International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Chronic Hypothyroidism Induced Pituitary Hyperplasia: A Reversible Cause of Pituitary Enlargement in Adolescence

Dr. Smrati Jain, Dr. Anjali

Abstract: ***Background**: Primary hypothyroidism is an important and often overlooked endocrine cause of short stature and delayed puberty in adolescents. Chronic untreated hypothyroidism may lead to pituitary thyrotroph hyperplasia, which can radiologically mimic pituitary macroadenoma. Differentiating between these entities is critical since hypothyroidism-induced pituitary hyperplasia resolves with thyroid hormone replacement, whereas macroadenomas may require surgical intervention. **Clinical Description**: We report a 13-year-old female who presented with short stature, delayed puberty, generalized edema, and recurrent morning vomiting. She was prepubertal (SMR stage I) with height and weight corresponding to 6- and 8-year equivalents, respectively. **Management**: Investigations revealed markedly elevated TSH (933.62 mIU/L) and low FT4 (<0.42 ng/dL), consistent with severe primary hypothyroidism. Gonadotropins (FSH 6.7 IU/L; LH 0.1 IU/L) were prepubertal. MRI brain with pituitary protocol demonstrated a diffusely bulky, dumbbell-shaped pituitary gland (height 11.8 mm) showing homogeneous post-contrast enhancement, suggestive of pituitary hyperplasia versus macroadenoma. Endocrinology evaluation confirmed hypothyroidism-induced pituitary hyperplasia. The patient was started on step-up levothyroxine therapy (25 mcg → 37.5 mcg → 50 mcg OD maintenance). **Conclusion**: Chronic primary hypothyroidism should be considered in adolescents presenting with growth failure, pubertal delay, and pituitary mass-like lesions. Early recognition and appropriate thyroid hormone replacement lead to complete regression of pituitary hyperplasia and prevent unnecessary surgical interventions.*

Keywords: Primary hypothyroidism, pituitary hyperplasia, short stature, delayed puberty, adolescent endocrinology

1. Introduction

Short stature and delayed puberty in adolescence warrant comprehensive evaluation to identify underlying etiologies. Endocrine causes, particularly primary hypothyroidism, account for a significant proportion of such cases. Long-standing untreated hypothyroidism can result in compensatory thyrotroph hyperplasia of the anterior pituitary, producing radiological features similar to pituitary macroadenoma. Distinguishing hypothyroidism-induced pituitary hyperplasia (HIPH) from adenomas is vital, as the former is reversible with thyroid hormone replacement. This report presents a classic case of chronic hypothyroidism presenting as pituitary hyperplasia, emphasizing the importance of correlating clinical, biochemical, and radiological findings.

2. Clinical Description

A 13-year-old female presented with progressive short stature, delayed puberty, generalized puffiness, and recurrent episodes of morning vomiting. Family and past history were unremarkable. On examination, her height was 117 cm (<3rd percentile; 6-year equivalent) and weight 26.7 kg (<–2 SD; 8-year equivalent). She exhibited coarse facial features, dry skin, diffuse goiter and prepubertal development (SMR stage I). No midline defects or visual field abnormalities were noted.

3. Management and Outcome

Laboratory evaluation revealed markedly elevated serum TSH (933.62 mIU/L) and low FT4 (<0.42 ng/dL), confirming severe primary hypothyroidism. Gonadotropins were within prepubertal range (FSH 6.7 IU/L; LH 0.1 IU/L). Extended karyotyping was performed twice to rule out gonadal dysgenesis, but culture failed due to absence of metaphase growth. MRI brain with pituitary protocol revealed a diffusely bulky, dumbbell-shaped pituitary gland measuring 11.8 mm in height, showing homogeneous post-contrast enhancement, abutting the cavernous portion of the internal carotid arteries bilaterally, with optic chiasma spared. Radiological impression suggested pituitary hyperplasia versus macroadenoma. Endocrinology consultation confirmed the diagnosis of hypothyroidism-induced pituitary hyperplasia. The patient was started on gradual step-up levothyroxine therapy (25 mcg OD ×3 weeks → 37.5 mcg OD ×3 weeks → 50 mcg OD maintenance). Follow-up at 3 months with thyroid profile and repeat MRI was planned to assess pituitary regression.

4. Discussion

Pituitary hyperplasia secondary to primary hypothyroidism is a rare but well-documented phenomenon. Chronic elevation of thyrotropin-releasing hormone (TRH) in response to low thyroid hormone levels stimulates thyrotroph and lactotroph proliferation, resulting in pituitary enlargement. Radiologically, such enlargement can mimic a macroadenoma, but the distinction is crucial to avoid unnecessary neurosurgical interventions.

Characteristic clinical features include growth retardation, delayed puberty, puffiness, lethargy, and features of hypothyroidism. Laboratory findings of markedly elevated TSH and low FT4 confirm the diagnosis. MRI typically shows a symmetrical, homogeneously enhancing pituitary gland without invasion of adjacent structures.Similar cases have been reported. (8, 9)

Thyroxine replacement leads to rapid normalization of thyroid function and gradual reduction of pituitary size over weeks to months. Recognition of this entity is vital for timely and appropriate management, preventing surgical morbidity.

Literature review reveals similar findings across reports emphasizing the reversibility of pituitary enlargement following hormone replacement.

In one review of 25 cases by Khawaja et al. (2020), 92% of patients demonstrated complete radiological regression within 3–6 months of therapy. Another case by Yoshinaga et al. (2018) highlighted visual improvement post-levothyroxine in a child initially misdiagnosed as macroadenoma. Thus, correlating endocrine parameters before surgical planning remains the cornerstone of management.

Figure 1: Clinical photograph of the patient showing physical features of short stature and diffuse goiter.

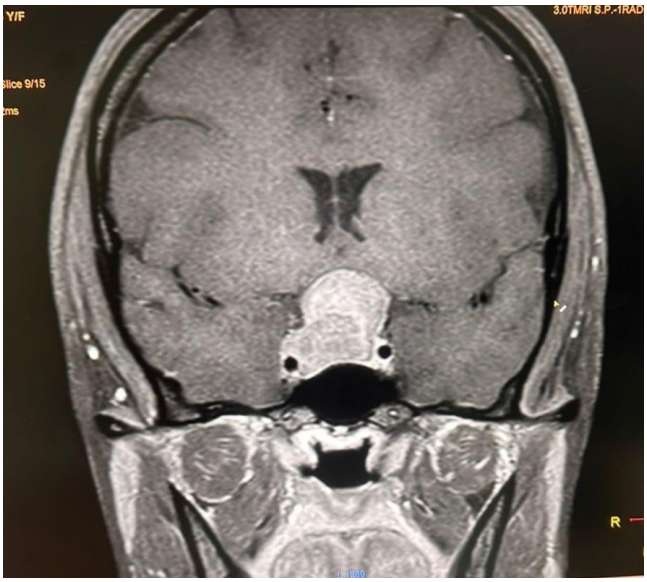

Figure 2: CE-MRI Brain with pituitary protocol revealed a diffusely bulky, dumbbell-shaped pituitary gland measuring 11.8 mm in height, showing homogeneous post-contrast enhancement, abutting the cavernous portion of the internal carotid arteries bilaterally, with optic chiasma spared. Radiological impression suggested pituitary hyperplasia versus macroadenoma

References

[1] Sharma A, Verma A, Bhargava B. Pituitary Hyperplasia Secondary to Primary Hypothyroidism: A Case Report. Medicine (Baltimore). 2019;98(12):e14720.
[2] Mohammad M, Khan S, Iqbal J. Pituitary Hyperplasia in Severe Primary Hypothyroidism: A Case Report and Literature Review. Case Rep Endocrinol. 2019;2019:2012546.
[3] Khawaja NM, Basha M, Al-Hussain TO, et al. Pituitary Hyperplasia Secondary to Primary Hypothyroidism in Children: Review of 25 Cases. J Pediatr Endocrinol Metab. 2020;33(4):475–482.
[4] Yoshinaga M, Saito T, Ito Y, et al. Reversible Pituitary Enlargement Due to Hypothyroidism in a Child. Endocr J. 2018;65(5):557–561.
[5] Kalina MA, Wojcik M, Starzyk JB. Hypothyroidism-Induced Pituitary Hyperplasia Mimicking Adenoma in a Girl with Growth Retardation. Horm Res Paediatr. 2017;88(3-4):299–302.
[6] Beck-Peccoz P, Persani L. Thyrotropin-Induced Hyperplasia of the Pituitary in Primary Hypothyroidism. Endocr Rev. 2019;40(2):636–670.
[7] Kanaya T, Wada T, et al. Regression of Pituitary Enlargement Following Thyroxine Replacement in a Child with Severe Hypothyroidism. Clin Pediatr Endocrinol. 2021;30(2):79–83.
[8] Mishra A, Jaiswal S, Abbas J, Verma A, Jain S. To study the prognostic factors in hemiparesis in children and correlate neuroimaging abnormalities to clinical characteristics: a prospective observational study. 10.5530/ijmedph.2024.1.12.
[9] Jain S, Srivastava A. Siblings with Van Der Knaap Disease -An Atypical Presentation. International Journal of Science and Research (IJSR).2025; 14. 1072. 10.21275/SR25321201028.