Preoperative Evaluation of Sellar and Parasellar Macrolesions by [^{18}F] Fluorodeoxyglucose Positron Emission Tomography

Masahiko Tosaka[1], Tetsuya Higuchi[2], Keishi Horiguchi[1], Tadashi Osawa[1], Yukiko Arisaka[2], Haruyasu Fujita[3], Yoshito Tsushima[2], Yuhei Yoshimoto[1]

■ OBJECTIVE: **Various diseases can occur in the sellar and suprasellar regions. The potential of [^{18}F]fluorodeoxyglucose (FDG) positron emission tomography (PET) for the preoperative evaluation of sellar and parasellar lesions was investigated.**

■ METHODS: **A total of 49 patients aged 8–82 years with sellar and parasellar macroscopic lesions (≥10 mm) underwent FDG PET. Twenty-two patients had pituitary adenomas, including 14 nonfunctioning and 8 growth hormone–secreting adenomas. Eleven patients had craniopharyngiomas, including 5 adamantinomatous and 6 squamous-papillary types. Eight patients had chordoma, 4 had meningioma, and 4 had a Rathke cleft cyst. The maximum standardized uptake value (SUV_{max}), and the ratio of the SUV_{max} in the tumor to the mean standardized uptake value in the normal cortex (T/N ratio) or in the normal white matter (T/W ratio) were calculated. The relationships between SUV_{max}, T/N ratio, and T/W ratio, and lesion disease were evaluated.**

■ RESULTS: **Uptakes of FDG, including SUV_{max}, T/N ratio, and T/W ratio, were lower in chordoma and Rathke cleft cyst compared with pituitary adenoma. SUV_{max}, T/N ratio, and T/W ratio of nonfunctioning adenoma were significantly higher than those of growth hormone–secreting adenoma. SUV_{max}, T/N ratio, and T/W ratio of squamous-papillary type were significantly higher than those of the adamantinomatous type of craniopharyngioma.**

■ CONCLUSIONS: **FDG PET is useful for the preoperative diagnosis of sellar and parasellar macrolesions. High uptake in nonfunctioning pituitary adenoma, and low uptake in chordoma are significant. The difference in FDG uptake dependent on the histologic subtype may be related to the specific genetics of the craniopharyngioma subtype.**

INTRODUCTION

The sellar and suprasellar regions consist of various anatomic structures with complex relationships. Various tumors and tumorlike lesions are known to occur in these regions. The differential diagnosis of various lesions presents some difficulty based on neuroradiologic findings, because many of these lesions can mimic the clinical, endocrinologic, and radiologic presentations of pituitary adenomas.[1-3] [^{18}F]Fluorodeoxyglucose (FDG) positron emission tomography (PET) has become an important diagnostic tool for brain tumors.[4,5] FDG PET has been useful for preoperative prediction of pathologic diagnosis and identification of malignant features in gliomas and other brain tumors.[6-8] However, FDG PET has not been evaluated for the preoperative diagnosis of tumors in the sellar and parasellar regions. The present study reviewed and analyzed FDG PET studies performed in our institution to investigate the clinical significance of FDG PET imaging of sellar and parasellar tumors and tumorlike lesions.

Key words
- Chordoma
- Craniopharyngioma
- FDG PET
- Pituitary adenoma

Abbreviations and Acronyms
FDG: [^{18}F]Fluorodeoxyglucose
GH: Growth hormone
MRI: Magnetic resonance imaging
PET: Positron emission tomography
ROI: Region of interest
SUV: Standardized uptake value
T/N ratio: Ratio of the maximum standardized uptake value in the tumor to the mean standardized uptake value in the normal cortex
T/W ratio: Ratio of the maximum standardized uptake value in the tumor to the mean standardized uptake value in the normal white matter

From the Departments of [1]Neurosurgery, [2]Diagnostic Radiology and Nuclear Medicine, and [3]Public Health, Gunma University Graduate School of Medicine, Maebashi, Gunma, Japan

To whom correspondence should be addressed: Masahiko Tosaka, M.D., Ph.D. [E-mail: nstosaka@gunma-u.ac.jp]

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Table 1. [^{18}F]Fluorodeoxyglucose Uptake in Various Types of Sellar and Parasellar Lesions

Diagnosis	Number of Cases	Age, Median, Years (IQR)	Sex, Female:Male	Maximum Diameter, Median (IQR), mm	[^{18}F]Fluorodeoxyglucose Uptake, Median (IQR)		
					Maximum Standardized Uptake Value	T/W Ratio	T/N Ratio
Pituitary adenoma	22	64 (22)	13:9	24 (8)	9.0 (7.3)	1.95 (2.07)	1.04 (0.6)
Nonfunctioning	14	67 (23)	8:6	25.5 (5)	11.9 (6.9)	3.26 (2.69)	1.4 (1.05)
Growth hormone—secreting	8	50 (43.5)	5:3	19.5 (19.5)	4.6 (4.5)	1.35 (0.90)	0.8 (0.45)
Craniopharyngioma	11	54 (27.5)	6:5	23 (13)	5.3 (7.1)	1.73 (1.46)	0.78 (0.73)
Adamantinomatous	5	41 (26.5)	5:0	39 (18)	3.8 (1.7)	0.85 (0.58)	0.38 (0.07)
Squamous-papillary	6	60.5 (13)	1:5	21.5 (6)	10.1 (6.0)	2.34 (0.63)	1.06 (0.31)
Chordoma	8	41.5 (26.5)	3:5	37 (17.5)	3.4 (1.6)	0.88 (0.77)	0.45 (0.29)
Meningioma	4	57.5 (25)	1:3	34.5 (6.5)	3.8 (0.8)	1.09 (0.90)	0.48 (0.18)
Rathke cleft cyst	4	36 (31)	3:1	20.5 (3.5)	2.4 (0.8)	0.58 (0.24)	0.26 (0.13)

IQR, interquartile range; T/W ratio, ratio of the maximum standardized uptake value in the tumor to the mean standardized uptake value in the normal white matter; T/N ratio, ratio of the maximum standardized uptake value in the tumor to the mean standardized uptake value in the normal cortex.

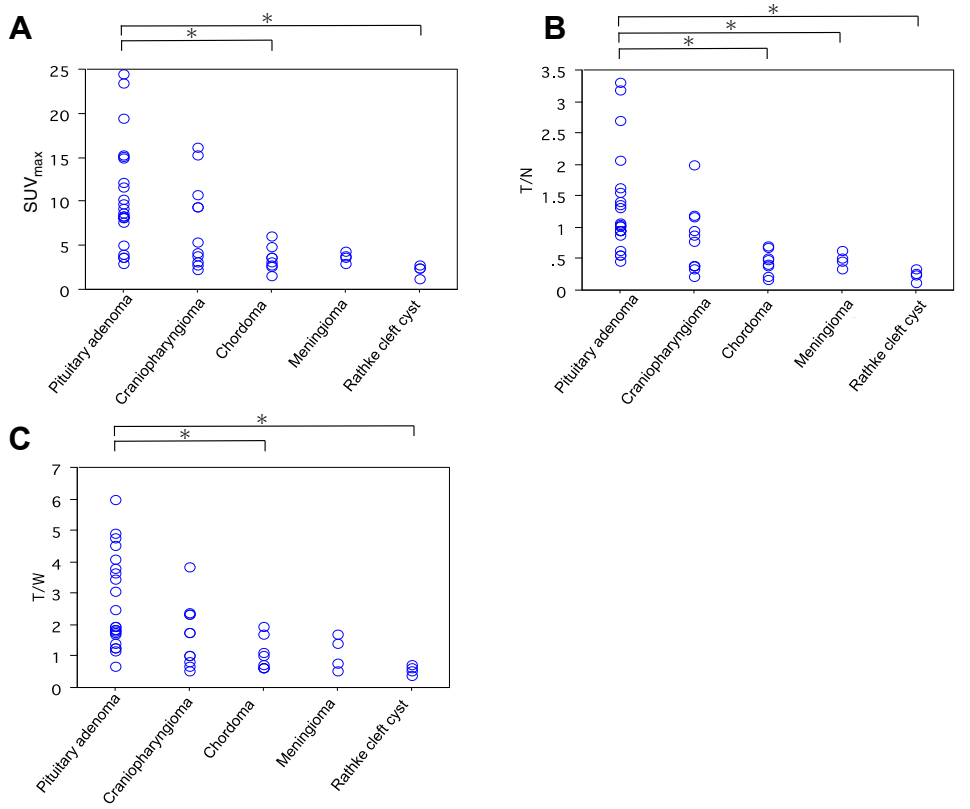

Figure 1. The relationship between maximum standardized uptake value (SUV_{max}) (**A**), T/N ratio (ratio of the SUV_{max} in the tumor to the mean standardized uptake value in the normal cortex) (**B**), and T/W ratio (ratio of the SUV_{max} in the tumor to the mean standardized uptake value in the normal white matter) (**C**) on [^{18}F]fluorodeoxyglucose positron emission tomography, and the diagnosis. The horizontal axis indicates the final diagnosis for the representative 5 diseases. Asterisks show significantly different combinations using the Steal-Dwass test.