Concurrent WHO Grade 1 Meningioma and Somatotroph Pituitary Neuroendocrine Tumor: A Case Report and Literature Review

*Joshua S Kurtz MD[1], *Chenyi C Yang BS[1] , Nischal Acharya BS[1], Jordan Davies MD[1], Frank PK Hsu MD PHD[1]

[1]Department of Neurological Surgery, University of California, Irvine Medical Center, Orange, CA

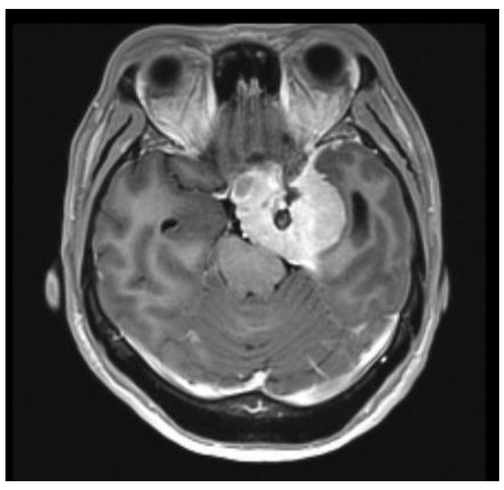
*Co-first authors

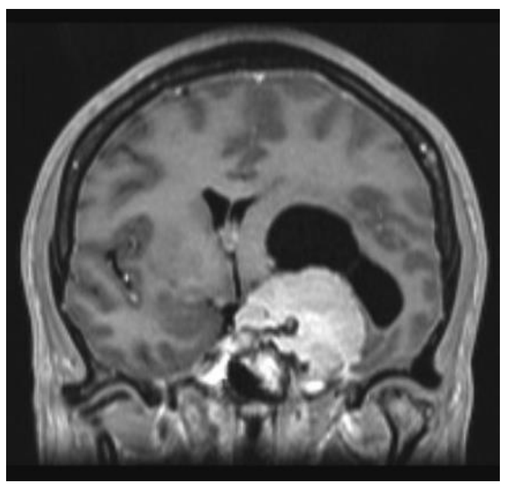
Introduction

- Cases of concurrent meningiomas and pituitary neuroendocrine tumors (PitNETs) are rare.
- Meningiomas are often noncancerous tumors arising from the arachnoid mater, whereas PitNETs arise from neuroendocrine cells.
- The presence of meningioma can overshadow the diagnosis of a concurrent PitNET
- We present a patient with low-grade meningioma, later found to have a concurrent PitNET.
- We aim to highlight the complexity of managing patients with multiple intracranial tumors.
- We also conducted a literature review to contextualize the current case within the broader spectrum of dual intracranial neoplasms.

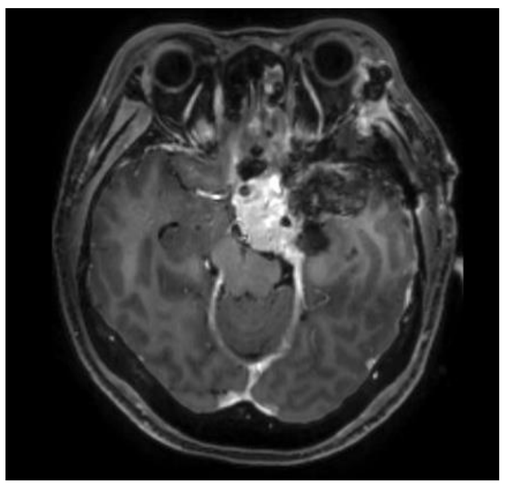
Case Presentation

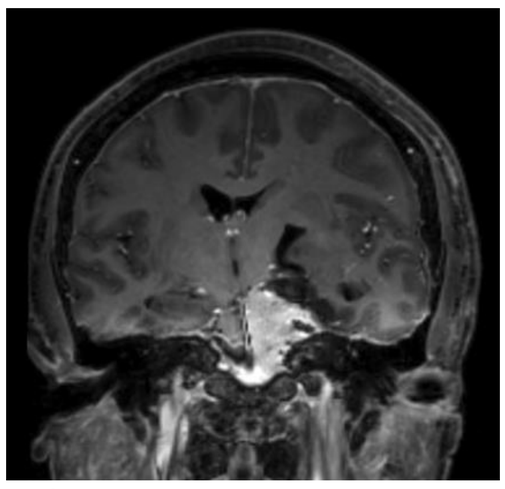
- A 56-year-old woman with history of diabetes mellitus initially presented to an outside hospital in February 2022 for 3 months of short-term memory difficulties and right-sided weakness.
- MRI revealed a left-sided skull base mass encasing the left anterior circulation with extension into middle cranial fossa, cavernous sinus, sella, and posterior fossa.
- Patient underwent staged left modified orbitozygomatic craniotomy for tumor resection in March 2022, followed by retrosigmoid craniotomy in October 2022 to resect the infratentorial component.
- Pathology: Meningothelial meningioma, WHO grade 1.
- Postoperatively, patient had a left CN III palsy and decreased sensation in V2/V3 distribution, both of which improved in subsequent visits.



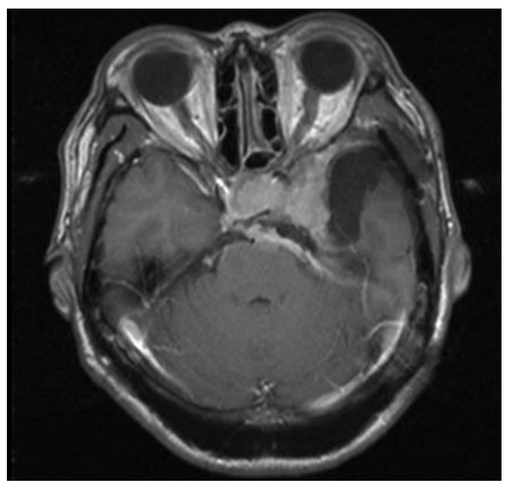


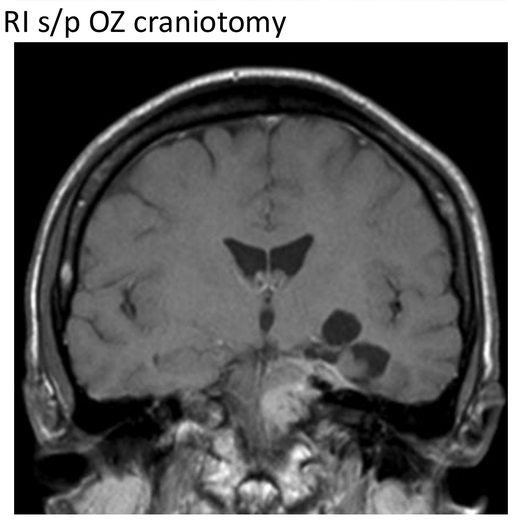
Figures 1 and 2. February 2022 – Preop MRI





Figures 3 and 4. April 2022 – Postop MRI s/p OZ craniotomy





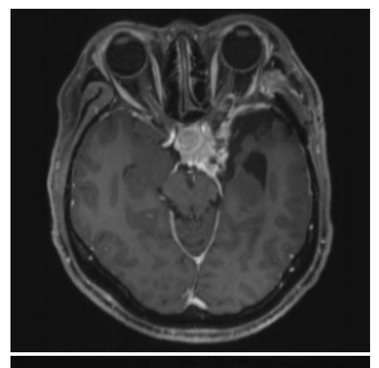
Figures 5 and 6. October 2022 – Postop MRI s/p retrosigmoid craniotomy

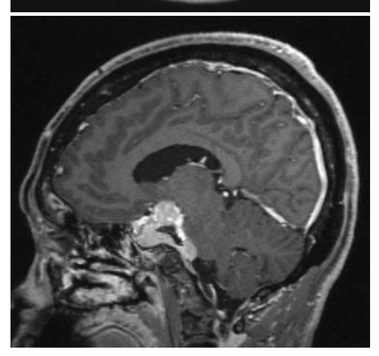
Case Presentation – Cont'd

- Follow-up surveillance MRI demonstrated stable residual meningioma and growth of the parasellar component, and patient had signs/symptoms of acromegaly.
- Subsequent pituitary function tests revealed elevated growth hormone and IGF-1 levels, concerning for GH-secreting pituitary tumor.
- Patient underwent endoscopic endonasal resection in April 2024.
- Pathology: Somatotroph PitNET with extensive meningioma involvement.
- Postoperatively, the patient reported improvement in acromegalic features.
- Surveillance MRI scans are ongoing for tumor recurrence/progression.

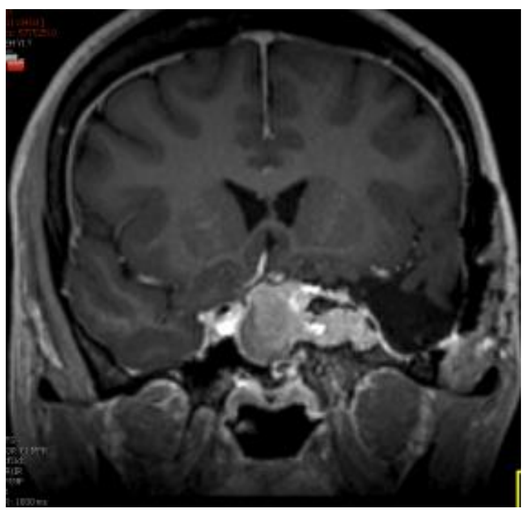
Cortisol	04/20/24 20
Estradiol, Blood	01/16/24 <20
Folate	04/27/23 34.0
IGF Binding Protein-3	01/16/24 8,380 ▲
IGF-1 (Insul-Like Grth 1)	04/18/24 563 ▲
Lactic Acid	04/01/22 2.0
LH	04/18/24 0.2
Osmolality (Serum)	01/16/24 300
Progesterone	01/16/24 0.4
Prolactin	04/18/24 17.2
Testosterone, Total	04/18/24 16
TSH	04/18/24 4.046
Vitamin B12	04/27/23 1,602 ▲
Vitamin D, 25-OH D3	04/19/24 22.0 ▼
Growth Hormone	01/16/24 45.7 ▲
Follicle Stimulating Hormone - Lab...	04/18/24 1.5
IGF 1 Z Score Calculation	04/18/24 3.9

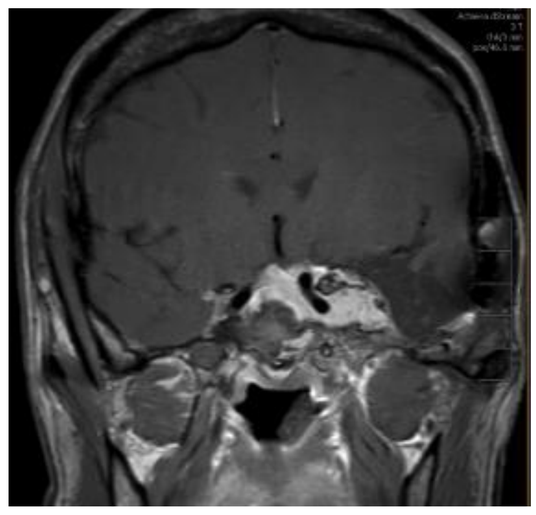
Figure 7. Pituitary labs





Figures 8 and 9. February 2023 – surveillance MRI





Figures 10 and 11. April 2024 – Pre (left) and post (right)-op MRI s/p EEA

Literature Review

- Multiple articles reported the coexistence of simultaneous parasellar masses, including various combinations meningiomas (including distinct subtypes), craniopharyngiomas, and pitNETs[1-9].
- However, the postoperative emergence/diagnosis of a PitNET was rare. In the few reported instances, the delay in diagnosing PitNET often resulted from the initial focus on the more symptomatic meningioma[8,9].
- One study suggested that growth factors from GH-secreting PitNET's may predispose patients to development of a meningioma[6].

Conclusions

- The coexistence of meningioma and PitNET poses diagnostic and therapeutic challenges.
- This case emphasizes the need for comprehensive evaluation and follow-up in patients with intracranial tumors and the potential for successful surgical outcomes with collaborative care.

References

1. Liu G, Su L, Xiang Y, Liu Y, Zhang S. Coexistence of craniopharyngioma and meningioma. *Medicine*. 2020;99(50):e23183. doi:https://doi.org/10.1097/md.0000000000023183

2. Amirjamshidi A, Mortazavi SA, Shirani M, Saeedinia S, Hanif H. "Coexisting pituitary adenoma and suprasellar meningioma-a coincidence or causation effect: report of two cases and review of the literature." *Journal of surgical case reports*. 2017;2017(5):rjx039. doi:https://doi.org/10.1093/jscr/rjx039

3. Kochanski R, Byrne N, Alnajar H, Arvanitis L, Bhabad S, Byrne R. A rare intracranial tumor consisting of malignant anaplastic and papillary meningioma subtypes. *Surgical Neurology International*. 2016;7(1):21. doi:https://doi.org/10.4103/2152-7806.176674

4. Snyder R, Fayed I, Dowlati E, Seager A, Mason RB. Pituitary Adenoma and Craniopharyngioma Collision Tumor: Diagnostic, Treatment Considerations, and Review of the Literature. *World Neurosurgery*. 2019;121:211-216. doi:https://doi.org/10.1016/j.wneu.2018.10.048

5. Shareef Z, Kerndt C, Nessel T, Mistry D, Figueroa B. Collision Tumor in the Pituitary, Concurrent Pituitary Adenoma, and Craniopharyngioma. *Case Reports in Otolaryngology*. 2020;2020:1-5. doi:https://doi.org/10.1155/2020/9584090

6. Engelhardt J, Nunes ML, Pouchieu C, et al. Increased Incidence of Intracranial Meningiomas in Patients With Acromegaly. *Neurosurgery*. 2019;87(4):639-646. doi:https://doi.org/10.1093/neuros/nyz438

7. Herrero-Ruiz A, Villanueva-Alvarado HS, Corrales-Hernández JJ, Higueruela-Mínguez C, Feito-Pérez J, Recio-Cordova JM. Coexistence of GH-Producing Pituitary Macroadenoma and Meningioma in a Patient with Multiple Endocrine Neoplasia Type 1 with Hyperglycemia and Ketosis as First Clinical Sign. *Case reports in endocrinology*. 2017;2017:2390797. doi:https://doi.org/10.1155/2017/2390797

8. Ashwin Kumaria, Scott IS, Robertson IJ. An unusual pituitary adenoma coexistent with bilateral meningiomas: case report. *British Journal of Neurosurgery*. 2017;33(5):579-580. doi:https://doi.org/10.1080/02688697.2017.1386283

9. Lim KZ, Goldschlager T, Chandra RV, Hall J, Uren B, Pullar M. Co-occurrence of Pituitary Adenoma with Suprasellar and Olfactory Groove Meningiomas. *Basic and clinical neuroscience*. 2016;7(4):361-365. doi:https://doi.org/10.15412/J.BCN.03070409