COVID-19 Vaccine Associated Autoimmune Hypophysitis: MRI Features and Clinical Correlation

Joseph Kim, MD; Yasaman Moazeni, MD; Pouya Entezari, MD; Atul Kumar, MD, MBA.

Yale Department of Radiology and Biomedical Imaging.

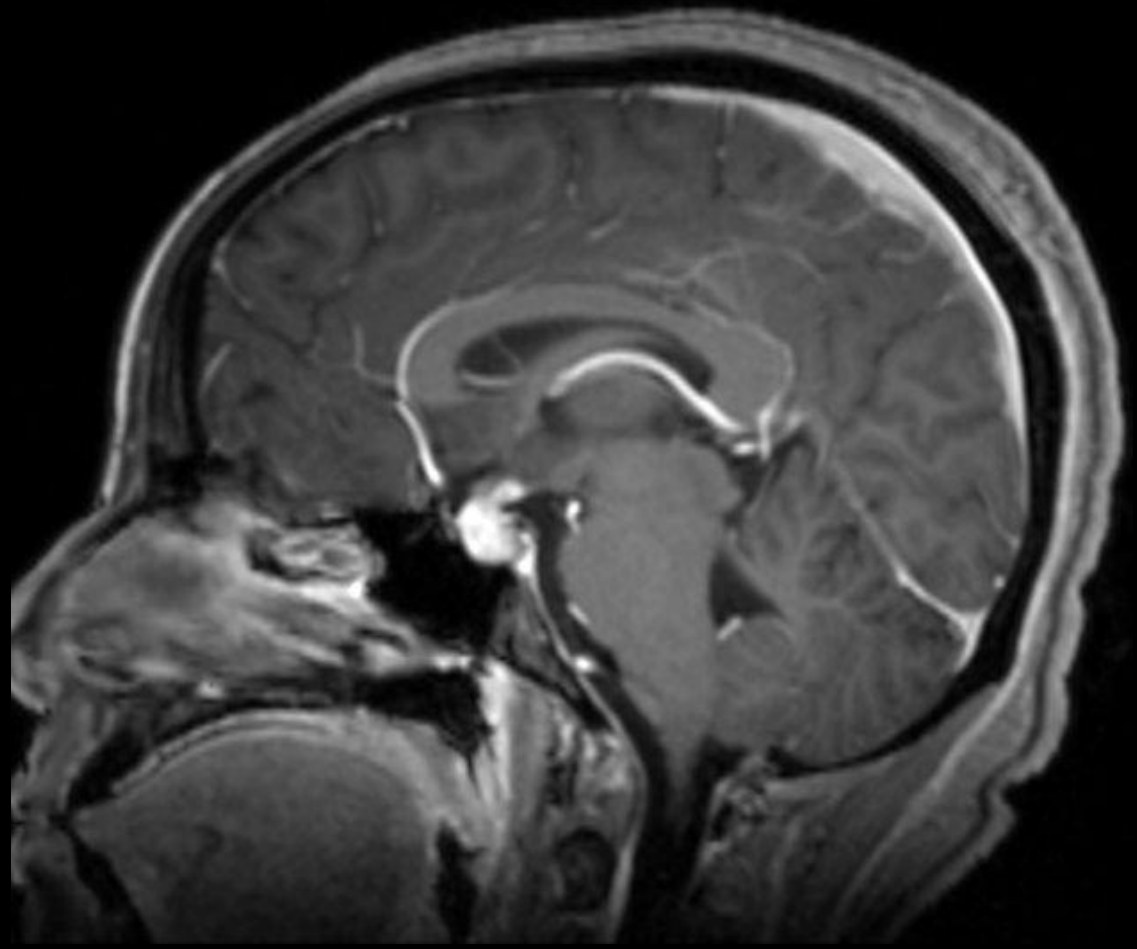
New Haven, Connecticut, USA.

Clinical Presentation

- A 40-year-old woman presented with headache, fatigue, and blurred vision shortly after receiving her second dose of an mRNA COVID-19 vaccine.
- Laboratory evaluation revealed central hypothyroidism, secondary adrenal insufficiency, and hypogonadotropic hypogonadism.

Imaging Discussion

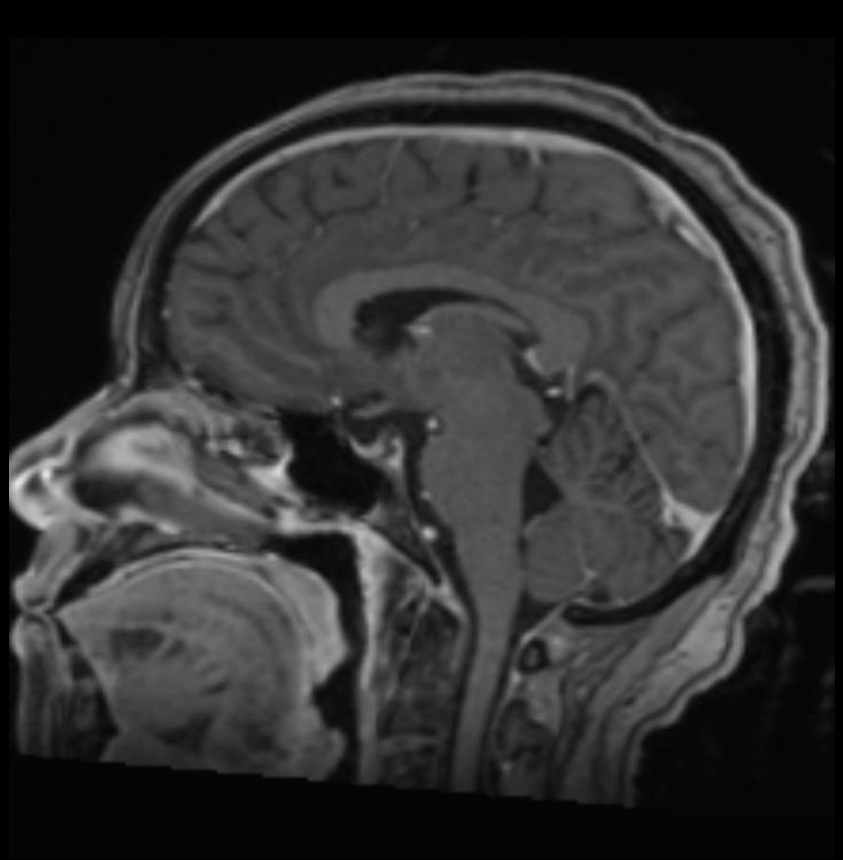
MRI of the brain with and without gadolinium demonstrated diffuse enlargement of the pituitary gland and thickening of the pituitary stalk with intense, homogeneous post-contrast enhancement. The optic chiasm was mildly displaced superiorly without significant compression. There was no evidence of a sellar or suprasellar mass, necrosis, cystic change, calcification, or cavernous sinus invasion.

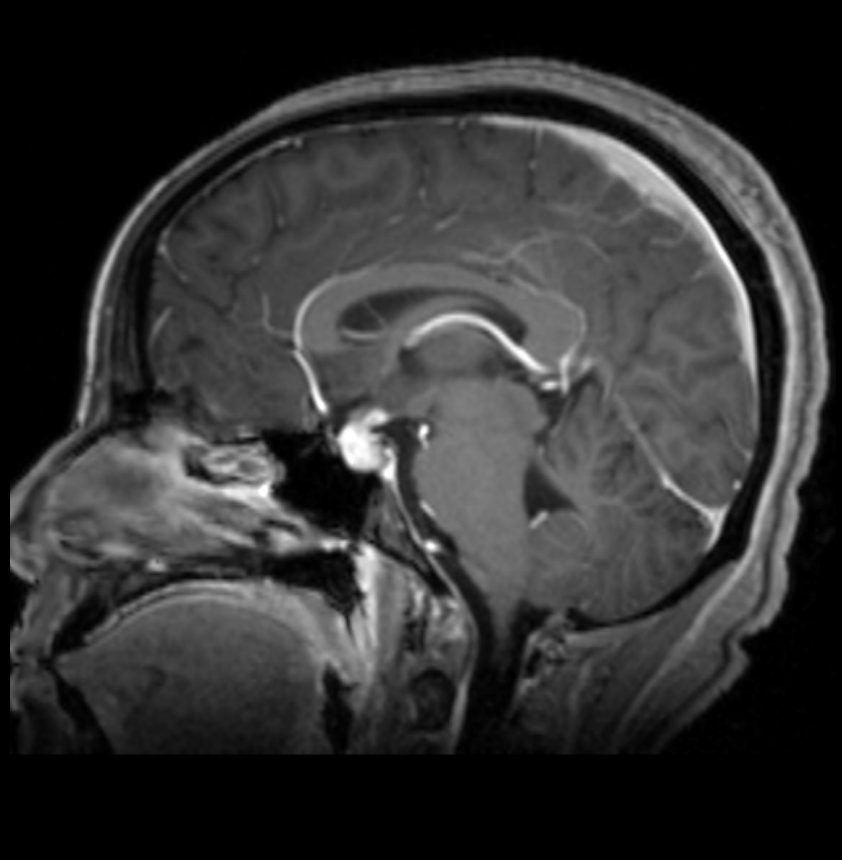


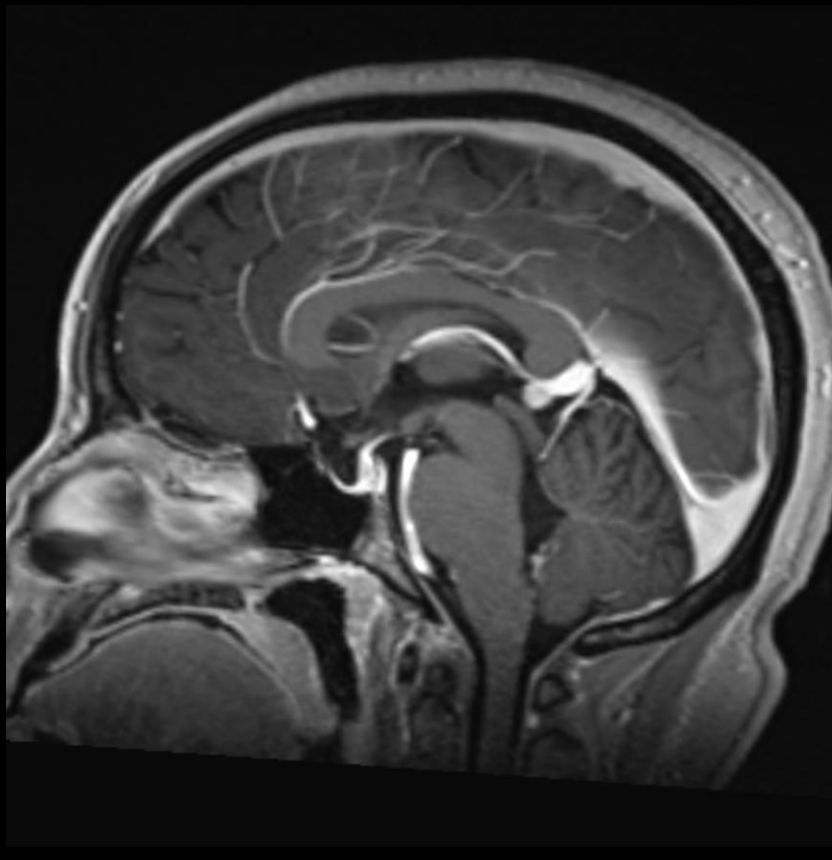
Management

- The imaging and clinical findings suggested a differential diagnosis including lymphocytic hypophysitis, granulomatous hypophysitis, pituitary adenoma, and metastatic disease.
- Lymphocytic hypophysitis was considered most likely due to the diffuse and homogeneous gland and stalk enlargement, the intense enhancement pattern, and the temporal relationship to recent mRNA COVID-19 vaccination.

Imaging Discussion







The left image is a non-contrast T1-weighted brain MRI showing the patient's baseline anatomy with a partially empty sella. The middle image is a post-contrast T1-weighted brain MRI demonstrating enlargement of the pituitary gland and thickening of the pituitary stalk with intense homogenous enhancement. The right image is a post-contrast T1-weighted brain MRI obtained at 4-month follow-up, showing complete resolution of pituitary gland enlargement and stalk thickening.

Outcome

- A diagnosis of presumed mRNA COVID-19 vaccine–associated autoimmune hypophysitis was made.
- The proposed mechanism was immune-mediated inflammation of the pituitary gland, potentially triggered by an aberrant autoimmune response following vaccination.
- The patient was treated with high-dose corticosteroids and hormone replacement therapy.
- At 4-month follow-up, MRI demonstrated resolution of pituitary and stalk enlargement with normalization of enhancement.
- Endocrine function partially recovered, although the patient remained on replacement therapy for secondary adrenal insufficiency.

Take Home Points

- Post-COVID-19 vaccination hypophysitis is a rare but increasingly recognized immune-mediated reaction.
- Clinicians should consider this diagnosis in patients presenting with new hypopituitarism following recent COVID-19 vaccination.
- Recognition of the characteristic MRI features—diffuse pituitary enlargement and stalk thickening with homogeneous enhancement—can help differentiate inflammatory from neoplastic lesions.
- Early initiation of corticosteroid therapy can lead to reversal of imaging abnormalities and clinical improvement, although residual hormonal deficits may persist despite resolution of abnormal imaging findings.

References

- Taieb A, Mounira EE. Pilot Findings on SARS-CoV-2 Vaccine-Induced Pituitary Diseases: A Mini Review from Diagnosis to Pathophysiology. *Vaccines (Basel)*. 2022;10(12):2004. Published 2022 Nov 24. doi:10.3390/vaccines10122004.
- Verrienti M, Marino Picciola V, Ambrosio MR, Zatelli MC. Pituitary and COVID-19 vaccination: a systematic review. *Pituitary*. 2024;27(6):970-985. doi:10.1007/s11102-024-01402-2.
- Yu Y, Zhou G, Du J, et al. Hypophysitis after COVID-19 vaccination in a patient with Rathke's cleft cyst: A case report. *Hum Vaccin Immunother*. 2024;20(1):2297455. doi:10.1080/21645515.2023.2297455.