This slide captures one way to think about the motility disorders. If it is unfamiliar, I strongly suggest you review the slide-set entitled ‘Motility disorders: Overview’ before proceeding.
Motility Disorders: The Sinus, the Fissure, and the Apex

In this slide-set, we’ll take a look at motility disorders stemming from pathology of the 
\textit{cavernous sinus (CS)}, \textit{superior orbital fissure (SOF)} and the \textit{orbital apex (OA)}.
Motility Disorders: *The Sinus, the Fissure, and the Apex*

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**Supranuclear**

**Nuclear**

- CN3 Nucleus
- MLF
- CN6 Nucleus
- CN4 Nucleus

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**Internuclear**

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**Infranuclear**

- Fascicular
- Subarachnoid
- Cavernous sinus
- Superior orbital fissure
- Orbital apex
- Neuromuscular junction
- Extraocular muscle

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What is the hallmark of pathology involving these three locations?
Motility Disorders: *The Sinus, the Fissure, and the Apex*

Supranuclear

Nuclear

Internuclear

Nuclear

Fascicular

Subarachnoid

Cavernous sinus

Superior orbital fissure

Orbital apex

Neuromuscular junction

Extraocular muscle

What is the hallmark of pathology involving these three locations? Deficits implicating multiple nerves simultaneously
Motility Disorders: *The Sinus, the Fissure, and the Apex*

Supranuclear

Nuclear

Internuclear

Infranuclear

**Fascicular**

Subarachnoid

**Cavernous sinus**

Superior orbital fissure

**Orbital apex**

Neuromuscular junction

Extraocular muscle

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What is the hallmark of pathology involving these three locations?

Deficits implicating multiple nerves simultaneously

Which nerves can be involved?

--?

--?

--?
Motility Disorders: The Sinus, the Fissure, and the Apex

What is the hallmark of pathology involving these three locations? Deficits implicating multiple nerves simultaneously

Which nerves can be involved?
-- Optic nerve
-- CN3
-- CN4
-- CNV (specifically V1 and V2)
-- CN6
-- Postganglionic sympathetics

Supranuclear

Nuclear

Internuclear

Infranuclear

Fascicular

Subarachnoid

Cavernous sinus
Superior orbital fissure
Orbital apex

Neuromuscular junction

Extraocular muscle
Motility Disorders: *The Sinus, the Fissure, and the Apex*

**Supranuclear**

**Nuclear**

**Internuclear**

**Infrauclear**

- Fascicular
- Subarachnoid
- Cavernous sinus
- Superior orbital fissure
- Orbital apex
- Neuromuscular junction
- Extraocular muscle

What is the hallmark of pathology involving these three locations?

- Deficits implicating multiple nerves simultaneously

Which nerves can be involved?

- Optic nerve
- CN3
- CN4
- CN6
- Postganglionic sympathetics including V3

Note: Some sources contend that the mandibular nerve (V3) can be affected by pathology in the posteriormost portion of the sinus. However, the most recent (at the time this slide-set was last edited) version of the BCSC *Neuro* book makes no mention of this.
Anatomically speaking, how are the cavernous sinus, superior orbital fissure and orbital apex related to one another?
Anatomically speaking, how are the cavernous sinus, superior orbital fissure and orbital apex related to one another? They are ‘ducks in a row’ in that the orbital apex is in direct communication with the cavernous sinus via the superior orbital fissure.
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus
Superior orbital fissure
Orbital apex

How many CSs are in a standard human head?
Motility Disorders: *The Sinus, the Fissure, and the Apex*

- **Cavernous sinus**
- Superior orbital fissure
- Orbital apex

*How many CSs are in a standard human head?*
Two
How many CSs are in a standard human head?
Two

Where are they located?
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus | Superior orbital fissure | Orbital apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus
Motility Disorders: *The Sinus, the Fissure, and the Apex*

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the **sella turcica/pituitary fossa** and the sphenoid sinus

**What structure occupies the pituitary fossa?**
Motility Disorders: The Sinus, the Fissure, and the Apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

What structure occupies the pituitary fossa?
The pituitary gland, duh
Motility Disorders: The Sinus, the Fissure, and the Apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus.

What structure occupies the pituitary fossa?
The pituitary gland, duh

What does this anatomic arrangement indicate regarding pituitary pathology and the CS?
Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior ← Cavernous sinus Superior orbital fissure Orbital apex → Anterior

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

What structure occupies the pituitary fossa?
The pituitary gland, duh

What does this anatomic arrangement indicate regarding pituitary pathology and the CS?
It implies that pituitary pathology can directly impact one or both CSs
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

**How many CSs are in a standard human head?**
Two

**Where are they located?**
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

**In a nutshell, what sort of structure is the CS?**
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus
Superior orbital fissure
Orbital apex

Posterior ← Anterior

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

How many CSs are in a standard human head?

Two

Where are they located?

Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?

A venous sinus — one of a number responsible for draining the cranial vault
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

How many CSs are in a standard human head?

Two

Where are they located?

Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?

venous sinus

Are the two CSs isolated, or in communication with one another?

They are in communication via numerous venous connections

Was this a random anatomy question, or is this fact of clinical significance?

The latter, as it explains how some pathologic processes can spread from one CS to the other
**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Cavernous sinus**  Superior orbital fissure  Orbital apex

How many CSs are in a standard human head? **Two**

Are the two CSs isolated, or in communication with one another? They are in communication via numerous venous connections.

Where are they located? Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus.

Was this a rando anatomy question, or is this fact of clinical significance?

In a nutshell, what sort of structure is the CS? A **venous sinus**—one of a number responsible for draining the cranial vault.
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

**Posterior** ← ------ → **Anterior**

How many CSs are in a standard human head?
- **Two**

Are the two CSs isolated, or in communication with one another?
- They are in communication via numerous venous connections

Where are they located?
- Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

Was this a rando anatomy question, or is this fact of clinical significance?
- The latter, as it explains how pathologic processes can spread from one CS to the other

In a nutshell, what sort of structure is the CS?
- A **venous sinus** -- one of a number responsible for draining the cranial vault
Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior ← Cavernous sinus Superior orbital fissure Orbital apex → Anterior

How many CSs are in a standard human head? Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS? venous sinus—one of a number responsible for draining the cranial vault

Is the sphenoid sinus another venous sinus? No, it is one of the four paranasal air sinuses
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus—one of a number responsible for draining the cranial vault

Is the sphenoid sinus another venous sinus?
No, it is one of the four paranasal air sinuses
Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior ← Cavernous sinus Superior orbital fissure Orbital apex ← Anterior

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus—one of a number responsible for draining the cranial vault

Is the sphenoid sinus another venous sinus?
No, it is one of the four paranasal air sinuses

What are the other three?
--Sphenoid sinus
--? sinuses
--? sinuses
--? sinuses
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus—one of a number responsible for draining the cranial vault

Is the sphenoid sinus another venous sinus?
No, it is one of the four paranasal air sinuses

What are the other three?
--Sphenoid sinus
--Frontal sinuses
--Ethmoid sinuses
--Maxillary sinuses
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus.

In a nutshell, what sort of structure is the CS?
A venous sinus—one of a number responsible for draining the cranial vault.

Is the sphenoid sinus another venous sinus?
No, it is one of the four paranasal air sinuses.

What are the other three?
Relative to the eyes, where is each located?
--Sphenoid sinus:  the eyes
--Frontal sinuses:  the eyes
--Ethmoid sinuses:  the eyes
--Maxillary sinuses:  the eyes
Motility Disorders: *The Sinus, the Fissure, and the Apex*

### Cavernous sinus

**Anterior**

*Posterior*  

**Superior orbital fissure**

**Orbital apex**

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**How many CSs are in a standard human head?**

Two

**Where are they located?**

Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

**In a nutshell, what sort of structure is the CS?**

A *venous sinus*—one of a number responsible for draining the cranial vault

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**Is the sphenoid sinus another venous sinus?**

No, it is one of the *four paranasal air sinuses*

---

**What are the other three?**

*Relative to the eyes, where is each located?*

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*Sphenoid sinus*: **behind** the eyes
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*Frontal sinuses*: **above** the eyes
---

*Ethmoid sinuses*: **between** the eyes
---

*Maxillary sinuses*: **below** the eyes
How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins
Motility Disorders: The Sinus, the Fissure, and the Apex

**Cavernous sinus**
**Superior orbital fissure**
**Orbital apex**

**Posterior**   ←   **Anterior**

How many CSs are in a standard human head? Two

Where are they located? Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS? A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head? **The internal jugular (IJ) veins**

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior ← Cavernous sinus Superior orbital fissure Orbital apex → Anterior

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus
**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Posterior** ← **Anterior**

**Cavernous sinus**  **Superior orbital fissure**  **Orbital apex**

*How many CSs are in a standard human head?*
Two

*Where are they located?*
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

*In a nutshell, what sort of structure is the CS?*
A venous sinus--one of a number responsible for draining the cranial vault

*Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?*
**The internal jugular (IJ) veins**

*What structure is the main conduit for blood leaving the CS to get to the IJ vein?*
**The inferior petrosal sinus**

*Through what eponymous space does the inferior petrosal sinus run?*
Motility Disorders: The Sinus, the Fissure, and the Apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus

Through what eponymous space does the inferior petrosal sinus run?
Dorello’s canal
Motility Disorders: The Sinus, the Fissure, and the Apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus

Through what eponymous space does the inferior petrosal sinus run?
Dorello’s canal

Which cranial nerve travels in Dorello’s canal on its way to the CS?
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus

Through what eponymous space does the inferior petrosal sinus run?
Dorello’s canal

Which cranial nerve travels in Dorello’s canal on its way to the CS? CN6
How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus, one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

Was this a set of rando anatomy questions, or is there a clinical point being made here, too?

As before, not rando. The clinical significance here is that if CS pathology extends via the inferior petrosal sinus, it can bag CN6 in the tight confines of Dorello's canal, thereby providing another mechanism by which CS disease can produce ocular dysmotility.

The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus

Through what eponymous space does the inferior petrosal sinus run?
Dorello's canal

Which cranial nerve travels in Dorello's canal on its way to the CS? CN6
How many CSs are in a standard human head? Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus, one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

Was this a set of rando anatomy questions, or is there a clinical point being made here, too?
As before, not rando. The clinical significance here is that if CS pathology extends via the inferior petrosal sinus, it can bag CN6 in the tight confines of Dorello’s canal, thereby providing another mechanism by which CS disease can produce ocular dysmotility.

The internal jugular (IJ) veins

What structure is the main conduit for blood leaving the CS to get to the IJ vein?
The inferior petrosal sinus

Through what eponymous space does the inferior petrosal sinus run?
Dorello’s canal

Which cranial nerve travels in Dorello’s canal on its way to the CS? CN6
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

**How many CSs are in a standard human head?**
Two

**Where are they located?**
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

**In a nutshell, what sort of structure is the CS?**
A venous sinus--one of a number responsible for draining the cranial vault

**Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?**
The internal jugular (IJ) veins

**What structures drain into the CS?**
## Cavernous sinus

**How many CSs are in a standard human head?**
Two

**Where are they located?**
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

**In a nutshell, what sort of structure is the CS?**
A venous sinus--one of a number responsible for draining the cranial vault

**Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?**
The internal jugular (IJ) veins

**What structures drain into the CS?**
The eye and orbit (along with some intracranial blood)
Motility Disorders: The Sinus, the Fissure, and the Apex

**Posterior** ← Cavernous sinus ← Superior orbital fissure ← Orbital apex → **Anterior**

**How many CSs are in a standard human head?**
Two

**Where are they located?**
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

**In a nutshell, what sort of structure is the CS?**
A venous sinus--one of a number responsible for draining the cranial vault

**Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?**
The internal jugular (IJ) veins

**What structures drain into the CS?**
The eye and orbit (along with some intracranial blood)

**What vessel is the main conduit for blood leaving the eye to get to the CS?**
How many CSs are in a standard human head?
Two

Where are they located?
Just behind the orbits, and just lateral to the sella turcica/pituitary fossa and the sphenoid sinus

In a nutshell, what sort of structure is the CS?
A venous sinus--one of a number responsible for draining the cranial vault

Into what vessels do the sinuses ultimately drain; ie, how does intracranial blood get out of the head?
The internal jugular (IJ) veins

What structures drain into the CS?
The eye and orbit (along with some intracranial blood)

What vessel is the main conduit for blood leaving the eye to get to the CS?
The superior ophthalmic vein
Motility Disorders: *The Sinus, the Fissure, and the Apex*

Cavernous sinus  Superior orbital fissure  Orbital apex

A number of critical structures are located within each CS.
CN6 was alluded to a few slides ago—what are the others?

--?
--CN6
--?
--?
--?
--?
Motility Disorders: The Sinus, the Fissure, and the Apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others?

--The internal carotid artery
--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics
A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others?

--The internal carotid artery
--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics

What eye-critical structure is notable for its absence from this list?
Cavernous sinus  Superior orbital fissure  Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others?

--The internal carotid artery
--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics

--Not the...optic nerves!

What eye-critical structure is notable for its absence from this list?
The optic nerve
A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: ?
--CN6: ?
--CN3: ?
--CN4: ?
--V1: ?
--V2: ?
--Postganglionic sympathetics: ?
A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern
--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
--V1: The lateral wall
--V2: The lateral wall
--Postganglionic sympathetics: The cavern
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern

--**CN6**: The cavern
--**CN3**: The lateral wall
--**CN4**: The lateral wall
--**V1**: The lateral wall
--**V2**: The lateral wall
--**Postganglionic sympathetics**: Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus Superior orbital fissure Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern

--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
--V1: The lateral wall
--V2: The lateral wall
--Postganglionic sympathetics:

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology

What other signs/symptoms of CS disease might be present?

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--
--
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus Superior orbital fissure Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others?

Where within the CS is each located?

--The internal carotid artery: The cavern
--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
--V1: The lateral wall
--V2: The lateral wall
--Postganglionic sympathetics:

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology

What other signs/symptoms of CS disease might be present?

--Engorged ocular surface veins
--Increased IOP
--Chemosis
A number of critical structures are located within each CS. CN6 was alluded to a few slides ago—what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern
--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
--V1: The lateral wall
--V2: The lateral wall
--Postganglionic sympathetics:

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology especially if signs and symptoms of orbital congestion are present as well!

What other signs/symptoms of CS disease might be present?

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: *The Sinus, the Fissure, and the Apex*

Cavernous sinus  Superior orbital fissure  Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern
--CN6: The cavern

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology, as if signs and symptoms of orbital congestion are present as well!

**How does CS pathology lead to orbital congestion and concomitant changes to the ocular surface, and IOP?**

What other signs/symptoms of CS disease might be present?

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?

--The internal carotid artery: The cavern

--CN6: The cavern

--CN3: The lateral wall

--CN4: The lateral wall

--V1: The lateral wall

--V2: The lateral wall

--Postganglionic sympathetics

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology, as if signs and symptoms of orbital congestion are present as well!

How does CS pathology lead to orbital congestion and concomitant changes to the ocular surface, and IOP?

Recall that most intraocular blood (and much orbital blood) drains into the CS via the superior ophthalmic vein. If CS pathology impedes venous drainage of the eye and orbit, the increased pressure on the venous side will produce the findings described.

What other signs/symptoms of CS disease might be present?

--Engorged ocular surface veins

--Increased IOP

--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus    Superior orbital fissure    Orbital apex

A number of critical structures are located within each CS. CN6 was alluded to a few slides ago--what are the others? Where within the CS is each located?
--The internal carotid artery: The cavern
--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
--V1: The lateral wall
--V2: The lateral wall
--Postganglionic sympathetics:

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology, as if signs and symptoms of orbital congestion and concomitant changes to the ocular surface, and IOP are present as well.

How does CS pathology lead to orbital congestion and concomitant changes to the ocular surface, and IOP?
Recall that most intraocular blood (and much orbital blood) drains into the CS via the superior ophthalmic vein. If CS pathology impedes venous drainage of the eye and orbit, the increased pressure on the venous side will produce the findings described.

What other signs/symptoms of CS disease might be present?
--Engorged ocular surface veins
--Increased IOP
--Chemosis
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Three general categories of CS pathology:
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

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Three general categories of CS pathology:

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- Vascular
- Inflammatory
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What other signs/symptoms of CS disease might be present?

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Can a neoplasia inducing a CS syndrome arise:

--As a primary in the CS?
--As a metastasis to the CS?
--In the pituitary gland, medial to the CS?
--In the ethmoid sinus, medial to the CS?
--As a sphenoid-wing meningioma, lateral to the CS?
--In an infiltrative manner, eg, from leukemia?
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**Two broad types of CS vascular pathology:**

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- **Vascular**
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**Motility Disorders: The Sinus, the Fissure, and the Apex**

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Two types of CS thrombosis:
- Septic
- Aseptic

Neoplastic
Vascular
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In septic CS thrombosis, is the intra-cavernous infection usually primary to the sinus, or does it originate in another site?

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Motility Disorders: The Sinus, the Fissure, and the Apex

In septic CS thrombosis, is the intra-cavernous infection usually primary to the sinus, or does it originate in another site?

In addition to simultaneous ophthalmic neuropathies and signs of orbital congestion, how does septic CS thrombosis present?

The pt is usually ill-appearing, with constitutional signs of infection (fever, chills, etc). Headache and N/V are the rule.

Are the ophthalmic findings unilateral, or bilateral?

The typical case presents unilaterally, but quickly becomes bilateral if appropriate and aggressive tx isn’t initiated. In the proper clinical context (ie, a very ill pt), bilateral simultaneous ophthalmic neuropathies is essentially diagnostic of septic CS thrombosis

Inflammatory

Neoplastic

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Motility Disorders: The Sinus, the Fissure, and the Apex

**Cavernous Sinus**

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In most cases it originates elsewhere and spreads to the CS.

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**Septic**

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Motility Disorders: The Sinus, the Fissure, and the Apex

In septic CS thrombosis, is the intra-cavernous infection usually primary to the sinus, or does it originate in another site? In most cases, it originates elsewhere.

Three sites are notorious for spreading to the CS—what are they?
--?
--?
--?

What other signs/symptoms of CS disease might be present?
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Inflammator
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In septic CS thrombosis, is the intra-cavernous infection usually primary to the sinus, or does it originate in another site?

In most cases, it originates elsewhere and spreads to the CS.

Three sites are notorious for spreading to the CS—what are they?

- The mid-face
- The oral cavity (usually in the form of a dental infection)
- The sphenoid/ethmoid sinuses

In inflammatory CS thrombosis, is the intra-cavernous infection usually primary to the sinus, or does it originate in another site?

In most cases, it originates elsewhere and spreads to the CS.

In septic CS thrombosis, how does it present?

- The pt is usually ill-appearing, with constitutional signs of infection (fever, chills, etc).
- Headache and N/V are the rule.
- Are the ophthalmic findings unilateral, or bilateral?
- The typical case presents unilaterally, but quickly becomes bilateral if appropriate and aggressive tx isn’t initiated. In the proper clinical context (ie, a very ill pt), bilateral simultaneous ophthalmic neuropathies is essentially diagnostic of septic CS thrombosis.

In septic CS thrombosis, what other signs/symptoms might be present?

- Engorged ocular surface veins
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What about orbital cellulitis--can it be the nidus for CS thrombosis?

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Motility Disorders: The Sinus, the Fissure, and the Apex

Neoplastic
- Thrombosis
- Fistula

Vascular
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Inflammatory
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Orbital cellulitis? No

What about orbital cellulitis--can it be the nidus for CS thrombosis?
In theory yes, but it is considered to be a very rare source in practice.

What other signs/symptoms of CS disease might be present?
- Engorged ocular surface veins
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Motility Disorders: The Sinus, the Fissure, and the Apex

Postganglionic sympathetics

Neoplastic

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In addition to simultaneous ophthalmic neuropathies and signs of orbital congestion, how does septic CS thrombosis present?

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What is the posterior fossa syndrome?

The syndrome is widely distributed across the posterior fossa (pons and cerebellum).

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Motility Disorders: The Sinus, the Fissure, and the Apex

- Neoplastic
- Vascular
- Septic
- Aseptic
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Postganglionic sympathetics:

- Hypotensive
- Bradycardia
- Ptosis
- Miosis

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Neoplastic

Vascular

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How is septic CS thrombosis managed?

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In addition to simultaneous ophthalmic neuropathies and signs of orbital congestion, what other signs/symptoms might be present?

--Engorged ocular surface veins

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--Headache and N/V

Are all 6 CNs involved?

The typical case presents unilaterally, but quickly becomes bilateral if appropriate and aggressive tx isn’t initiated. In the proper clinical context (ie, a very ill pt), bilateral simultaneous ophthalmic neuropathies is essentially diagnostic of septic CS thrombosis.

How is septic CS thrombosis managed?

Given its high mortality rate, it should be managed as the medical emergency it is. Appropriate imaging and labs should be obtained. Broad-spectrum abx therapy should be started without delay (and probably anti-coag therapy as well). Invite your friends on the Neurosurgery and Infectious Disease services to the party.
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Motility Disorders: The Sinus, the Fissure, and the Apex

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What other signs/symptoms of CS disease might be present?

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--Increased IOP
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What about aseptic CS thrombosis—how does it present?

--The pt is not nearly as ill-appearing;
--The signs/symptoms of orbital congestion are not as severe.

Further, and not surprisingly, lab work fails to reveal evidence of an infection.

How is it managed?

With anticoagulation/anti-platelet therapy
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--- The internal carotid artery: The cavern
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What other signs/symptoms of CS disease might be present?

--- Engorged ocular surface veins
--- Increased IOP
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Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

Neoplastic

Vascular

Inflammatory

Aseptic

Septic

Thrombosis

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Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology

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Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

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Posterior

Anterior

Neoplastic

Vascular

Inflammatory

Thrombosis

Fistula

Septic

Aseptic

Two types of CS fistula:
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Motility Disorders: The Sinus, the Fissure, and the Apex
An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. What is that aspect?

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An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. What is that aspect?

It is the configuration—unique in the human body—of having an arterial structure (the internal carotid artery and its branches) wholly within the confines of a venous structure (i.e., the CS itself).

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What is the fundamental problem that results from a fistula within the CS?

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What is the fundamental problem that results from a fistula within the CS?
It’s a pressure thing. A fistula allows high-pressure blood from the arterial tree to flow into the low-pressure, venous-sided CS. The subsequent increase in blood pressure within the CS impedes venous flow into the CS, leading to congestion of the eye and orbit.

What other signs/symptoms of CS disease might be present?
--Engorged ocular surface veins
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Neoplastic
Vascular
Fistula
Thrombosis
High-flow
Aseptic
Septic
Low-flow
Inflammatory
An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. Earlier in the slide-set, the main venous conduit from the eye and orbit to the CS was identified. What was it again?

It's the superior ophthalmic vein. It's a small conduit that transports blood from the eye and orbit to the CS. The CS is a unique structure, with a dural framework that contains arterial and venous structures. When an A-V fistula develops, high-pressure arterial blood can flow into the low-pressure, venous-sided CS. This impedes venous flow into the CS, leading to congestion of the eye and orbit.

What other signs/symptoms of CS disease might be present?

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Motility Disorders: The Sinus, the Fissure, and the Apex
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Motility Disorders: The Sinus, the Fissure, and the Apex

An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. Earlier in the slide-set, the main venous conduit from the eye and orbit to the CS was identified. What was it again?
The superior ophthalmic vein

In a pt with a CS fistula, what is the appearance of the superior ophthalmic vein on orbital imaging studies?

It's enlarged. This is an important sign to search for when reviewing imaging studies in cases of suspected CS fistulas!

What other signs/symptoms of CS disease might be present?

- Engorged ocular surface veins
- Increased IOP
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Neoplastic
- Thrombosis
- Septic
- Aseptic

Vascular
- Fistula
- High-flow
- Low-flow

Inflammatory
An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. Earlier in the slide-set, the main venous conduit from the eye and orbit to the CS was identified. What was it again? The superior ophthalmic vein.

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An aspect of CS anatomy makes it uniquely vulnerable to the development of A-V fistulas. What is that aspect?
It is the configuration—unique in the human body—of having an arterial structure (the internal carotid artery and its dural branches) wholly within the confines of a venous structure (ie, the CS itself).

What is the fundamental problem that results from a fistula within the CS?
It’s a pressure thing. A fistula allows high-pressure blood from the arterial tree to flow into the low-pressure, venous-sided CS. The subsequent increase in blood pressure within the CS impedes venous flow into the CS, leading to congestion of the eye and orbit. Further, if the pressure increase within the CS is significant enough, reversal of blood flow through the venous structures that drain into the CS will occur—that is, blood will circulate from the CS to the eye and orbit.

What other signs/symptoms of CS disease might be present?
--Engorged ocular surface veins
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Motility Disorders: The Sinus, the Fissure, and the Apex
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It is the configuration—unique in the human body—of having an arterial structure (the internal carotid artery and its dural branches) wholly within the confines of a venous structure (i.e., the CS itself).

What is the fundamental problem? It’s a pressure thing. A fistula allows high-pressure arterial blood to flow into the low-pressure, venous-sided CS. This impeded venous flow into the CS impedes venous flow into the eye and orbit.

If the pressure increase within the CS is significant enough, reversal of blood flow through the venous structures that drain into the CS will occur—that is, blood will circulate from the CS to the eye and orbit.

What other signs/symptoms of CS disease might be present?

--Engorged ocular surface veins
--Increased IOP
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Reversal of blood produces a classic finding on the ocular surface. What is that finding?

Arterialization of conj vessels

What is the classic term used to describe the appearance of these arterialized conj vessels?

'Corkscrewing'
Motility Disorders: The Sinus, the Fissure, and the Apex

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What is the fundamental problem? It’s a pressure thing. A fistula allows high-pressure arterial blood into the low-pressure, venous-sided CS, which impedes venous flow into the CS. If the pressure increase within the CS is significant enough, reversal of blood flow through the venous structures that drain into the CS will occur—that is, blood will circulate from the CS to the eye and orbit.

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Neoplastic

Vascular

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Inflammatory

Septic

Aseptic

High-flow

Low-flow

Anterior ——— Posterior
Motility Disorders: The Sinus, the Fissure, and the Apex

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What is the fundamental problem when a fistula occurs?
It’s a pressure thing. A fistula allows high-pressure blood from the arterial tree to flow into the low-pressure, venous-sided CS. This impedes venous flow into the CS, leading to congestion of the eye and orbit. If the pressure increase within the CS is significant enough, reversal of blood flow through the venous structures that drain into the CS will occur--that is, blood will circulate from the CS to the eye and orbit.

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Reversal of blood produces a classic finding on the ocular surface. What is that finding?
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What is the classic term used to describe the appearance of these arterIALIZED conj vessels?
reversal of blood flow
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What is the fundamental problem that arises with a fistula within the CS? It’s a pressure thing. A fistula allows high-pressure blood from the arterial tree to flow into the low-pressure, venous-sided CS. This impedes venous flow into the CS, leading to congestion of the eye and orbit.

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Motility Disorders: The Sinus, the Fissure, and the Apex
A number of critical structures are located within each CS. CN6 was alluded to a few slides ago—what are the others? Where within the CS is each located?

--The internal carotid artery
--CN6: The cavern
--CN3: The lateral wall
--CN4: The lateral wall
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--V2: The lateral wall
--Postganglionic sympathetics:

What are some other signs/symptoms of CS disease that might be present?

--Engorged ocular surface veins
--Increased IOP
--Chemosis

What is the anatomic difference between low- and high-flow fistulas (other than flow rate, duh)?

A low-flow fistula involves…

whereas

a high-flow fistula involves…

What is highly suggestive of CS pathology?

Neoplastic

Vascular

Fistula

High-flow

Low-flow

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What is the anatomic difference between low- and high-flow fistulas?

Low-flow fistula involves...a dural branch of the internal carotid, whereas a high-flow fistula involves...the internal carotid itself.

What is the most common cause of high-flow fistulas?

Severe head trauma and inflammation

CS pathology

- Neoplastic
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Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus Superior orbital fissure Orbital apex

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Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous

Superior orbital fissure

Orbital apex

Posterior

Anterior

How about low-flow fistulas--are they 2ndry to trauma as well?

(other than flow rate, duh)?

A low-flow fistula involves...a dural branch of the internal carotid, whereas a high-flow fistula involves...the internal carotid itself

CS pathology

Neoplastic

Vascular

Fistula

Thrombosis

Aseptic

Septic

Inflammatory

low-flow fistula

high-flow fistula

What is the anatomic difference between low- and high-flow fistulas

A low-flow fistula involves...a dural branch of the internal carotid, whereas a high-flow fistula involves...the internal carotid itself

How about low-flow fistulas--are they 2ndry to trauma as well?

A low-flow fistula involves...a dural branch of the internal carotid, whereas a high-flow fistula involves...the internal carotid itself

No, most of these are spontaneous.

Is there a gender predilection?

Yes, ♀ are more likely to be affected.

Is it more likely to occur in younger, or older women?

Older

Inflammatory
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Cavernous
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Is there a gender predilection?

Motility Disorders: The Sinus, the Fissure, and the Apex

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Fistula

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Inflammatory

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Posterior
Cavernous

Orbital apex

Anterior

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Is there a gender predilection?
Yes, ♀ are more likely to be affected.

Is it more likely to occur in younger, or older women?

Motility Disorders: The Sinus, the Fissure, and the Apex

Neoplastic

Vascular

Fistula

High-flow

Low-flow

Thrombosis

Septic

Aseptic

Inflammatory

How about low-flow fistulas—are they 2ndry to trauma as well?
No, most of these are spontaneous.

A number of possible signs and symptoms of CS disease

Engorged ocular surface veins
Increased IOP
Chemosis

Is there a gender predilection?
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Is it more likely to occur in younger, or older women?

Older

Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior

Cavernous

Superior orbital fissure
Orbital apex

Anterior

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What other signs/symptoms of CS disease might be present?

- Engorged ocular surface veins
- Increased IOP
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Motility Disorders: The Sinus, the Fissure, and the Apex

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What is the anatomic difference between low- and high-flow fistulas (other than flow rate, duh)?
A low-flow fistula involves...a dural branch of the internal carotid, whereas
A high-flow fistula involves...the internal carotid itself

High-flow fistula
Low-flow fistula

CS pathology

Vascular

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Inflammatory
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What other signs/symptoms of CS disease might be present?

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With respect to their clinical presentation, how do high- and low-flow fistulas differ?

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With respect to their clinical presentation, how do high- and low-flow fistulas differ?

They don’t—at least, not in a manner reliable enough to be distinguish between them. That is, one cannot differentiate between high- and low-flow fistulas on the basis of the extent of the neural deficits, or the severity of the congestion signs/symptoms.
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A number of critical structures are located within each CS.

**CN6** was alluded to a few slides ago—what are the others?

Where within the CS is each located?

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--Postganglionic sympathetics: **CS path**

What other signs/symptoms of CS disease might be present?

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--Engorged ocular surface
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The BCSC Neuro book discusses one specific inflammatory condition by name. What is that condition?

Tolosa-Hunt syndrome

Painful ophthalmoplegia secondary to noninfectious inflammation of the cavernous sinus

Is it common, or rare?

Very rare

Is there an age predilection?

No

Is there a gender predilection?

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**Tolosa-Hunt syndrome**
Motility Disorders: The Sinus, the Fissure, and the Apex

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What is the classic description of the pain in Tolosa-Hunt?

'Boring'

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Motility Disorders: The Sinus, the Fissure, and the Apex

Posterior ➔ Anterior

Cavernous sinus

Superior orbital fissure

Orbital apex

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**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Cavernous sinus**

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What is the treatment of choice for Tolosa-Hunt?

Systemic steroids

How does Tolosa-Hunt respond to steroid tx?

The pain is exquisitely responsive, whereas the ophthalmoplegia takes longer to resolve.
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What other structures are located within the CS?

- The sinus, the fissure, and the apex

What is the BCSC Neuro book discussing about Tolosa-Hunt syndrome?

- Tolosa-Hunt syndrome
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What is the Tolosa-Hunt syndrome?

What is the treatment of choice for Tolosa-Hunt?

Systemic steroids

How does Tolosa-Hunt respond to steroid tx?

The pain is exquisitely responsive, whereas the ophthalmoplegia takes longer to resolve.

Is it common, or rare?

Very rare

Is there an age predilection?

No

Is there a gender predilection?

No

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What other signs/symptoms of CS disease might be present?

- Engorged ocular surface veins
- Increased IOP
- Chemosis

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Which two causes are particularly notorious for being steroid-responsive, and thus giving a false confirmation of Tolosa-Hunt?

--Sinusitis
--Systemic lupus erythematosus

Inflammatory
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--Neoplasm
--Infectious
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Which neoplasm in particular?

Lymphoma
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--Infectious

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The Neuro book puts it this way: “Not infrequently, it is later discovered that the cause of the painful ophthalmoplegia in patients initially diagnosed with Tolosa-Hunt syndrome is neoplastic.”

Which neoplasm in particular? Lymphoma

What other signs/symptoms might be present in CS disease besides Tolosa-Hunt?

- Engorged ocular surface veins
- Increased IOP
- Chemosis

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Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus Superior orbital fissure Orbital apex

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Which two causes are particularly notorious for being steroid-responsive, and thus giving a false confirmation of Tolosa-Hunt?

- Neoplasm
- Infectious

Which type of infectious in particular?

Exquisitely responsive

Infectious

Fungal
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- Infectious

Which type of infectious in particular?

- Fungal

Which type of inflammatory in particular?

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---Increased IOP

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The BCSC Neuro book discusses one specific inflammatory condition by name. What is that condition? Tolosa-Hunt syndrome

The takeaway point: Tolosa-Hunt is vastly more likely to appear on a test than in your exam chair. So, while you should feel free to sling the diagnosis around on the OKAP, prudence dictates to be much more circumspect with it in the clinic. (Andrew Lee, among others, argues that the diagnosis should not be made by anyone other than a trained neuro-oph.)

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Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone
Superior orbital fissure

*What bony relationship forms the SOF?*
It is the gap between the greater and lesser wings of the sphenoid bone

*How long is the SOF?*
**Superior orbital fissure**

*What bony relationship forms the SOF?*
It is the gap between the greater and lesser wings of the sphenoid bone

*How long is the SOF?*
About 2 cm
Superior orbital fissure

What bony relationship forms the SOF?
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How long is the SOF?
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The SOF is straddled by a very important structure--what is the eponymous name of this structure?
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

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The SOF is straddled by a very important structure--what is the eponymous name of this structure?
The annulus of Zinn
Superior orbital fissure

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*What portion of the SOF is straddled by the annulus?*
Roughly the middle third
Motility Disorders: The Sinus, the Fissure, and the Apex

**Cavernous sinus**

Superior orbital fissure

Orbital apex

**Posterior**<br>**Anterior**

What bony relationship forms the SOF?  
It is the gap between the greater and lesser wings of the sphenoid bone

How long is the SOF?  
About 2 cm

The SOF is straddled by a very important structure—what is the eponymous name of this structure?  
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*By dint of its location, the annulus divides the SOF into three sections. What are they called?*

--?
--?
--?

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Motility Disorders: The Sinus, the Fissure, and the Apex

Superior Orbital Fissure

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By dint of its location, the annulus divides the SOF into three sections. What are they called?
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What portion of the SOF is straddled by the annulus?
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Motility Disorders: The Sinus, the Fissure, and the Apex

**Superior orbital fissure**

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By dint of its location, the annulus divides the SOF into three sections.
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What structures pass through the superior portion of the SOF?
--?
--?
--?
Motility Disorders: The Sinus, the Fissure, and the Apex

**Superior orbital fissure**

*What bony relationship forms the SOF?*

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*What is the annulus of Zinn?*

It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

*What portion of the SOF is straddled by the annulus?*

Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections:

--- The superior portion is above the annulus.
--- The intra-annular portion.
--- The inferior portion below it.

*What structures pass through the superior portion of the SOF?*

--- The superior ophthalmic vein.
--- The lacrimal and frontal nerves.
--- CN4 (two words).
**Superior orbital fissure**

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*By dint of its location, the annulus divides the SOF into three sections. What are they called?*

- The **superior** portion is above the annulus.
- The **intra-annular** portion.
- The **inferior** portion below it.

*What structures pass through the superior portion of the SOF?*

- The superior ophthalmic vein.
- The lacrimal and frontal nerves.
- CN4.
**Motility Disorders: The Sinus, the Fissure, and the Apex**

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*What portion of the SOF is straddled by the annulus?*
Roughly the middle third.

*By dint of its location, the annulus divides the SOF into three sections. What are they called?*
- **Superior portion** is above the annulus
- **Intra-annular portion**
- **Inferior portion** below it

*What structures pass through the superior portion of the SOF?*
- The superior ophthalmic vein
- The lacrimal and frontal nerves
- CN4

*What sort (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal?*
Sensory

*To which cranial nerve do they belong?*
CN5, specifically V1 (aka the ophthalmic nerve).
**Superior orbital fissure**

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What are they in the cranial nerve?  
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Motility Disorders: The Sinus, the Fissure, and the Apex

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What structures pass through the superior portion of the SOF?
-- The superior ophthalmic vein
-- The lacrimal and frontal nerves
-- CN4

By dint of its location, the lacrimal and frontal nerves are above the annulus.
What are they called?

The superior portion

What portion of the SOF is straddled by the annulus?
Roughly the middle third.

What are they called?

The intra-annular portion

What are they called?

The inferior portion below it

What are they called?

The superior ophthalmic vein

What are they called?

The lacrimal and frontal nerves

What sort (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal?
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What are they called?
-- The lacrimal and frontal nerves.

The annulus of Zinn

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By dint of its location, the annulus divides the SOF into three sections:
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Cavernous sinus

Orbital apex

Posterior ⇆ Anterior
Superior orbital fissure

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Motility Disorders: The Sinus, the Fissure, and the Apex

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What bony relationship forms the SOF? It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF? About 2 cm.

The SOF is straddled by a very important structure--what is the eponymous name of this structure? The annulus of Zinn.

What is the annulus of Zinn? It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

What portion of the SOF is straddled by the annulus? Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections. What are they called?
- The superior portion is above the annulus
- The intra-annular portion
- The inferior portion below it

What structures pass through the superior portion of the SOF? The superior ophthalmic vein, the lacrimal and frontal nerves, CN4.

V1/the ophthalmic nerve divides into three branches, two of which are the frontal and lacrimal. What is the other?
- Frontal
- Lacrimal
- CN4

To which cranial nerve do they belong? CN5, specifically V1 (aka the ophthalmic nerve).

V1/the ophthalmic nerve divides into three branches, two of which are the frontal and lacrimal. What is the other?
- Frontal
- Lacrimal
- CN4

V1 (aka the ophthalmic nerve)
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF? It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF? About 2 cm.

What structures pass through the superior portion of the SOF? (V1/ophthalmic nerve divides into three branches, two of which are the frontal and lacrimal. What is the other?)

- Superior ophthalmic vein
- Lacrimal and frontal nerves
- CN4

What portion of the SOF is straddled by the annulus? Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections. What are they called?

- Superior portion
- Intra-annular portion
- Inferior portion below it

What cranial nerve do the lacrimal and frontal nerves belong to? CN5, specifically V1 (aka the ophthalmic nerve).

V1/the ophthalmic nerve divides into three branches, two of which are the frontal and lacrimal. What is the other?

- Nasociliary
- Frontal
- Lacrimal
Motility Disorders: The Sinus, the Fissure, and the Apex

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What sort (i.e., sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal?
Sensory

To which cranial nerve do they belong?
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V1/the ophthalmic nerve divides into three branches, two of which are the frontal and lacrimal. What is the other?
--Nasociliary
--Frontal
--Lacrimal

Note that the initials of the V1 branches make a good mnemonic!
What becomes of the lacrimal and frontal nerves, ie, where do they go and what do they do?

The lacrimal nerve…

The frontal nerve…

What are they called?

- The superior portion
- The intra-annular portion
- The inferior portion below it

What portion of the SOF is straddled by the annulus?

Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections.

What are they called?

- The superior portion
- The intra-annular portion
- The inferior portion below it

What sorts (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal?

Sensory

To which cranial nerve do they belong?

CN5, specifically V1 (aka the ophthalmic nerve)

What structures pass through the superior portion of the SOF?

-- Superior ophthalmic vein
-- CN4
-- The lacrimal and frontal nerves

What structures pass through the intra-annular portion of the SOF?

-- The superior ophthalmic vein
-- CN4

What structures pass through the inferior portion of the SOF?

-- CN4

By dint of its location, the annulus forms the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?

About 2 cm.
Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

The SOF is straddled by a very important structure—what is the eponymous name of this structure?
The annulus of Zinn.

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections. What are they called?
--The superior portion is above the annulus
--The intra-annular portion
--The inferior portion below it

What structures pass through the superior portion of the SOF?
--The superior ophthalmic vein
--The lacrimal and frontal nerves
--CN4

What sort (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal nerves?
Sensory

To which cranial nerve do they belong?
The lacrimal and frontal nerves belong to CN5, specifically V1 (aka the ophthalmic nerve).

What becomes of the lacrimal and frontal nerves, ie, where do they go and what do they do?
The lacrimal nerve...heads toward, and is sensory to, the lacrimal gland.
The frontal nerve...
Motility Disorders: The Sinus, the Fissure, and the Apex

What becomes of the lacrimal and frontal nerves, ie, where do they go and what do they do?
The lacrimal nerve...heads toward, and is sensory to, the lacrimal gland
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What sort (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal?
Sensory

To which cranial nerve do they belong?
CN5, specifically V1 (aka the ophthalmic nerve)

What structures pass through the superior portion of the SOF?
--The superior ophthalmic vein
--The lacrimal and frontal nerves

What portion of the SOF is straddled by the annulus?
Roughly the middle third

By dint of its location, the annulus divides the SOF into three sections.
---The superior portion is above the annulus
---The intra-annular portion
---The inferior portion below it
What becomes of the lacrimal and frontal nerves, ie, where do they go and what do they do?
The lacrimal nerve…heads toward, and is sensory to, the lacrimal gland
The frontal nerve…divides into two terminal branches (the supraorbital and supratrochlear nerves), which are sensory to the forehead, upper lids, and a portion of the conjunctiva.
Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
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-- The superior portion is above the annulus
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-- The inferior portion below it

What structures pass through the superior portion of the SOF?
-- The superior ophthalmic vein
-- The lacrimal and frontal nerves
-- CN4

What sort (ie, sensory, motor, autonomic, etc) of nerves are the lacrimal and frontal nerves?
Sensory.

To which cranial nerve do they belong?
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Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone

How long is the SOF?
About 2 cm

The SOF is straddled by a very important structure--what is the eponymous name of this structure?
The annulus of Zinn

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles

What portion of the SOF is straddled by the annulus?
Roughly the middle third

By dint of its location, the annulus divides the SOF into three sections.
-- The superior portion is above the annulus
-- The intra-annular portion
-- The inferior portion below it

What structures pass through the annulus itself?
--? --? --?

What are they called?
--The superior portion is above the annulus
--The intra-annular portion
--The inferior portion below it

Roughly the middle third
Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
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What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections.

What are they called?
--The superior portion is above the annulus
--The intra-annular portion
--The inferior portion below it

What structures pass through the annulus itself?
--The nasociliary nerve
--CN3
--CN6

Superior orbital fissure
Orbital apex

Posterior → Anterior
Cavernous sinus

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

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What portion of the SOF is straddled by the annulus?
Roughly the middle third.
Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

Is CN3 a single entity as it passes through the SOF?
By dint of its location, the annulus divides the SOF into three sections.
The annulus divides the SOF into three sections.

--- The superior portion is above the annulus.
--- The intra-annular portion is straddled by the annulus.
--- The inferior portion is below it.
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone

How long is the SOF?
About 2 cm

Is CN3 a single entity as it passes through the SOF?
No—by the time it reaches the SOF, CN3 has already split into superior and inferior divisions

The annulus divides the SOF into three sections.
---The superior portion is above the annulus
---The intra-annular portion
---The inferior portion below it

By dint of its location, the annulus straddles which structure?
The annulus of Zinn

What are they called?
---The nasociliary nerve
---CN3
---CN6

Is CN3 a single entity as it passes through the SOF?
No—by the time it reaches the SOF, CN3 has already split into superior and inferior divisions

The annulus of Zinn
---The nasociliary nerve
---CN3
---CN6

What portion of the SOF is straddled by the annulus?
Roughly the middle third
**Motility Disorders: The Sinus, the Fissure, and the Apex**

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**Superior orbital fissure**

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

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What portion of the SOF is straddled by the annulus?
Roughly the middle third

---The nasociliary nerve
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Motility Disorders: *The Sinus, the Fissure, and the Apex*

**Superior orbital fissure**

What bony relationship forms the SOF?
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What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections. What are they called?
- The superior portion is above the annulus.
- The intra-annular portion is below the annulus.
- The inferior portion is below it.

What structures pass through the annulus itself?
- The nasociliary nerve.
- CN3.
- CN6.

Is CN3 a single entity as it passes through the SOF?
No—by the time it reaches the SOF, CN3 has already split into superior and inferior divisions.
Motility Disorders: *The Sinus, the Fissure, and the Apex*

**Superior orbital fissure**

*What bony relationship forms the SOF?*
It is the gap between the greater and lesser wings of the sphenoid bone.

*How long is the SOF?*
About 2 cm.

*The annulus of Zinn*
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

*What portion of the SOF is straddled by the annulus?*
Roughly the middle third.

*By dint of its location, the annulus divides the SOF into three sections. What are they called?*
--- The **superior** portion is above the annulus.
--- The **intra-annular** portion.
--- The **inferior** portion below it.

*What structures pass through the annulus itself?*
--- The nasociliary nerve
--- CN3
--- CN6

*Is CN3 a single entity as it passes through the SOF?*
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-- The inferior portion below it.

What passes through the annulus itself?
-- The nasociliary nerve.
-- CN3.
-- CN6.

Is CN3 a single entity as it passes through the SOF?
No—by the time it reaches the SOF, CN3 has already split into superior and inferior divisions.

Which muscles are innervated by fibers in the:
Superior division? Superior rectus, and the levator
Inferior division? The medial rectus, inferior rectus, and inferior oblique.
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

The SOF is straddled by a very important structure—what is the eponymous name of this structure?
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What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections. What are they called?
--The superior portion is above the annulus.
--The intra-annular portion.
--The inferior portion below it.

Which muscles are innervated by fibers in the:
Superior division? Superior rectus, and the levator
Inferior division? The medial rectus, inferior rectus, and inferior oblique.

Is CN3 a single entity as it passes through the SOF?
No—by the time it reaches the SOF, CN3 has already split into superior and inferior divisions.

What structures pass through the annulus itself?
--The nasociliary nerve.
--CN3.
--CN6.

Which functions are innervated by CN3?
Superior division:
Superior rectus, and the levator

Inferior division:
The medial rectus, inferior rectus, and inferior oblique.
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus | Superior orbital fissure | Orbital apex

**What bony relationship forms the SOF?**
It is the gap between the greater and lesser wings of the sphenoid bone.

**How long is the SOF?**
About 2 cm

The SOF is straddled by a very important structure--what is the eponymous name of this structure?
The annulus of Zinn

By dint of its location, the annulus divides the SOF into three sections. What are they called?
--The **superior** portion is above the annulus
--The **intra-annular** portion
--The **inferior** portion below the annulus

What structures pass through the inferior portion?
Roughly the middle third
Motility Disorders: *The Sinus, the Fissure, and the Apex*

Cavernous sinus

**Superior orbital fissure**

Orbital apex

---

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

The SOF is straddled by a very important structure—what is the eponymous name of this structure?
The annulus of Zinn.

By dint of its location, the annulus divides the SOF into three sections. What are they called?

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- The **superior** portion is above the annulus.
- The **intra-annular** portion is below the annulus.
- The **inferior** portion is roughly the middle third.

What structures pass through the inferior portion?
Not much. Sometimes, the inferior ophthalmic vein passes through it.
What bony relationship forms the SOF? It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF? About 2 cm.

The SOF is straddled by a very important structure--what is the eponymous name of this structure? The annulus of Zinn.

By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms?

--The intra-annular portion is below it.
--The inferior portion is below it.

What portion of the SOF is straddled by the annulus? Roughly the middle third.
Motility Disorders: *The Sinus, the Fissure, and the Apex*

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**Posterior** ← Cavernous sinus ← Superior orbital fissure ← Orbital apex ← **Anterior**

*Superior orbital fissure*

**What bony relationship forms the SOF?**
It is the gap between the greater and lesser wings of the sphenoid bone

**How long is the SOF?**
About 2 cm

*The SOF is straddled by a very important structure—what is the eponymous name of this structure?*
*The annulus of Zinn*

*By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms?*
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!

---

*The intra-annular portion*

*The inferior portion*

---

*What portion of the SOF is straddled by the annulus?*
Roughly the middle third
Motility Disorders: The Sinus, the Fissure, and the Apex

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms?
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!

---

Cavernous sinus Superior orbital fissure Orbital apex

---
What bony relationship forms the SOF?  
It is the gap between the greater and lesser wings of the sphenoid bone.

What bony relationship forms the inferior orbital fissure?  
It is formed by a gap in the confluence among the orbital bones comprising the floor and medial wall.

By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms?  
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of
the sphenoid bone

How long is the SOF?
About 2 cm

The SOF is straddled by a very important structure—
what is the eponymous name of this structure?
The annulus of Zinn

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous
insertions of the four rectus muscles

What portion of the SOF is straddled by the annulus?
Roughly the middle third

By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms?
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion
of the SOF. Don’t get them confused!

The inferior orbital fissure

What bony relationship forms the inferior orbital fissure?
It is formed by a gap in the confluence among the orbital
bones comprising the floor and medial wall

What structures pass through the inferior orbital fissure?
--
--
--Postganglionic parasympathetics heading up from the
pterygopalatine ganglion to the lacrimal gland
--
**Superior orbital fissure**

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of
the sphenoid bone

How long is the SOF?
About 2 cm

The SOF is straddled by a very important structure--
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The annulus of Zinn

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous
insertions of the four rectus muscles

What portion of the SOF is straddled by the annulus?
Roughly the middle third

By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonyms?
No! The inferior orbital fissure
is a separate and distinct structure from the inferior portion
of the SOF. Don't get them confused!

What bony relationship forms the inferior orbital fissure?
It is formed by a gap in the confluence among the orbital
bones comprising the floor and medial wall

What structures pass through the inferior orbital fissure?
--The infraorbital nerve and artery
--The zygomatic nerve and artery
--Postganglionic parasympathetics heading up from the
  pterygopalatine ganglion to the lacrimal gland
--The inferior ophthalmic vein (sometimes)
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm.

What bony relationship forms the SOF?
It is straddled by a very important structure—what is the eponymous name of this structure?
The annulus of Zinn.

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

What portion of the SOF is straddled by the annulus?
Roughly the middle third.

By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonyms?
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don't get them confused.

What bony relationship forms the inferior orbital fissure?
It is formed by a gap in the confluence among the orbital bones comprising the floor and medial wall.

What structures pass through the inferior orbital fissure?
--The infraorbital nerve and artery
--The zygomatic nerve and artery
--Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
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Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

What is the eponymous name of the structure that is straddled by the SOF?
The annulus of Zinn.

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

Roughly which portion of the SOF is straddled by the annulus?
Roughly the middle third.

By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonymous?
No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!

What structures pass through the inferior orbital fissure?
-- The infraorbital nerve and artery
-- The zygomatic nerve and artery
-- Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
-- The inferior ophthalmic vein (sometimes)

What sort (ie, sensory, motor, autonomic, etc) of nerves are the infraorbital and zygomatic?
Sensory.

To which cranial nerve do they belong?
CN5, specifically V2 (aka the maxillary nerve).
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

How long is the SOF?
About 2 cm

The SOF is straddled by a very important structure—what is the eponymous name of this structure?
The annulus of Zinn

What is the annulus of Zinn?
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

What portion of the SOF is straddled by the annulus?
Roughly the middle third

By dint of its location, the annulus divides the SOF into three sections.

What are they called?
--The superior portion is above the annulus
--The intra-annular portion
--The inferior portion below it

By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonyms?
No!
The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don't get them confused!

What structures pass through the inferior orbital fissure?
--The infraorbital nerve and artery
--The zygomatic nerve and artery
--Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
--The inferior ophthalmic vein (sometimes)

What sort (i.e., sensory, motor, autonomic, etc) of nerves are the infraorbital and zygomatic?
Sensory

To which cranial nerve do they belong?
CN5, specifically V2 (aka the maxillary nerve)
**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Superior orbital fissure**

*What bony relationship forms the SOF?*

It is the gap between the greater and lesser wings of the sphenoid bone.

*How long is the SOF?*

About 2 cm.

*The SOF is straddled by a very important structure--what is the eponymous name of this structure?*

The annulus of Zinn.

*What is the annulus of Zinn?*

It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

*What portion of the SOF is straddled by the annulus?*

Roughly the middle third.

By dint of its location, the annulus divides the SOF into three sections.

--- The **superior** portion is above the annulus.

--- The **intra-annular** portion.

--- The **inferior** portion below it.

*By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonyms?*

No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don't get them confused!

*What bony relationship forms the inferior orbital fissure?*

It is formed by a gap in the confluence between the orbital bones comprising the floor and medial wall.

*What structures pass through the inferior orbital fissure?*

-- The **infraorbital nerve** and artery

-- The **zygomatic nerve** and artery

-- Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland

-- The inferior ophthalmic vein (sometimes)

*What sort (ie, sensory, motor, autonomic, etc) of nerves are the infraorbital and zygomatic?*

Sensory.

*To which cranial nerve do they belong?*

CN5, specifically V2 (aka the maxillary nerve).
Motility Disorders: The Sinus, the Fissure, and the Apex

Superior orbital fissure

What bony relationship forms the SOF?
It is the gap between the greater and lesser wings of the sphenoid bone.

What sort (i.e., sensory, motor, autonomic, etc.) of nerves are the infraorbital and zygomatic?
Sensory

To which cranial nerve do they belong?
CN5, specifically V2 (aka the maxillary nerve)

What structures pass through the inferior orbital fissure?
-- The infraorbital nerve and artery
-- The zygomatic nerve and artery
-- Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
-- The inferior ophthalmic vein (sometimes)

By the way: Are the terms 'inferior portion of the SOF' and 'inferior orbital fissure' synonyms?
No!
The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!

What portion of the SOF is straddled by the annulus?
Roughly the middle third.
**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Cavernous sinus**
**Superior orbital fissure**
**Orbital apex**

**What bony relationship forms the SOF?**
It is the gap between the greater and lesser wings of the sphenoid bone.

**How long is the SOF?**
About 2 cm.

**The SOF is straddled by a very important structure—what is the eponymous name of this structure?**
The annulus of Zinn.

**What is the annulus of Zinn?**
It is a ring-shaped structure formed by the tendinous insertions of the four rectus muscles.

**What portion of the SOF is straddled by the annulus?**
Roughly the middle third.

**By dint of its location, the annulus divides the SOF into three sections. What are they called?**
--- The superior portion is above the annulus
--- The intra-annular portion
--- The inferior portion below it

--- The *infraorbital nerve* and artery
--- The *zygomatic nerve* and artery
--- Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
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Sensory.

**To which cranial nerve do they belong?**
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--- The *zygomatic nerve* and artery
--- Postganglionic parasympathetics heading up from the pterygopalatine ganglion to the lacrimal gland
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By the way: Are the terms ‘inferior portion of the SOF’ and ‘inferior orbital fissure’ synonyms? No! The inferior orbital fissure is a separate and distinct structure from the inferior portion of the SOF. Don’t get them confused!
**Motility Disorders: The Sinus, the Fissure, and the Apex**

**Cavernous sinus**

**Superior orbital fissure**

**Orbital apex**

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**Posterior** ←

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**Anterior** →

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**As stated earlier in the slide-set, this is how CS pathology presents clinically. How does SOF pathology present?**

- Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of **CS pathology** especially if signs and symptoms of orbital congestion are present as well!

- --CN6
- --CN3
- --CN4
- --V1
- --V2
- --Postganglionic sympathetics:
  - --Engorged ocular surface veins
  - --Increased IOP
  - --Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

Posterior

--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics:

As stated earlier in the slide-set, this is how CS pathology presents clinically. How does SOF pathology present?
In the exact same manner

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology and SOF pathology especially if signs and symptoms of orbital congestion are present as well!

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus

Superior orbital fissure

Orbital apex

Posterior

Anterior

As stated earlier in the slide-set, this is how CS pathology presents clinically. How does SOF pathology present? In the exact same manner.

Simultaneous deficits involving structures innervated by some (or all) of these nerves is highly suggestive of CS pathology and SOF pathology especially if signs and symptoms of orbital congestion are present as well!

--CN6
--CN3
--CN4
--V1
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--Postganglionic sympathetics:

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

Posterior  Anterior

As stated earlier in the slide-set, this is how CS pathology presents clinically. How does SOF pathology present?

In the exact same manner

Simultaneous deficits involving

If CS pathology and SOF pathology present in identical fashion, how does one distinguish between them clinically?

One doesn’t--they cannot be reliably differentiated clinically. Further, given that the CS and SOF are contiguous, it is not uncommon for a pathologic process to involve both simultaneously.

CS pathology and SOF pathology
especially if
signs and symptoms of orbital congestion are present as well!

--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics:

--Engorged ocular surface veins
--Increased IOP
--Chemosis
What critical structure is present at the orbital apex (OA) that wasn’t present at the SOF or in the CS?

- CN6
- CN3
- CN4
- V1
- V2
- Postganglionic sympathetics:
- ?

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: *The Sinus, the Fissure, and the Apex*

What critical structure is present at the orbital apex (OA) that wasn’t present at the SOF or in the CS?

- The optic nerve

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Cavernous sinus Superior orbital fissure Orbital apex

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Posterior Anterior

--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics:
--The optic nerve

---

--Engorged ocular surface veins
--Increased IOP
--Chemosis
What critical structure is present at the orbital apex (OA) that wasn’t present at the SOF or in the CS? The optic nerve

What does the presence of the optic nerve indicate about the clinical presentation of pathology at the OA?

--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics: The optic nerve

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

What critical structure is present at the orbital apex (OA) that wasn’t present at the SOF or in the CS?

The optic nerve

What does the presence of the optic nerve indicate about the clinical presentation of pathology at the OA?

It indicates that vision could be affected

--CN6
--CN3
--CN4
--V1
--V2
--Postganglionic sympathetics:
--The optic nerve

--Engorged ocular surface veins
--Increased IOP
--Chemosis
Motility Disorders: The Sinus, the Fissure, and the Apex

Cavernous sinus  Superior orbital fissure  Orbital apex

Posterior  Anterior

- CN6
- CN3
- CN4
- V1
- V2
- Postganglionic sympathetics:
  - The optic nerve

Simultaneous deficits involving structures innervated by some (or all) of these nerves, along with the optic nerve, is highly suggestive of orbital apex pathology especially if signs and symptoms of orbital congestion are present as well!

- Engorged ocular surface veins
- Increased IOP
- Chemosis