INDOCYANINE GREEN (ICG) USE FOR OPHTHALMIC ARTERY IDENTIFICATION AND SAFE OPTIC CANAL OPENING DURING EXPANDED ENDOSCOPIC ENDONASAL APPROACHES

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Introduction

- Relationship of the ophthalmic artery (OA) origin from the internal carotid artery (ICA) as well as with the optic nerve (ON) is crucial for safe endoscopic endonasal approaches to the suprasellar region.
- OA courses medial and inferior to the ON at its entry into the dura of the optic canal before beginning to course lateral to the ON. Noninvasive methods of confirmation add a valuable layer of certainty.

- Indocyanine green (ICG) has proven useful for assessment of nasoseptal flap (NSF) and ON perfusion.
- We describe the use of ICG for the reliable localization of the OA prior to opening of the dura of the optic canal.

Case 1

- 65-year-old female, with headaches and bilateral superior quadrantanopia, was found to have a large tuberculum meningioma (Figure 1a).
- After NSF elevation, the extradural bone was removed including the tuberculum, proximal optic canal and medial opticocarotid recess (mOCR) bilaterally.

- Ten mg of ICG within a 5 mL solution were injected intraoperatively followed by a saline flush to identify the OA course from the ICA and within the optic canal (Figure 2).

- The optic canal dura was opened at the superior and medial portion of the canal to prevent injury of the OA.
- A wide opening allowed visualization and early identification of the ONs during the remainder of tumor resection.

- The patient had a gross total resection (Figure 1b) and did well postoperatively.

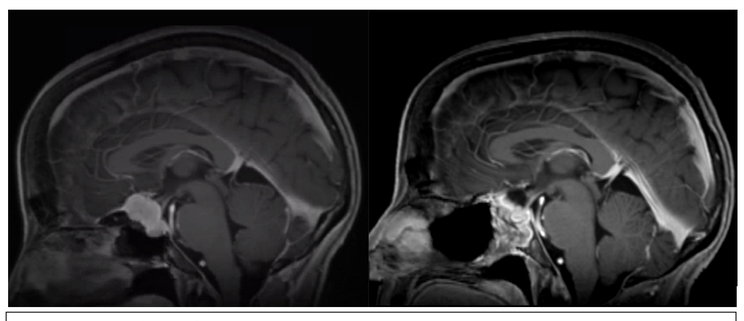

Figure 1. a) Pre-operative MRI demonstrating large tuberculum meningioma. b) Post-operative MRI demonstrating gross total resection.

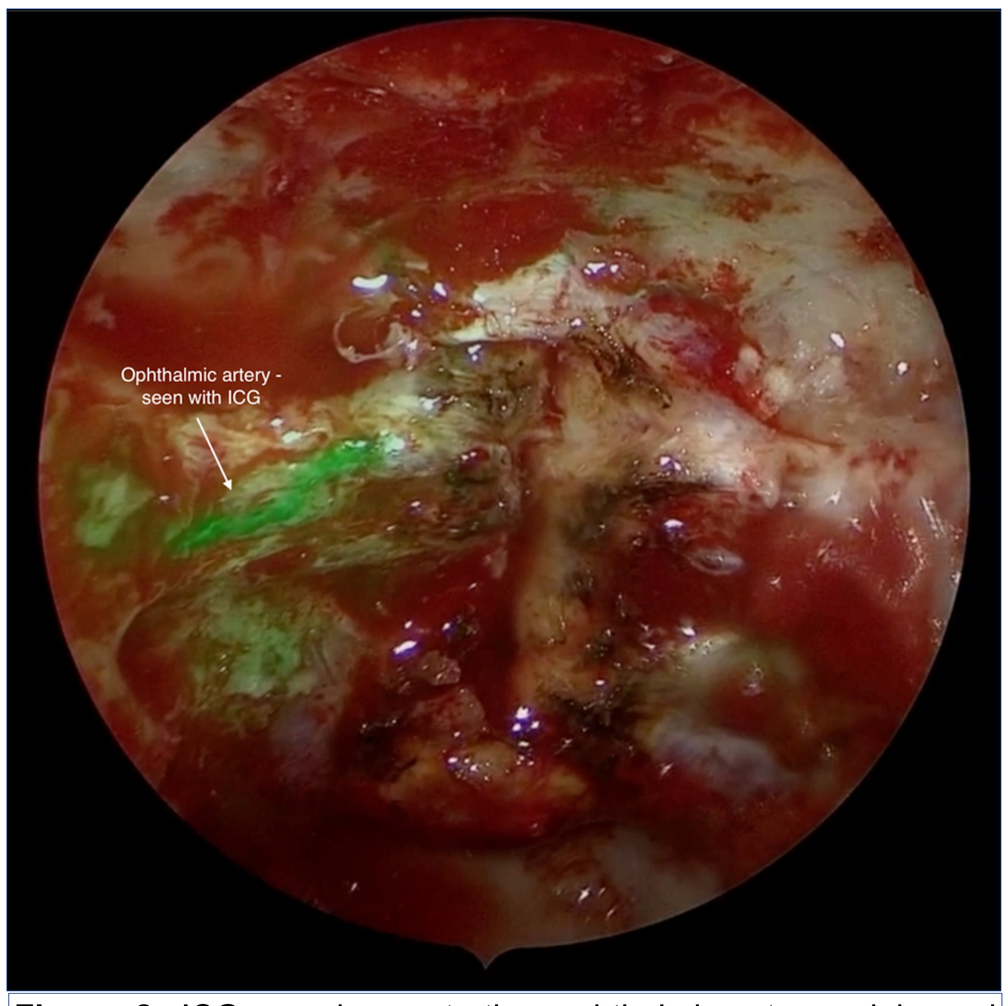

Figure 2. ICG run demonstrating ophthalmic artery origin and course in relation to ICA and ON.

Please scan QR-Code or use the links below to view the operative video for Case 1 and Case 2

Case 1:
https://vimeo.com/1052141956/8c744f4894

Case 2:
https://vimeo.com/1052142343/f52659989c

Case 2

- 60-year-old male, with tuberculum meningioma, had progressive headaches and worsening bitemporal visual field loss (Figure 3a).

- After NSF harvest and extradural exposure of optic canals and mOCRs, 10 mg of ICG within 5 mL ICG was used to localize the OA course bilaterally prior to dural opening (Figure 4).

- Dura of the proximal optic canal was opened in the superomedial quadrant with preservation of the OA and early ON identification, facilitating a gross total resection (Figure 3b).

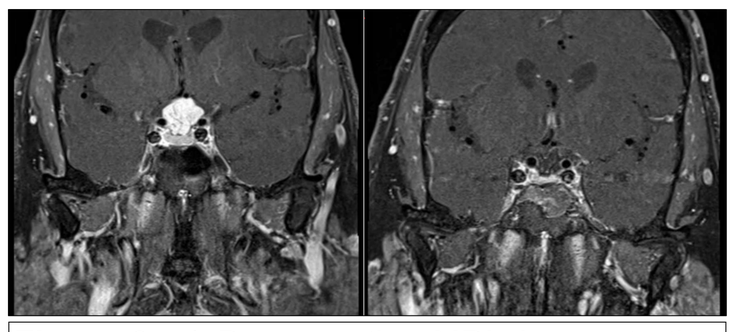

Figure 3. a) Pre-operative MRI demonstrating large tuberculum meningioma. b) Post-operative MRI demonstrating gross total resection.

Conclusion

- Use of ICG to confirm the anatomic location of the OA bolsters the anatomic fund of knowledge of the endonasal skull base surgeon and allows more confidence in safe widening of the suprasellar corridor.

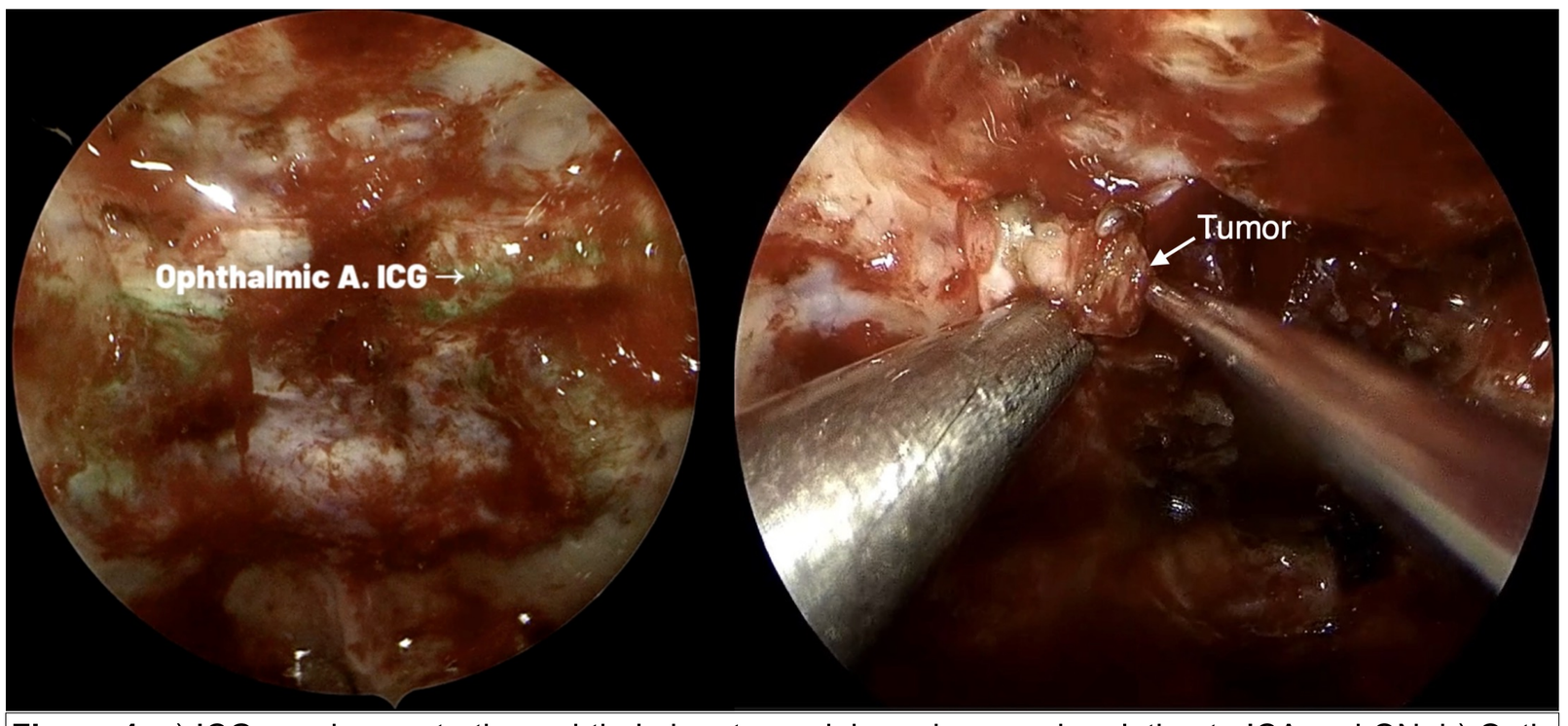

Figure 4. a) ICG run demonstrating ophthalmic artery origin and course in relation to ICA and ON. b) Optic nerve dural sheath opening made superior to the location of ophthalmic artery

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References

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2. Shahein M. et. al. The role of indocyanine green fluorescence in endoscopic endonasal skull base surgery and its imaging correlations. J Neurosurg. 2020 Nov 13;135(3):923-933. PMID: 33186906.