

**SUNY Downstate Medical Center**  
**Department of Ophthalmology**  
**Grand Rounds**  
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April 24, 2013

# Case Presentation

- 68 yo female
- History of retinal drusen
- Last seen 2 months prior with normal eye examination; scheduled follow-up in 9 months

# Case Presentation

- 68 yo female
- History of retinal drusen
- Last seen 2 months prior with normal eye examination
- “Right eye feeling heavy” x 3 weeks
- Right eye redness X 2 weeks
- Intermittent sharp pain OD in the morning

# Case Presentation

- PMH/PSH: DM (A1C 6.3%), HTN, Trigeminal Neuralgia
- POH: retinal drusen
- FH: Denies
- Meds: amlodipine, gabapentin, simvastatin, sitagliptin, metformin
- Gtts: None
- All: NKDA

# Differential Diagnosis

# Physical Exam

- DVAcc: 20/40-2 ph 20/30 OD, 20/30+2 OS (last exam-20/30 OU)
- Pupils: 5-3, no RAPD
- EOM: full OU
- CVF: FTFC OU
- Tapp: **32/16 @ 0917**; 20/20 at last 2 examinations
- External-No proptosis

# Physical Exam

- SLE: see photos, anterior segment otherwise normal
- DFE: c/d 0.4 OD, 0.3 OS; M/V/P WNL

# Physical Exam

OD



OS





# Physical Exam

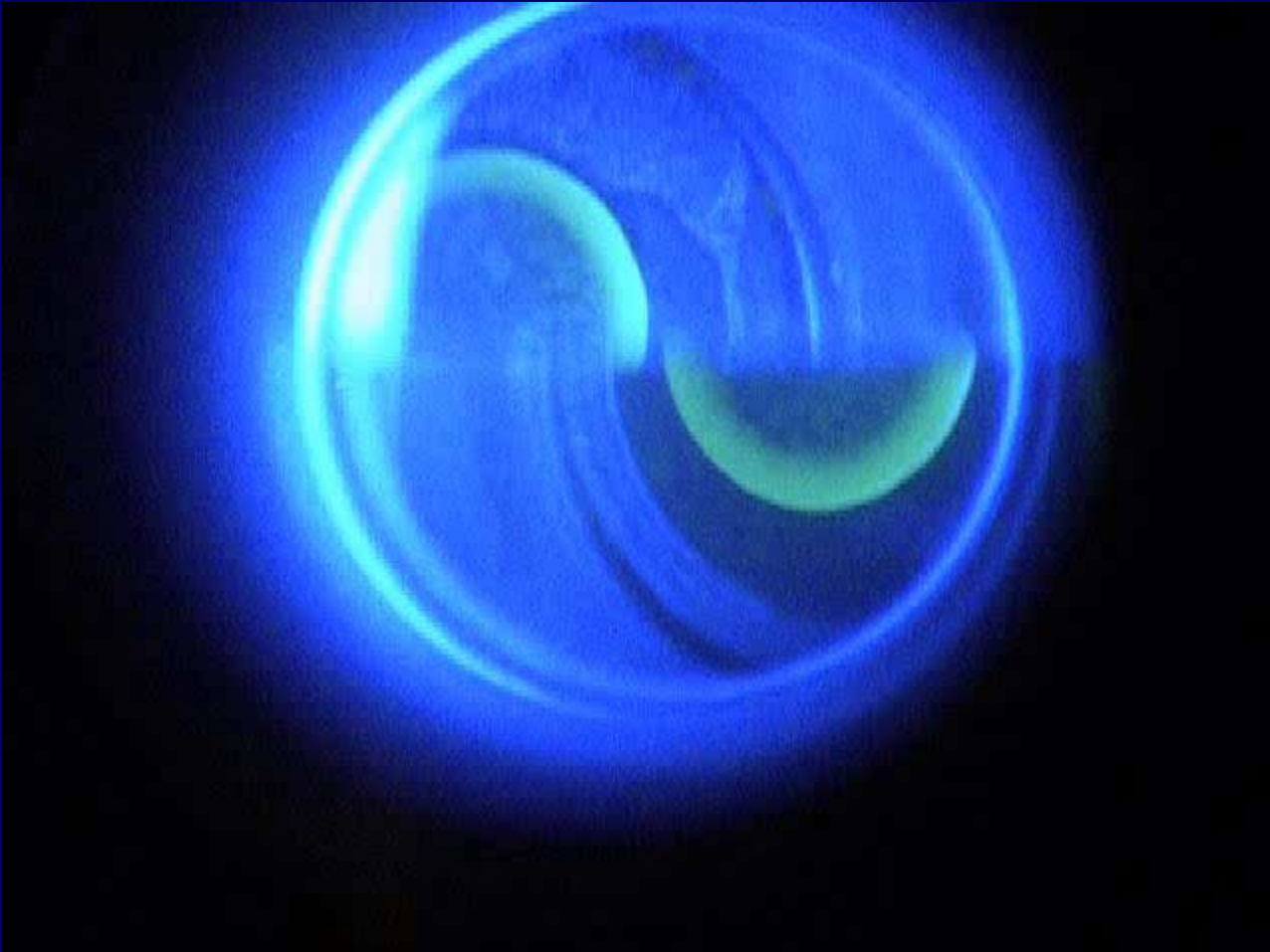
OD



OS



# Physical Exam

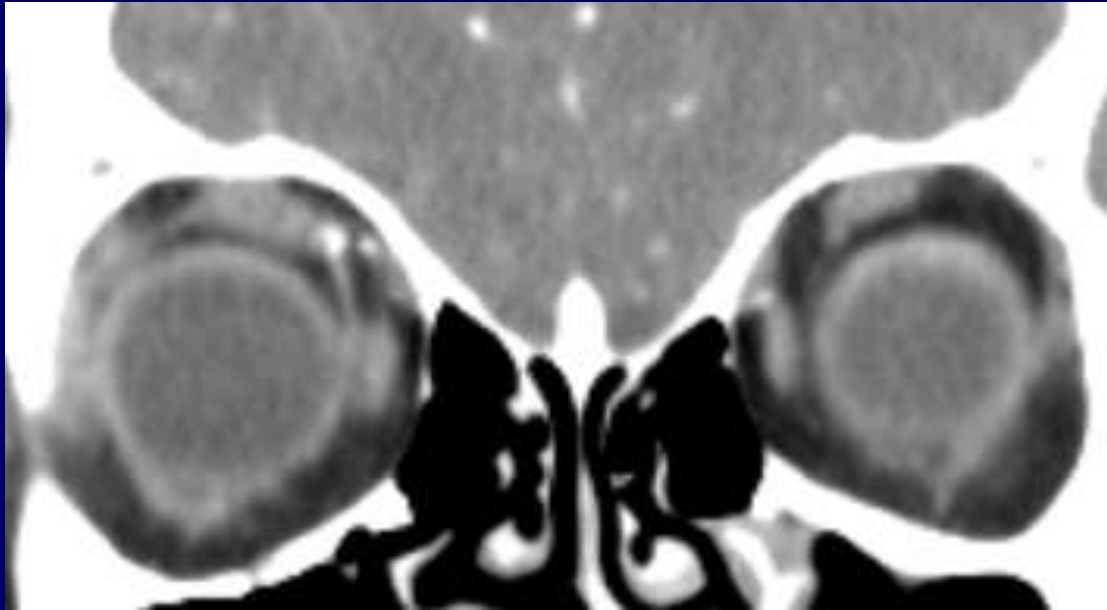


# Differential Diagnosis (raised episcleral venous pressure)

- Arteriovenous Fistula
  - Dural Sinus
  - Carotid Cavernous Sinus
  
- Neurofibromatosis
- Thyroid Orbitopathy
- Venous sinus thrombosis
- Superior Vena Cava Syndrome
- Sturge-Weber
- Scleritis/Episcleritis
- Orbital Tumors

# What Next??

# Imaging



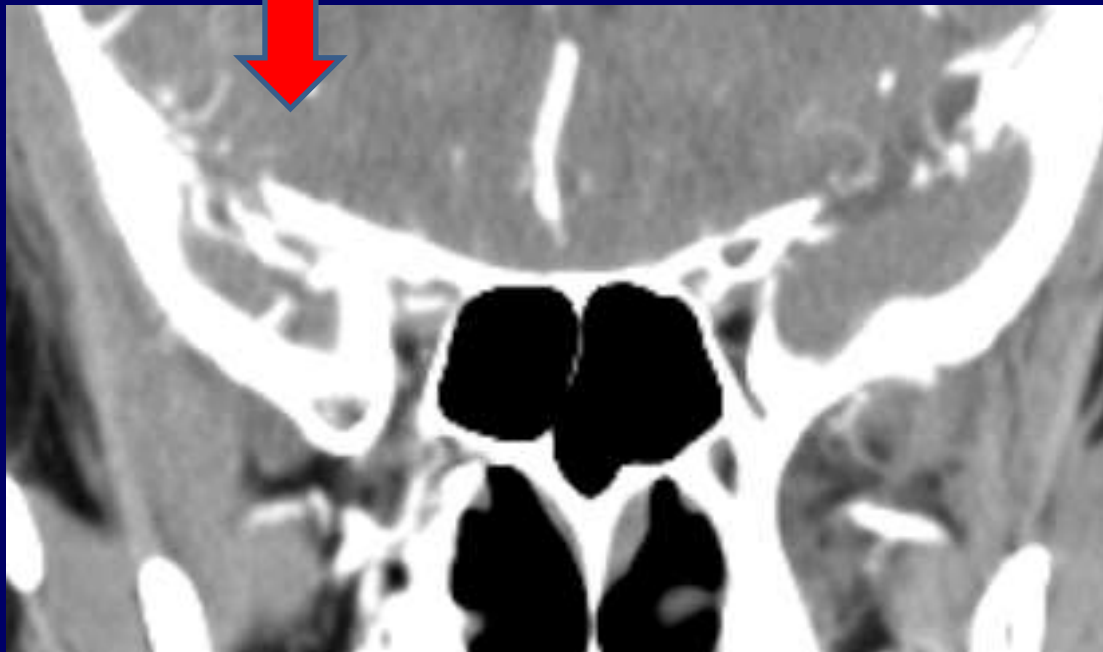
# Imaging



# Imaging



# Imaging





# Differential Diagnosis

- Arteriovenous Fistula
  - Dural Sinus
  - Carotid Cavernous Sinus

# Intracranial Arteriovenous Fistula

## Introduction

- Carotid-cavernous (CC) fistula-abnormal communication between the carotid artery and the cavernous sinus
- Can be classified by etiology (trauma/spontaneous), blood flow velocity (high/low), and anatomy (direct/dural)

# Intracranial Arteriovenous Fistula

## Introduction

- Direct CC fistula (high flow)
  - 70-90% of all CC fistulas
  - Trauma (MVA, fights, falls)
  - Surgical manipulation (trans-sphenoidal, endarterectomy, ethmoidal sinus)
  - Connection between ICA and cavernous sinus
  - Progressive symptoms
  - 3% incidence spontaneous intracerebral hemorrhage

# Intracranial Arteriovenous Fistula

## Introduction

- Dural CC fistula (low flow)
  - Spontaneous
  - Middle age to elderly women; no associated trauma
  - Cavernous sinus and meningeal branch of ICA, ECA, or both
  - Possibly due to congenital A-V malformations
  - Possible spontaneous resolution
  - Visual loss in 20-30%

# Intracranial Arteriovenous Fistula Presentation/Exam

- History
  - Trauma
  - Pregnancy/Childbirth
  - Recent surgery
  - HTN
  - Atherosclerosis
  - Collagen Vascular Disease
  - Connective Tissue Disease
  - Pseudoxanthoma elasticum

# Intracranial Arteriovenous Fistula

## Presentation/Exam

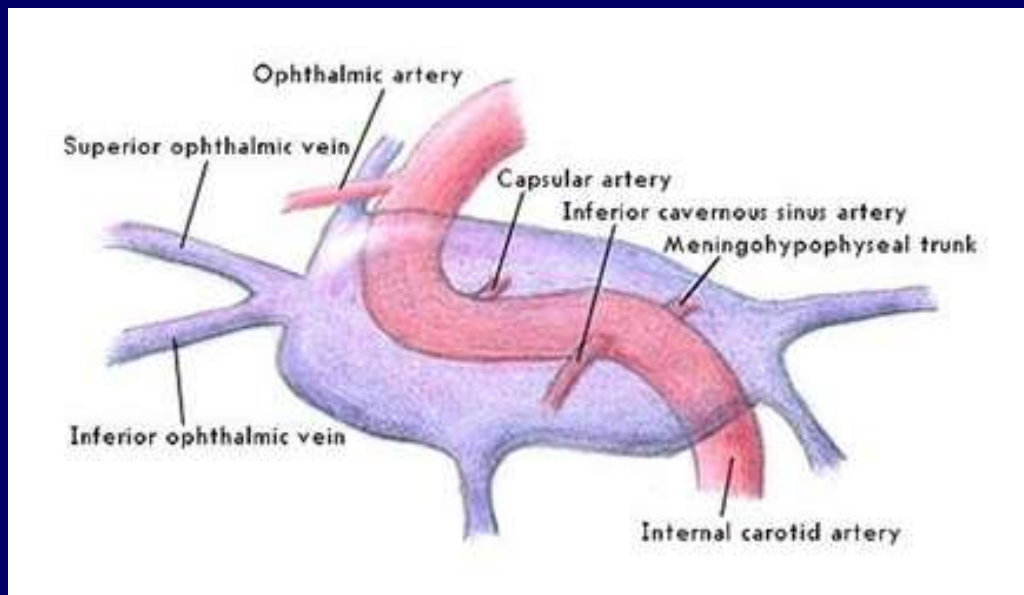
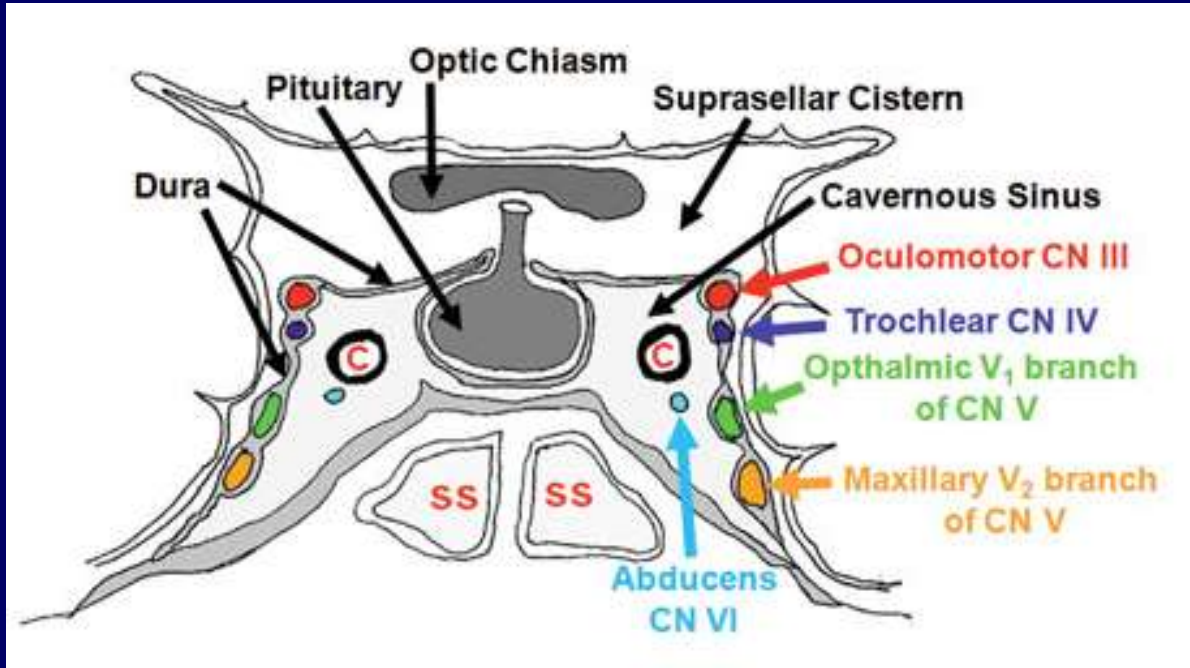
- History
  - Red eye
  - Diplopia
  - Pulsatile tinnitus/whooshing sound
  - Decreased vision
  - Bulging Eye/Proptosis
  - **Facial pain in the 1<sup>st</sup> or 2<sup>nd</sup> division of CN 5 or hemicranial headache**

# Intracranial Arteriovenous Fistula

## Presentation/Exam

- Exam
  - Proptosis
  - Eyelid edema
  - Pulsating proptosis
  - Ocular bruit
  - Chemosis
  - Dilation of retinal veins
  - Optic disc swelling
  - Vitreous or intraretinal hemorrhage
  - CRVO
  - Elevated IOP
  - Glaucoma (Neovascular/Angle-closure)

# Intracranial Arteriovenous Fistula

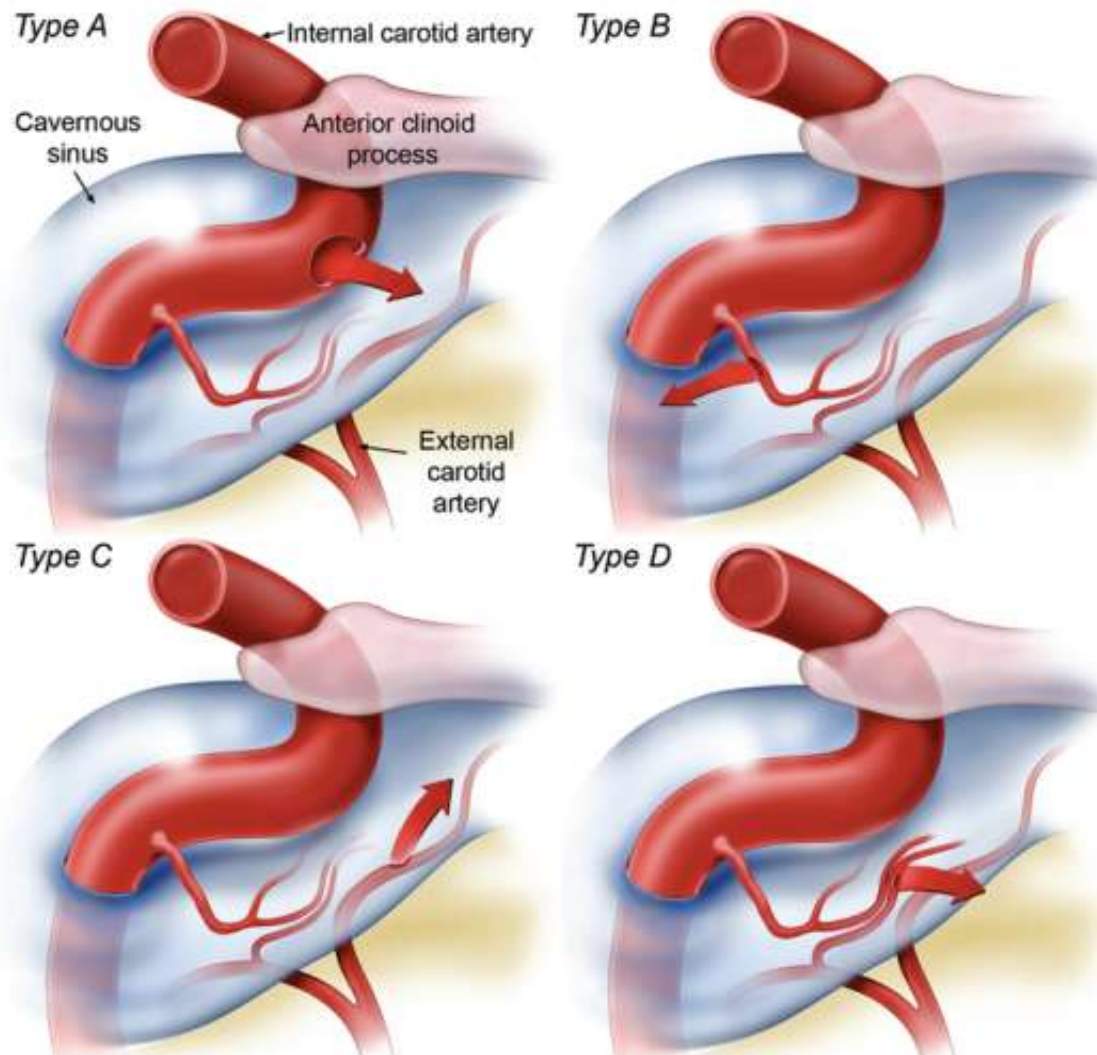




# Intracranial Arteriovenous Fistula Imaging

- MRI, CT
  - Extraocular muscle engorgement
  - Dilation of superior ophthalmic vein
  - Enlargement of the cavernous sinus (CC Fistula)
- Conventional Angiography
  - Gold Standard
  - Therapeutic

# Intracranial Arteriovenous Fistula

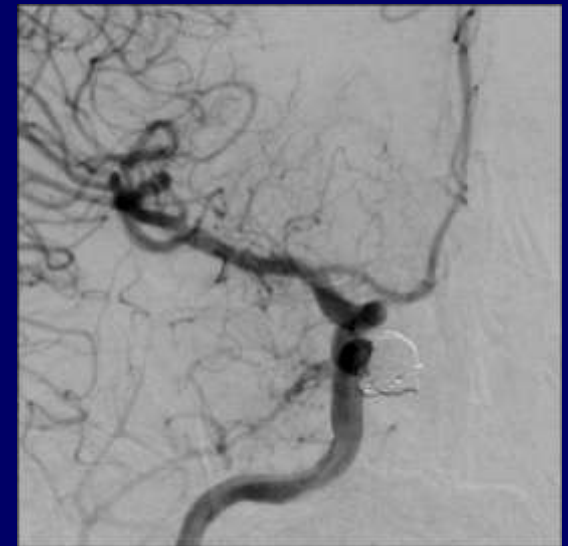
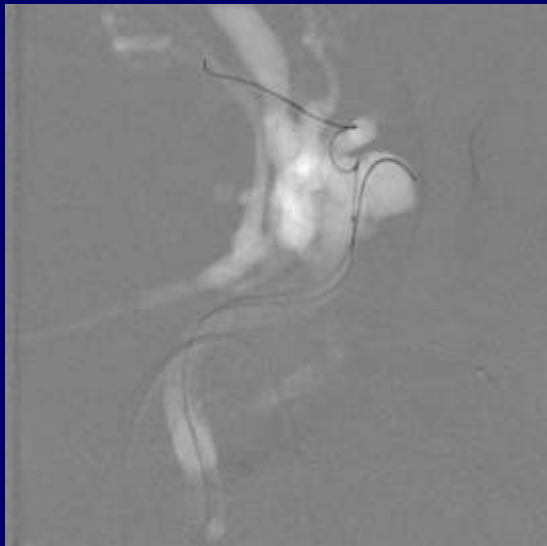


**FIG. 2.** Barrow classification of CCFs. Type A fistulas are characterized by direct shunting of blood flow from the ICA into the cavernous sinus. Type B and C fistulas are shunts to the cavernous sinus from branches of the ICA and ECA, respectively. Type D fistulas have shunts from both the ICA and ECA simultaneously. Printed with permission from Jason A. Ellis.

# Intracranial Arteriovenous Fistula Treatment

- Neurosurgical/Interventional Neuroradiology Referral
- Direct CC Fistula
  - Surgical closure of the fistula with preservation of ICA patency
  - Coil embolization, electrothrombosis, balloon occlusion
- Dural Sinus Fistula
  - Spontaneous resolution
  - Surgical Intervention (same as for CC fistula)

# Intracranial Arteriovenous Fistula Treatment



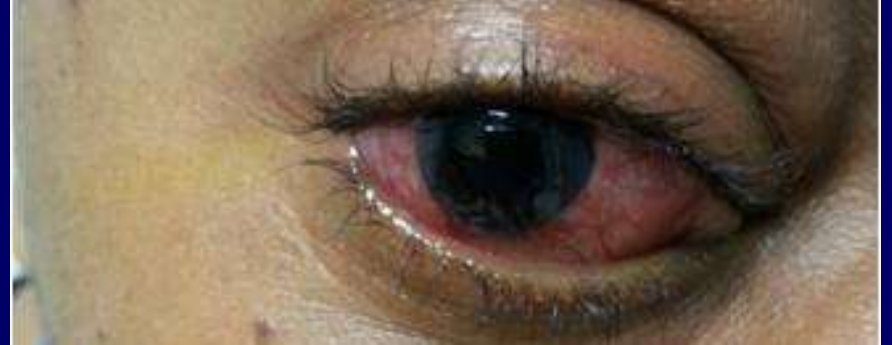
# Our Patient

- Started on xalatan and combigan to lower the IOP OD
- Evaluated by Dr. Mangla (SUNY, Interventional Neuroradiology)
- Scheduled for conventional angiography 4/22/14
- Last seen on 4/16/14 by Neuro-Ophthalmology; stable exam

## Case Presentation #2

- 41 yo female s/p assault to face 1 month ago
- Swelling of the right eye X 2 weeks
- Pain and redness OD X 1 week

# Case Presentation #2

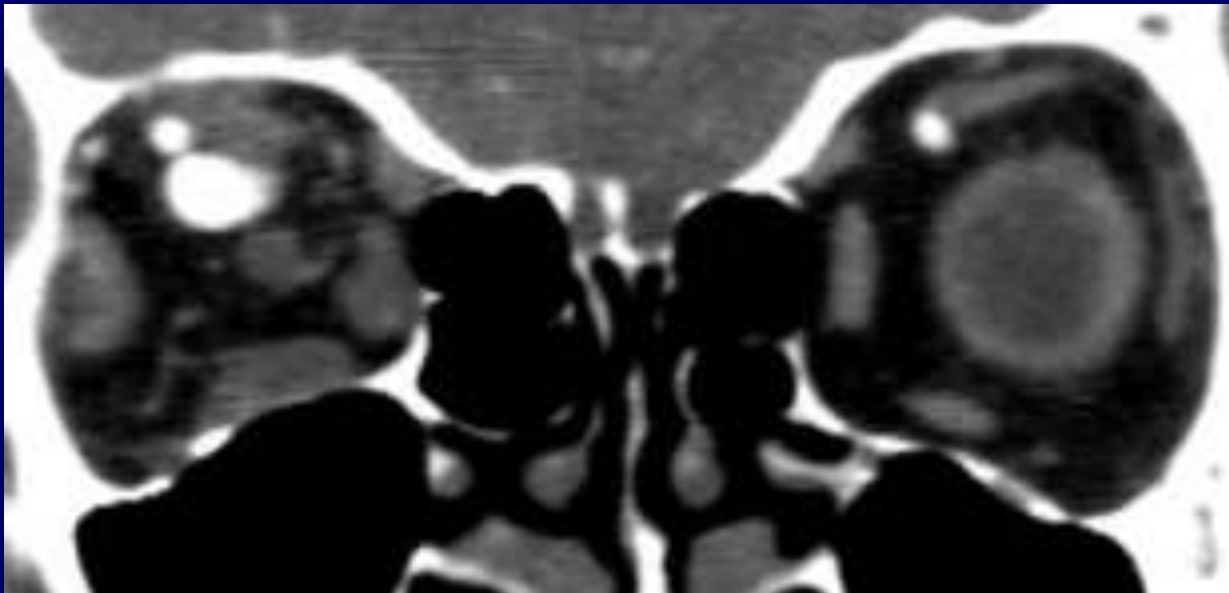
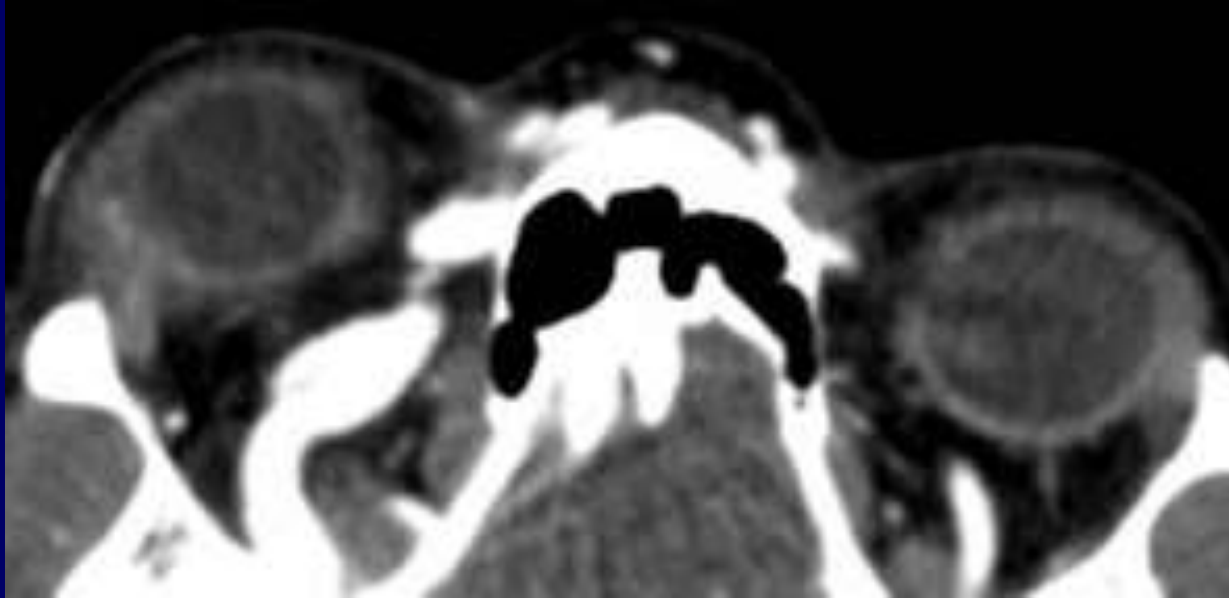


## Case Presentation #2

- VA 20/40 OU
- EOMS: **-3 infraduction and adduction OD, full OS**
- **Orbital Bruit**
- **Pulsating mires loops**
- Elevated IOP OD (**30/18**)

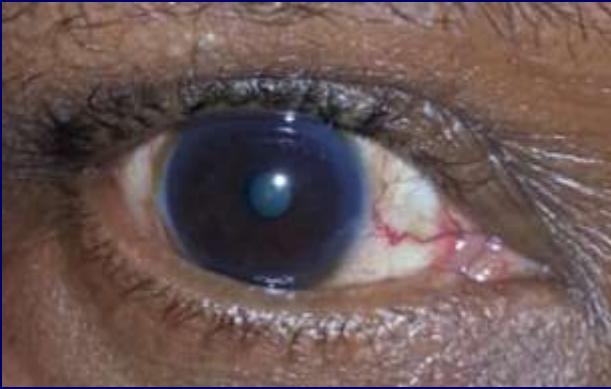


# Case Presentation #2

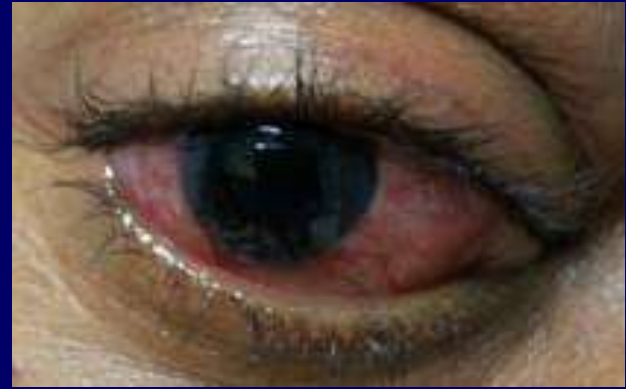


# Case Comparison

**DSF**

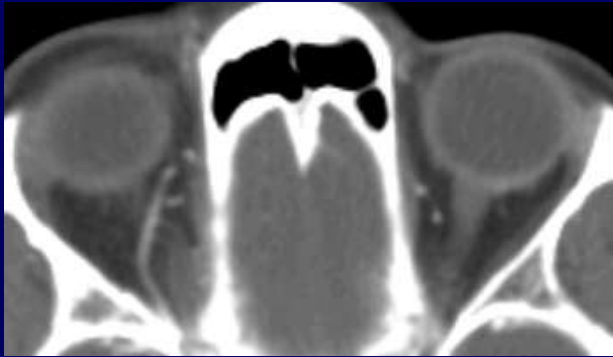
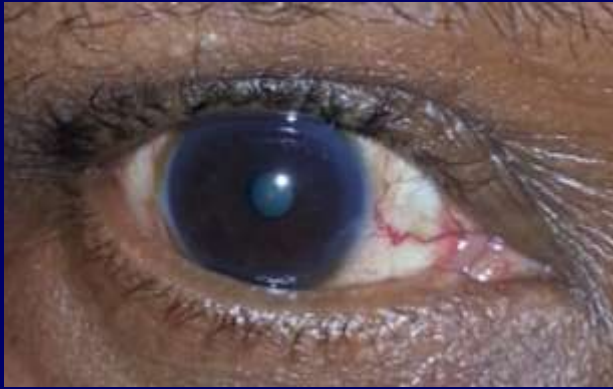


**CCF**

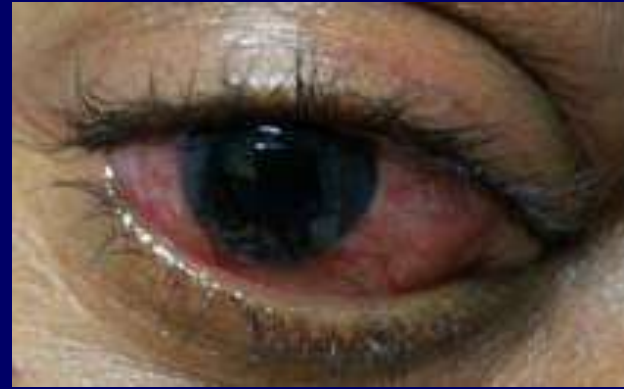


# Case Comparison

**DSF**

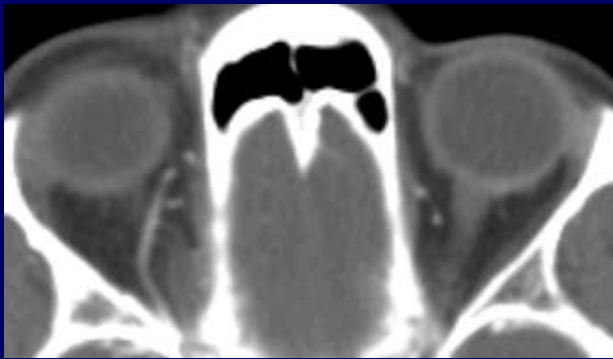
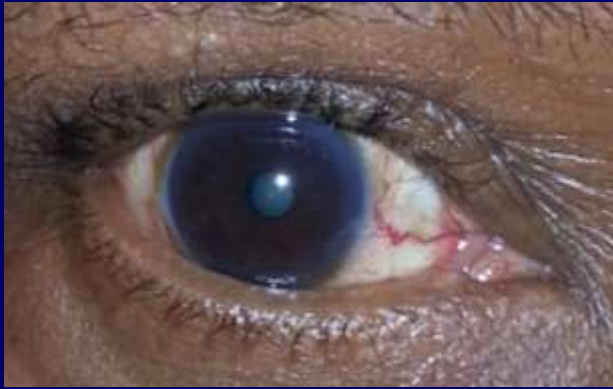


**CCF**

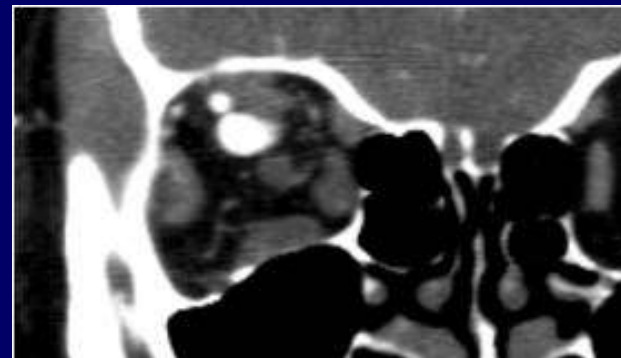
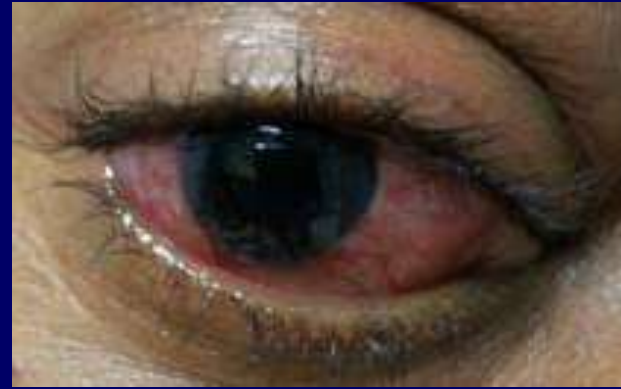


# Case Comparison

**DSF**



**CCF**



# Reflective Practice

Here we have presented two cases of Arterial-venous fistulas. The patients were evaluated promptly and given the appropriate treatment, follow up, and referrals. The patient was offered the most current information and treatment based on the clinical situation. Patient care was coordinated between the department of ophthalmology and ancillary services so that the patient received prompt evaluation and treatment.

# Core Competencies

- **Patient Care** – The patient was appropriately treated in a timely manner with compassion and with the patient's best interest in mind
- **Interviewing and Communication Skills** – A thorough ROS and history was obtained from the patient
- **Professionalism** – The patient was treated with kindness and in a respectful, professional manner at all times
- **Medical Knowledge** – The scientific literature was reviewed and was applied to the patient encounters
- **Systems Based Practice** – The ophthalmologists were able to work within the framework of the hospital system to obtain the most appropriate care in a timely manner
- **Practice Based Learning** – The patient was monitored closely and interval changes were noted at each visit, documented, and management decisions tailored to the changing clinical course

# References

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- Oh JT, et al. Intracranial dural arteriovenous fistulas: Clinical characteristics and management based on location and hemodynamics. *J Cerebrovasc Endovasc Neurosurg* 2012; 14(3): 192-202

# Acknowledgements

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- Case#2
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    - Dr. McNally
    - Dr. Williams
    - Dr. Shinder
    - Dr. Pultizer
    - Dr. Mangla