

# Indocyanine green endoscopy to evaluate pituitary blood flow in pituitary tumors



## Purpose

➤ We aimed to assess the use of indocyanine green (ICG) fluorescence endoscope to evaluate pituitary blood flow in pituitary tumors during resection.



# Craniopharyngiomas

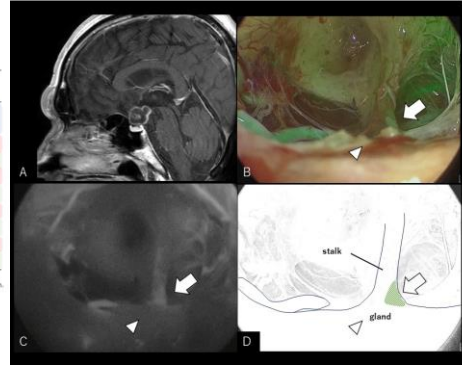
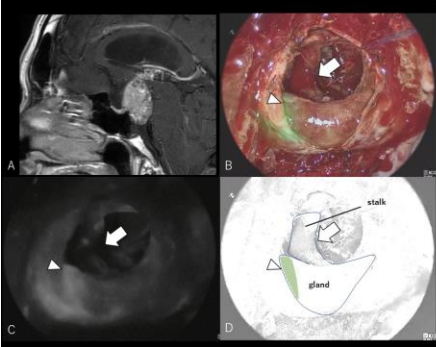
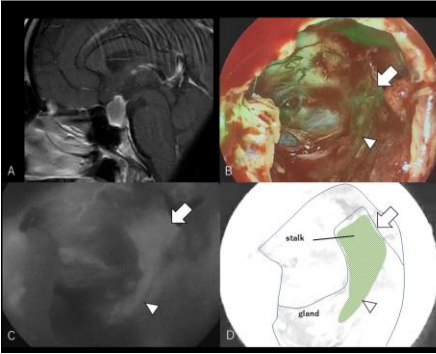
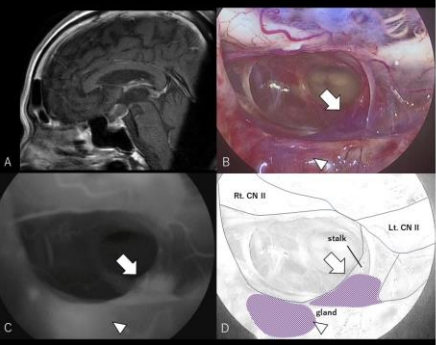
## Methods

- When targeted tumor removal was approaching completion, 10 mg of ICG was administered intravenously, and blood flow in the pituitary stalk and gland was evaluated.
- Subsequently, ICG signals and endocrinological status before and after surgery were evaluated retrospectively.

### Results

Case	Age/Sex	Subtype	Kassam's classification	Removal rate	ICG signal			Recurrence	Hypopituitarism	
					Stalk	Pituitary gland	Stalk processing		Pre-OP	Post-OP
1	70/M	ACP	pre-	GTR	++	++	preserve	-	none	some
2	47/F	ACP	pre-	GTR	++	+	preserve	-	none	some
3	68/M	ACP	pre-	GTR	-	+++	preserve	-	none	AL, HT, sGHD, DL, HG
4	67/F	PCP	trans-	STR	+	+++	preserve	-**	AL, HG, GH, DI	AL, HT, sGHD, DL, HG
5	58/M	PCP	retro-	STR	-	+	preserve	-	HG	AL, HT, sGHD, DL, HG
6	71/F	ACP	pre-	STR	+	+++	preserve	-	none	none
7	29/F	ACP	trans-	GTR	-	+++	sacrifice	-	HG	AL, HT, sGHD, DL, HG
8	64/F	unknown	pre-	STR	+	+++	preserve	-	none	HT
9	35/F	ACP	trans-	GTR	-	+	sacrifice	-	HG, GH, DI	AL, HT, sGHD, DL, HG
10	57/M	PCP	pre-	GTR	+	-	preserve	-	none	AL, HT, DL, HG

ACP: adamantinomatous craniopharyngioma, PCP: papillary craniopharyngioma, retro-: retro-infundibular type, pre-: pre-infundibular type, CTR: gross total resection, STR: subtotal resection, AL: adrenal insufficiency, HT: hypothyroidism, GH: growth hormone deficiency, sGHD: severe growth hormone deficiency, DL: diabetes insipidus, HG: hypogonadism  
 \* ICG possibly pooling in the pituitary gland due to the use of ICG prior to tumor removal.  
 \*\* Gamma Knife was performed for recurrence in the right hypothalamus (17.5Gy/5fx). No recurrence in the pituitary stalk.



Case (No. 1): 70 y.o. man

Pre-infundibular type

ICG: Stalk ++, Gland ++

No-hypopituitarism

Case (No. 2): 47 y.o. woman

Pre-infundibular type

ICG: Stalk ++, Gland +

No-hypopituitarism

Case (No. 5): 58 y.o. man

Retro-infundibular type

ICG: Stalk -, Gland +

Hypopituitarism

Case (No. 10): 57 y.o. man

Pre-infundibular type

ICG: Stalk +, Gland -

Hypopituitarism

## Discussions

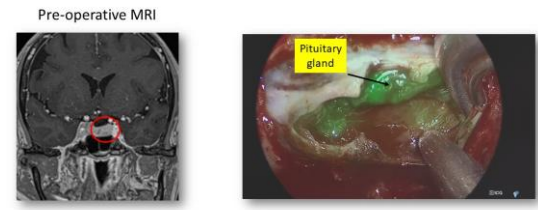
- In a study of 54 patients with craniopharyngiomas, there was no significant difference in the recurrence rate with or without stalk preservation in GTR. [Ordóñez-Rubiano EG, et al. J Neurol Surg, 2019](#)
- A recent report showed an increased tumor recurrence rate with preservation of the pituitary stalk. [Bobeff EJ, et al. J Neurosurg, 2023](#)
- Naturally, amputation of the pituitary stalk requires patients to undergo permanent hormone replacement, leading to a reduced quality of life. However, stalk preservation does not always lead to the preservation of pituitary function.
- We showed that a negative ICG signal is likely to indicate postoperative loss of pituitary function.
- Craniopharyngiomas surgery with ICG endoscopy may be useful in determining whether to preserve the pituitary stalk intraoperatively.

# PitNETs

## Methods

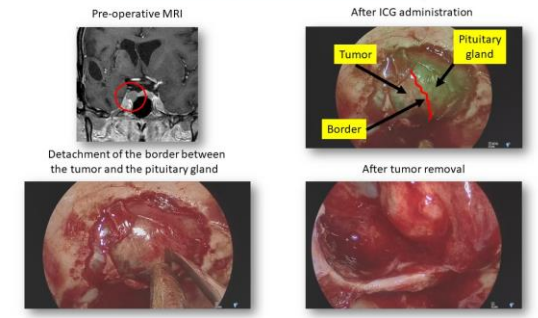
- When the surgeon exposed the dura mater of the sella during surgery, 10 mg of ICG was administered intravenously.
- Subsequently, we observed the ICG signal of tumor and pituitary gland.

## 54y F: Thyrotroph PitNET

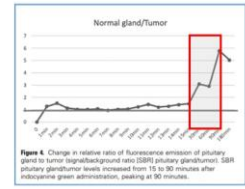


The pituitary gland remained chromogenic for a relatively long time after ICG administration

## 31y F: Corticotroph PitNET



## Discussions



- Moto J, et al. showed the obvious differences in fluorescence intensities between the normal gland and tumor during endoscopic surgery at 15-90 minutes after ICG administration. [Muto J, et al. World Neurosurg, 2023](#)
- In our study, the pituitary gland remained chromogenic for a relatively long time after ICG administration than biological half-time.

- Differences in the amount of ICG remaining in the tissue may discriminate between pituitary gland and tumor.

## Conclusions

- Craniopharyngioma surgery using ICG endoscopy may be useful for predicting endocrine prognosis and improving tumor outcomes.
- In PitNETs, differences in the blood flow and the amount of ICG remaining in the tissue may discriminate between pituitary gland and tumor.