

MR : 1

. . . 2

T1 MR , (olfactory bulb) (olfactory tract),
(olfactory sulci) MR

(medial olfactory placode) (TR/TE : 665/20msec)
(LHRF)

(lateral olfactory placode) (Fig. 1C). T1 (TR/TE : 450/15msec)
5mm (Fig. 1D).
(1).

MR 2 가 20 가

2 MR 가

: 0.1mlu/ml
(: 2-20), : 0.3mlu/ml (: 2-10),
: 0.16ng/ml (: -2.5-8.5, -0.1-1.0)

1
17 가

. 1.0Tesla Magnetom 42SPE(Siemens AG, Erlangen,
Germany) T1

() (TR/TE:500/15msec)

(LH): 0.97mlu/ml
(: 1.8-5.2), (FSH) : 2.06mlu/ml (:
2.9-8.2)

(Fig. 2A, B).

(karyotyping)

CT . 1.0Tesla (Magne-
tom impact, Siemens, Erlangen, germany)

가 X
가

T1
(TR/TE : 480/15msec) 5mm
(Fig. 1A, B)

(1).

(Fig. 1B). T1 가 1/10000,

1/50000

1
2
1999 7 12 2000 1 17
(2).
3-7mm,

2.1-2.3mm (3), 3mm T1 가 18
 (1,4,5)(Fig. 3), Yousem (3)
 3mm T1 가
 18.6mm³ 11.6mm³ . MR 가 1
 Vogl (2) 18 17 가 3-5mm, 가 40mm
 10 가
 T1 가 1

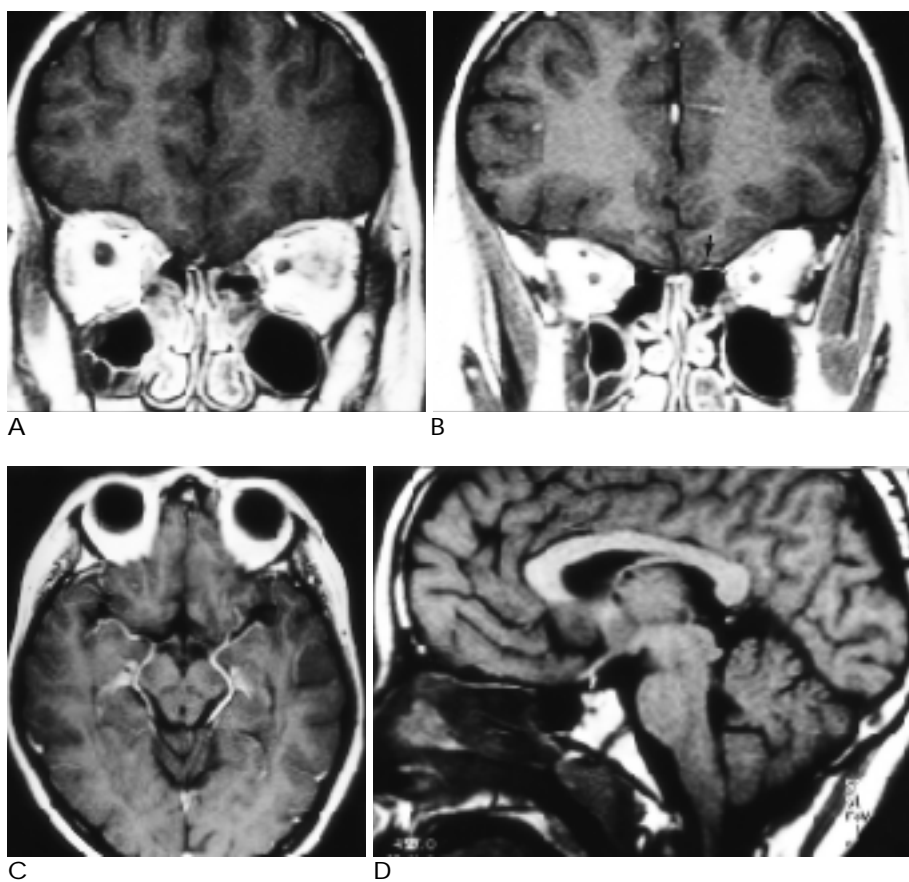


Fig. 1. Kallmann syndrome with primary amenorrhea and anosmia in 17 year-old female patient.

A. Gadolinium-enhanced coronal T1 weighted image(TR/TE:480msec/15msec) shows bilateral absence of olfactory bulb and olfactory sulci

B. Gadolinium-enhanced coronal T1 weighted image(TR/TE:480msec/15msec), more posterior view than A. Rudimentary left olfactory sulcus is noted (arrow).

C. Gadolinium-enhanced axial T1 weighted image(TR/TE:665msec/20msec) shows bilateral absence of olfactory sulci.

D. Sagittal T1 weighted image(TR/TE:450msec/15msec) shows concave upper margin of pituitary gland(arrow) with 7.5mm in anteroposterior length and 5mm in height, suggesting small pituitary gland.

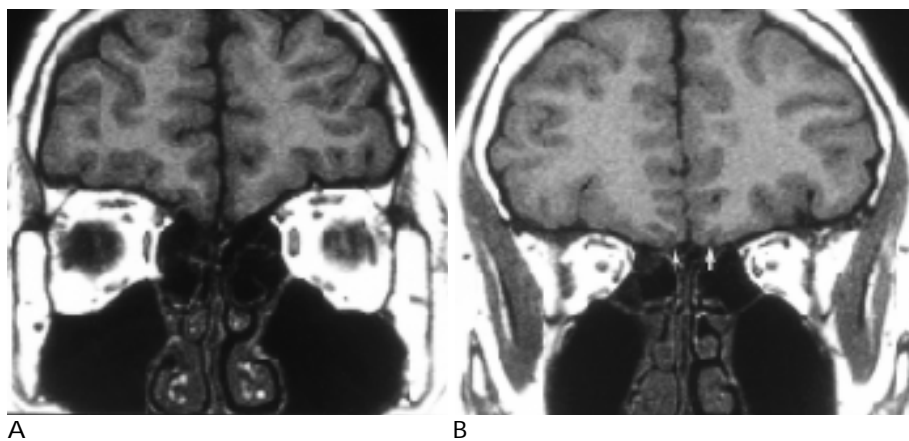


Fig. 2. Kallman syndrome with anosmia and hypogonadism in 20-year old male patient.

A. Coronal T1 weighted image(TR/TE:500msec/15msec) shows bilateral absence of olfactory bulb and olfactory sulci.

B. Coronal T1 weighted image(TR/TE:500msec/15msec) further posteriorly, both olfactory sulci are noted(arrows).

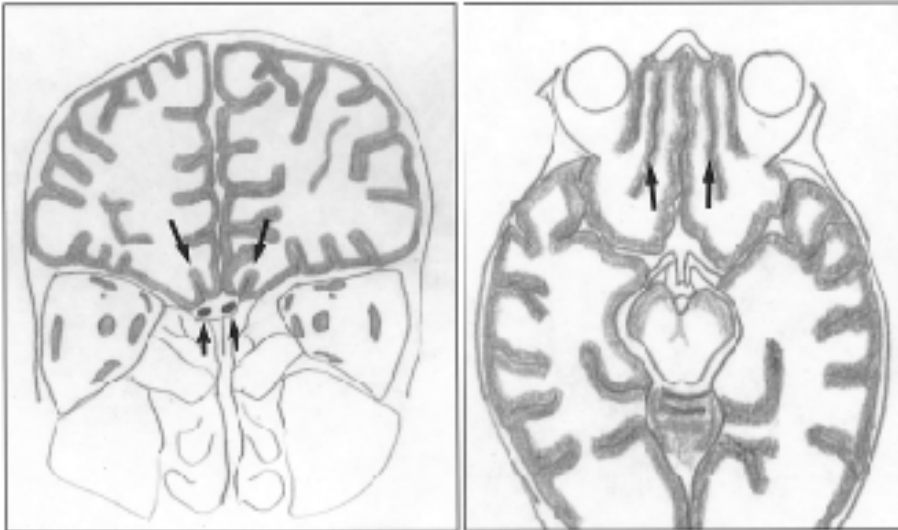


Fig. 3. Schematic drawing of frontal area, coronal and axial view. Bilateral olfactory bulbs(short arrows) are noted at subfrontal area and olfactory sulci(large arrows) are noted between rectus gyrus and olfactory gyrus.

2

(1).

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가 가

T1

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50
10.8mm 1.1,

17
(height) 6.1 mm
(7), Vogel

1.7 53%가

(2) 18 8 , 가

10 3 가

1 7.5mm 가

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1. Truwit CL, Barkovich AJ, Grumbach MM, Martini JJ. MR imaging of Kallmann syndrome, a genetic disorder of neuronal migration affecting the olfactory and genetic system. *AJNR* 1993;14:827-838
2. Vogel TJ, Stemmler J, Heye B, et al. Kallmann syndrome versus idiopathic hypogonadotropic hypogonadism at MR imaging. *Radiology* 1994;191:53-57
3. Suzuki M, Takashima T, Kadoya M, Takahashi S, Miyayama S, Taira S. MR imaging of olfactory bulbs and tracts. *AJNR* 1989;10: 955-957
4. Yousem DM, Turner WJD, Li C, Snyder PJ, Dorty RL. Kallmann's syndrome: MR evaluation of olfactory system. *AJNR* 1993;14:839-843
5. Knorr JR, Ragland RL, Brown RS, Gelber N. Kallmann syndrome: MR findings. *AJNR* 1993;14:845-851
6. Klingmuller D, Dewes W, Krane T, Brecht G, Schweikert HU. Magnetic Resonance imaging of the brain in patients with anosmia and hypothalamic hypogonadism(Kallmann's syndrome). *J Clin Endocrinol Metab* 1987;65:581
7. Doraiswamy M, Potts JM, Axelson DA, et al. MR assessment of pituitary gland morphology in healthy volunteers: age- and gender-related differences *AJNR* 1992;13:1295-1299
8. Li C, Yousem DM, Doty RL, Kennedy DW. Neuroimaging in patients with olfactory dysfunction. *AJR* 1994;162:411-418

MR Findings of Kallmann Syndrome: Case Reports¹

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Kallman syndrome is characterised by hypogonadotrophic hypogonadism and anosmia.

T1 weighted MR coronal images show the bilateral absence or hypoplasia of olfactory bulbs, tracts, and sulci. We report the MR findings of Kallmann syndrome and review the literature.

Index words : Brain, abnormalities

Brain, growth and development

Brain, MR

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