P3-D3-920

A case of hypopituitarism caused by traumatic brain injury in infancy

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Background

Reports of hypopituitarism resulting from traumatic brain injury (TBI) are increasingly common in adults (1). TBI-mediated hypopituitarism in infancy and children has been scarcely reported (2), and long-term clinical courses are unclear. We here present a Japanese 31-year-old male with hypopituitarism caused by TBI at the age of 5 months.

Objective and hypothesis

To analyze the evolution of clinical and endocrinological data for 30 years in this patient. We hypothesize that the evolution progressed gradually.

Patient Report

➢ Clinical course

①5 months: traffic accident

②3 years: Height velocity began to decrease.

③ 7years: He was brought to our hospital for retarded growth.

＜physical findings＞

Height 107.4 cm(-3.4SD)
Body Weight 19.3 kg(-1.4SD)
no neurological abnormalities
penile length 30 mm (4.07± 0.32)
testis rt 1 ml, lt 1 ml
PH Ⅰ, AH(-)

＜Endocrinological test＞

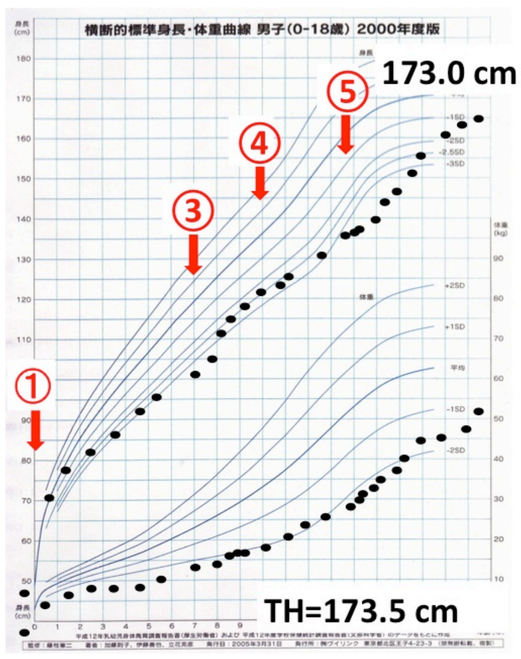
TSH 1.38 μIU/ml
T3 0.81 ng/ml (0.8～1.8)
T4 3.91 μg/dl (6～12)
LH <0.1 mIU/ml
FSH <0.1 mIU/ml
Testosterone 0.1 ng/ml

＜Bone Age＞ 3y6m

	GH (ng/ml)	BS (mg/dl)	TSH (μIU/ml)	PRL (ng/ml)	LH (mIU/ml)	FSH (mIU/ml)
	arginine	arginine	TRH	TRH	LH-RH	LH-RH
0 (min)	1.4	80	1.72	26	<0.1	<0.1
15						
30	1.9	71	14.22	39	<0.1	<0.1
45						
60	1.4	61	18.01	33	0.7	<0.1
90	1.7	72	20.53	30	<0.1	0.2
120						

GH (ng/ml)	BS (mg/dl)	ACTH (pg/ml)	F (μg/dl)
insulin	insulin	insulin	insulin
2.0	77	36	11.84
1.9	29	33	11.19
1.7	45	44	12.53
1.6	45	32	12.11
1.7	49	22	10.91
1.7	70	28	9.35
	77	19	8.5

➢ We diagnosed him as having GH, TSH deficiencies. Gonadotropin deficiency was suspected. GH and l-thyroxine (LT4) therapy were started.



④10 years:

Cortisol 2.4→3.0 μg/dl (insulin)

We diagnosed him as having ACTH deficiency. Hydrocortisone therapy was started.

⑤14 years:

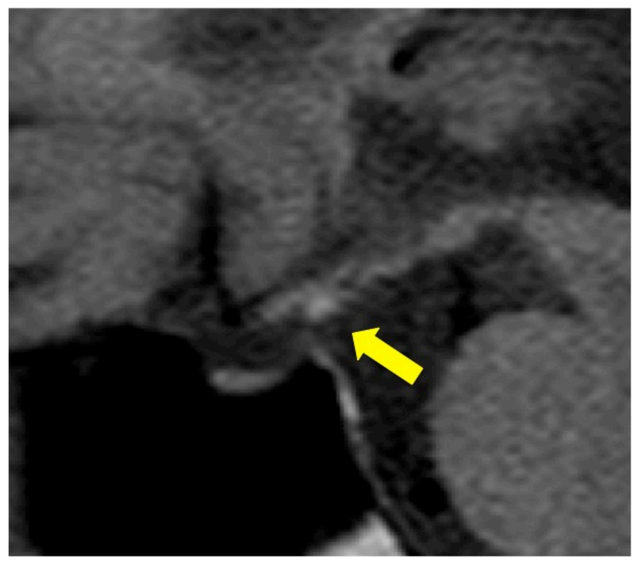
Testosterone enanthate therapy was needed to induce pubertal development at the age of 14 years, when hypogonadotropic hypogonadism was confirmed (LH, FSH, T; all below the detection limit).

⑥Adult:

After starting GH injection, growth rate improved with his final height being 0.4 SD at the age of 31 years.

＜Head MRI＞

The pituitary stalk could not be identified on MRI, and ectopic posterior pituitary bright spot was noted(arrow).



＜gene analysis＞

The mutations for congenital hypopituitarism were not detected. (*CHD7, FGFR1, FGF8, KAL1, PROK2, PROKR2, SOX2, HESX1, LHX4, PROP1, POU1F1, GLI2, OTX2*)

＜physical findings＞at 31years

Height 173.0 cm (+0.4SD)
Body Weight 71.0 kg (+0.8SD)
no neurological abnormalities
penile length 90 mm (9.50± 0.71)
testis rt 4 ml, lt 5 ml
PH Ⅳ, AH(+)

Discussion

➢ We assume hypopituitarism in this case results from TBI, based on the following the reason. He was born uneventfully by spontaneous cephalic delivery, and had no hypoglycemia, polyuria, micropenis, or mental retardation. Absence of the mutations for congenital hypopituitarism is consistent with the assumption above.

➢ Hypopituitarism progressed with age after TBI. Height velocity began to decrease around the age of 3 years. TSH gradually decreased because he did not have mental retardation. The evolution of gonadotropin and ACTH deficiencies were also suspected but they were not confirmed. The cortisol peak of insulin tolerance test at the age of 7 years was obtained before starting LT4.

➢ The order of hormone deficiencies in patients of TBI-mediated hypopituitarism in children has not been described so far. In this case, GH, TSH, gonadotropin deficiencies were documented at the first full-evaluation. It remains to be established which deficiency occurred firstly.

➢ Decreasing height velocity or hypogonadism is one of the symptoms of TBI-mediated hypopituitarism in children (2-5). Retarded growth is the most common, and hypogonadism is the second in the past articles (2-5). In this case, retarded growth found him hypopituitarism.

Conclusion

After the head trauma, GH, TSH gradually worsened in this patient.

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Disclosure Statement

We have declared no conflicts of interest.

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