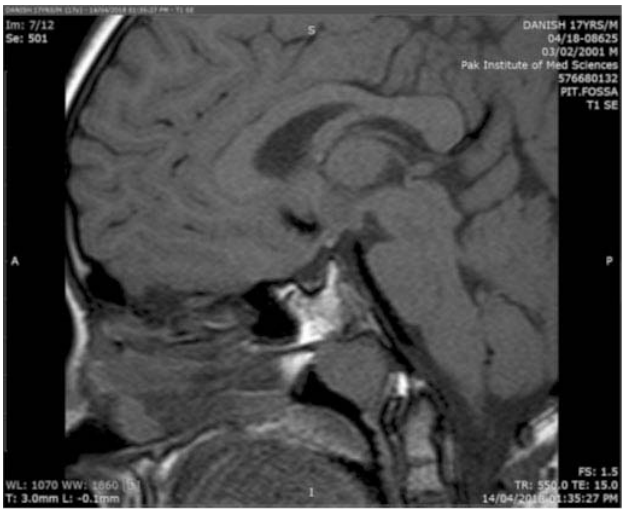

Figure 1: Sagittal T1WI showing hypoplastic anterior pituitary, total absence of infundibulum and an ectopic posterior pituitary at the median eminence of tuber cinereum.

function is the ideal mode of management. Our patient is currently on steroid therapy, growth hormone and thyroid hormone replacement therapy, and testosterone intramuscular injections.

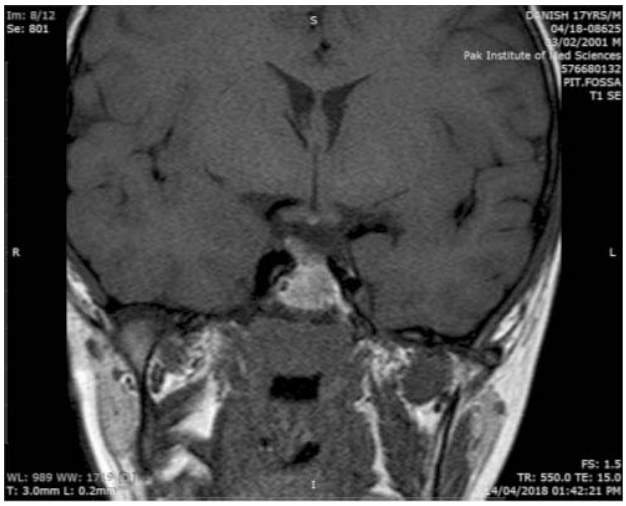

Figure 2: Coronal T1WI showing ectopic posterior pituitary seen at the median eminence in the floor of third ventricle.

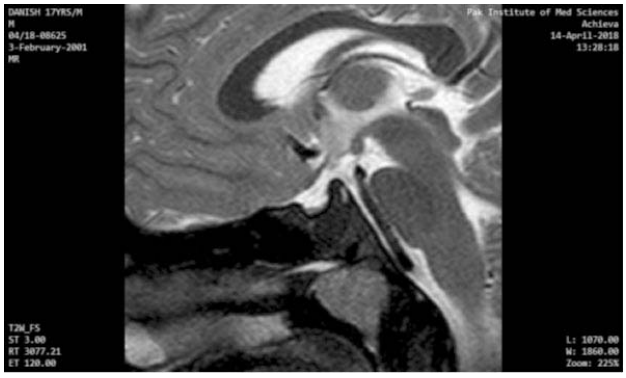

Figure 3: Sagittal T2 FATSAT sequence showing suppression of ectopic pituitary bright spot at the median eminence of tuber cinereum.

Conclusion

We reported the case of an adolescent male who presented with growth retardation and absent secondary sexual characteristics and was diagnosed with a rare congenital pituitary anomaly called pituitary stalk interruption syndrome. In children and young patients with anterior hypopituitarism, it is important to rule out pituitary stalk interruption syndrome on magnetic resonance imaging. Prompt and early management of endocrine disturbances may help patients in achieving normal heights if they present in early childhood.

Conflicts of Interest: None

References

1. Nawaz A, Azeemuddin M, Shahid J. Pituitary stalk interruption syndrome presenting in euthyroid adult with short stature. Radiol Case Rep 2018; **13(2):** 503-6.

2. Guo Q, Yang Y, Mu Y, Lu J, Pan C, Dou J, et al. Pituitary Stalk Interruption Syndrome in Chinese People: Clinical Characteristic Analysis of 55 Cases. PLoS ONE 2013; **8(1):** p.e53579.

3. Voutetakis A, Sertedaki A, Dacou-Voutetakis C. Pituitary stalk interruption syndrome. Curr Opin Pharmacol 2016; **28(4):** 545-50.

4. Ramakrishnaiah R, Shelton J, Glasier C Phillips P. Reliability of Magnetic Resonance Imaging for the Detection of Hypopituitarism in Children with Optic Nerve Hypoplasia. Ophthalmology 2014; **121(1):** 387-91.

5. Bar C, Zadro C, Diene G, Oliver I, Pienkowski C, Jouret, B, et al. Pituitary Stalk Interruption Syndrome from Infancy to Adulthood: Clinical, Hormonal, and Radiological Assessment According to the Initial Presentation. PLoS ONE 2015; **10(11):** e0142354.

6. Wang C, Guo L, Han B, Su X, Guo Q, Mu Y. Pituitary Stalk Interruption Syndrome: From Clinical Findings to Pathogenesis. J Neuroendocrinol 2017; **29(1):** doi: 10.1111/jne.12451.

7. Zada G, Lopes M, Mukundan S, Laws E. Pituitary Hypoplasia and Other Midline Developmental Anomalies. Atlas of Sellar and Parasellar Lesions 2016; 493-6.

8. Argyropoulou M, Perignon F, Brauner R, Brunelle F. Magnetic resonance imaging in the diagnosis of growth hormone deficiency. J Pediatr 1992; **120(6):** 886-91.

9. van der Linden A, van Es H. Case 112: Pituitary Stalk Transection Syndrome with Ectopic Posterior Pituitary Gland. Radiology 2007; **243(2):** 594-97.