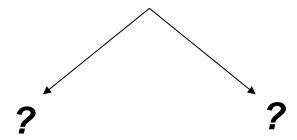
Primary Angle Closure Glaucoma



Glaucoma



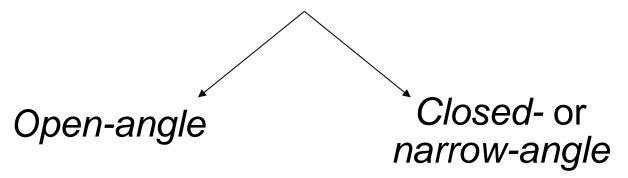
The first thought you should have when encountering a pt you suspect has glaucoma is...

A

Primary Angle Closure Glaucoma



Glaucoma

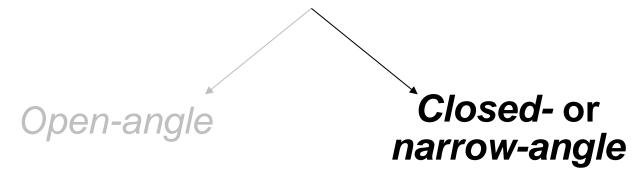


The first thought you should have when encountering a pt you suspect has glaucoma is... What is the status of the angle?

Primary Angle Closure Glaucoma



Glaucoma



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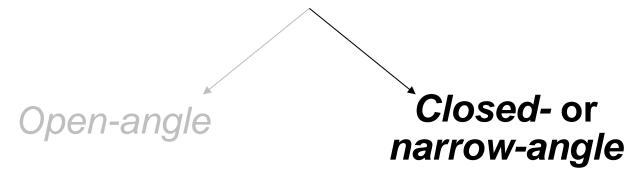
What does it mean to say the angle is closed?

A

Primary Angle Closure Glaucoma



Glaucoma



The first thought you should have when encountering a pt you suspect has glaucoma is... *What is the status of the angle?*

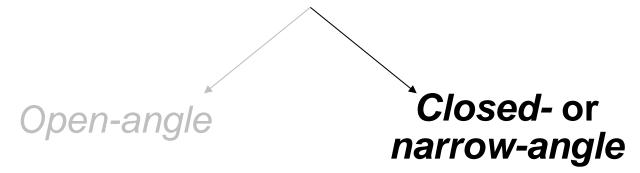
What does it mean to say the angle is closed?

It means the peripheral iris is in contact with the trabecular meshwork (TM)

Primary Angle Closure Glaucoma



Glaucoma



The first thought you should have when encountering a pt you suspect has glaucoma is... *What is the status of the angle?*

What does it mean to say the angle is closed?

It means the peripheral iris is in contact with the trabecular meshwork (TM)

This contact comes in two basic flavors—what are they?

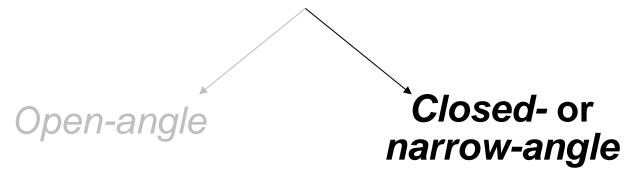
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Glaucoma



The first thought you should have when encountering a pt you suspect has glaucoma is... *What is the status of the angle?*

What does it mean to say the angle is closed?

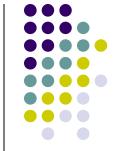
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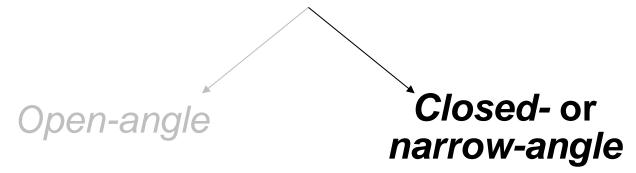
--The iris can be to the TM, ie, touch it without adhering to it to the TM, ie, adhered to it

A

Primary Angle Closure Glaucoma



Glaucoma



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What does it mean to say the angle is closed?

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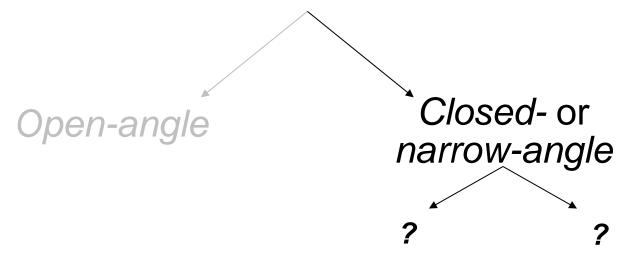
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Primary Angle Closure Glaucoma



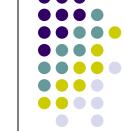
Glaucoma



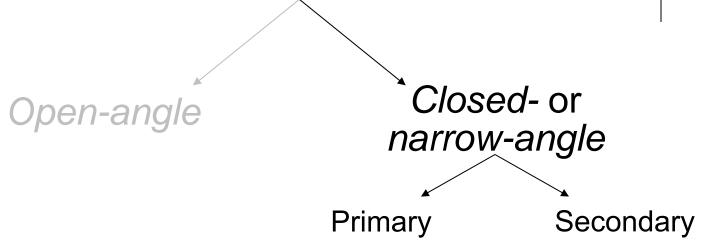
The first thought you should have when encountering a pt you suspect has angle-closure glaucoma is...

A

Primary Angle Closure Glaucoma



Glaucoma

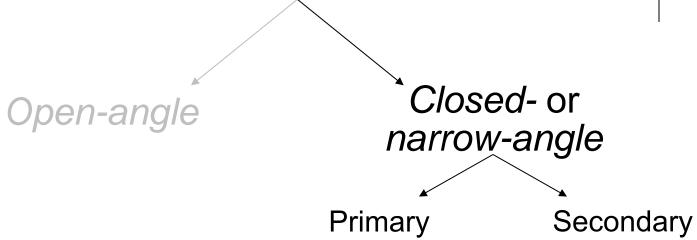


The first thought you should have when encountering a pt you suspect has angle-closure glaucoma is... is it primary or secondary?

Primary Angle Closure Glaucoma



Glaucoma



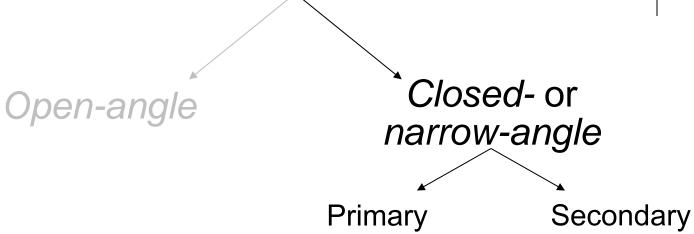
What differentiates primary from secondary angle-closure glaucoma?

A

Primary Angle Closure Glaucoma







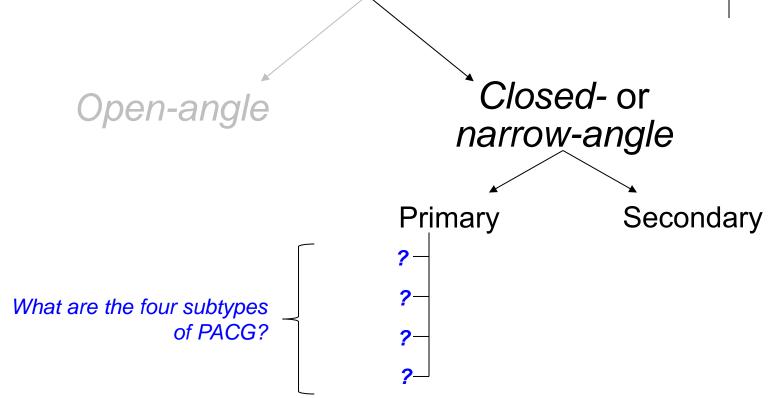
What differentiates primary from secondary angle-closure glaucoma? In secondary, a specific pathological cause of angle closure can be identified, whereas no such cause is present in primary dz

Glaucoma Closed- or narrow-angle Primary Secondary

Secondary angle-closure glaucoma is discussed in detail in its own slide-set; see the Table of Contents

Primary Angle Closure Glaucoma

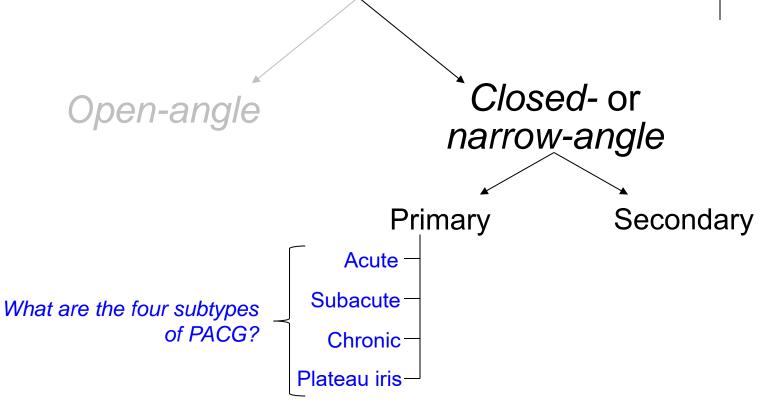




A

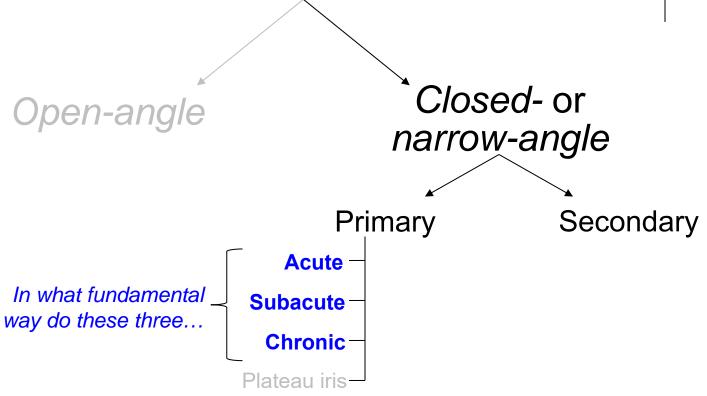
Primary Angle Closure Glaucoma





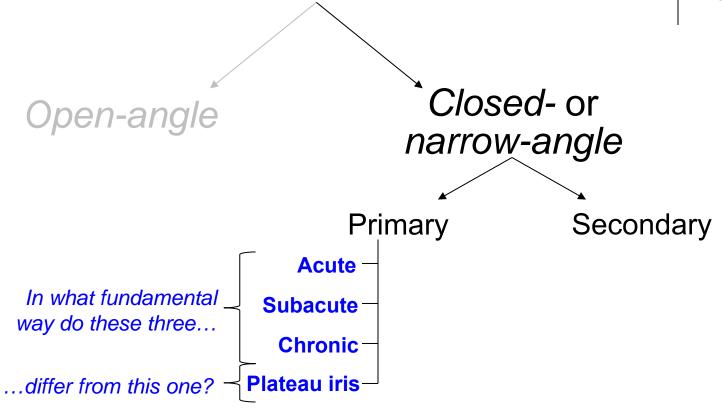
Primary Angle Closure Glaucoma





Primary Angle Closure Glaucoma





Primary Angle Closure Glaucoma

Glaucoma

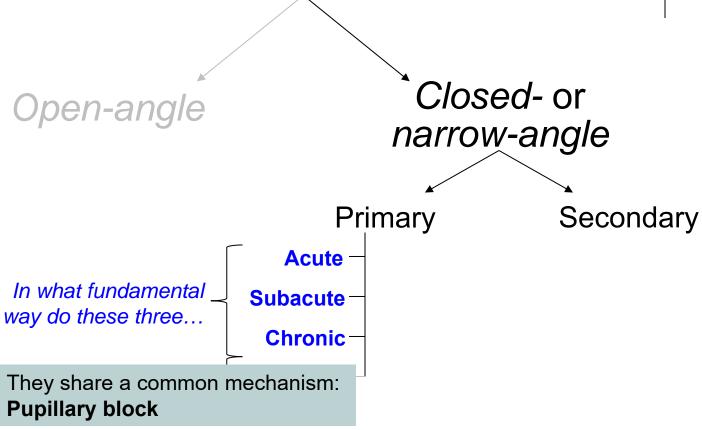


Closed- or Open-angle narrow-angle Primary Secondary Acute -In what fundamental Subacute way do these three... **Chronic** They share a common mechanism: two words

A

Primary Angle Closure Glaucoma





Primary Angle Closure Glaucoma



Glaucoma

14/hat daga nunillamuhla ak vafav ta avaatko					
What does pupillary block refer to, exactly?					

Pupillary block





Glaucoma

What does pupillary block refe		_		
It refers to contact between the	two words	and the word	that impedes the n	ormal
flow of aqueous from the	two diff words	to the	two still different words	
through the pupillary aperture.				

Pupillary block





Glaucoma

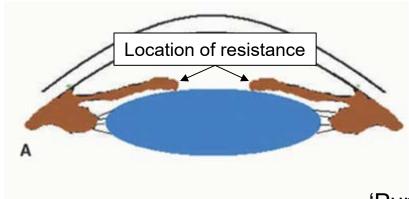
What does pupillary block refer to, exactly?

It refers to contact between the pupil margin and the lens that impedes the normal flow of aqueous from the posterior chamber (PC) to the anterior chamber (AC) through the pupillary aperture.

They chare a common mechanism:

Pupillary block





1. Resistance to aqueous flow from the PC to the AC

'Pupillary block'





Glaucoma

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Pupillary block leads to the development of a two words across the iris, which causes the iris to two diff words.

Pupillary block





Glaucoma

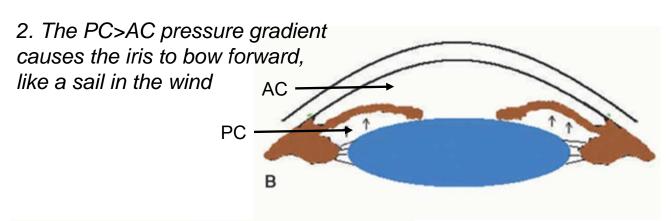
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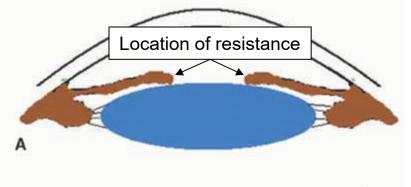
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Pupillary block







1. Resistance to aqueous flow from the PC to the AC

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Glaucoma

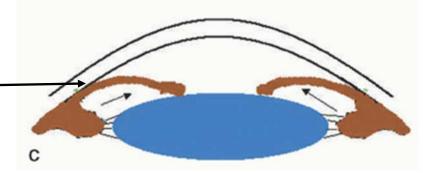
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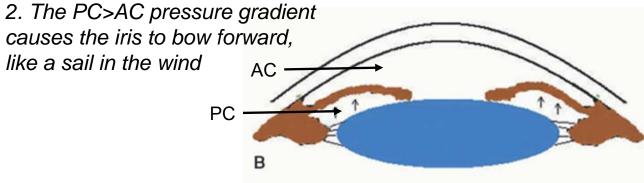
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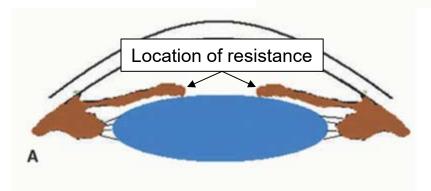
Pupillary block leads to the development of a pressure gradient across the iris, which causes the iris to bow forward. If the iris bows far enough, the peripheral iris will come into apposition with and occlude the drainage angle, precipitating acute closure of the angle and a prodigious rise in IOP.

They share a common mechanism:
Pupillary block

3. Forward movement of the iris leads to apposition of the peripheral iris against the drainage angle, occluding it

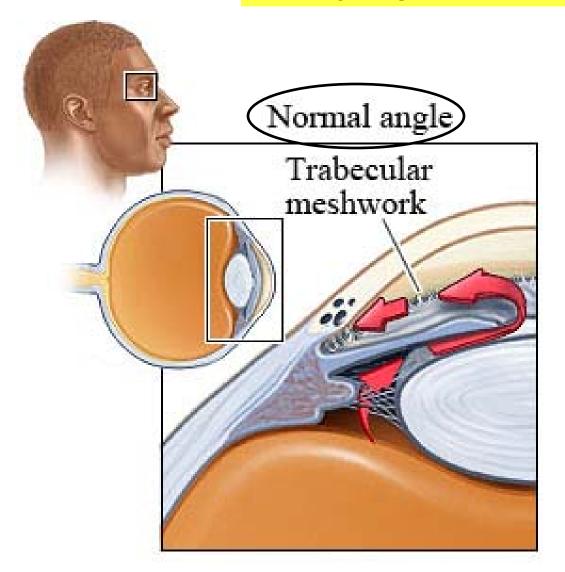




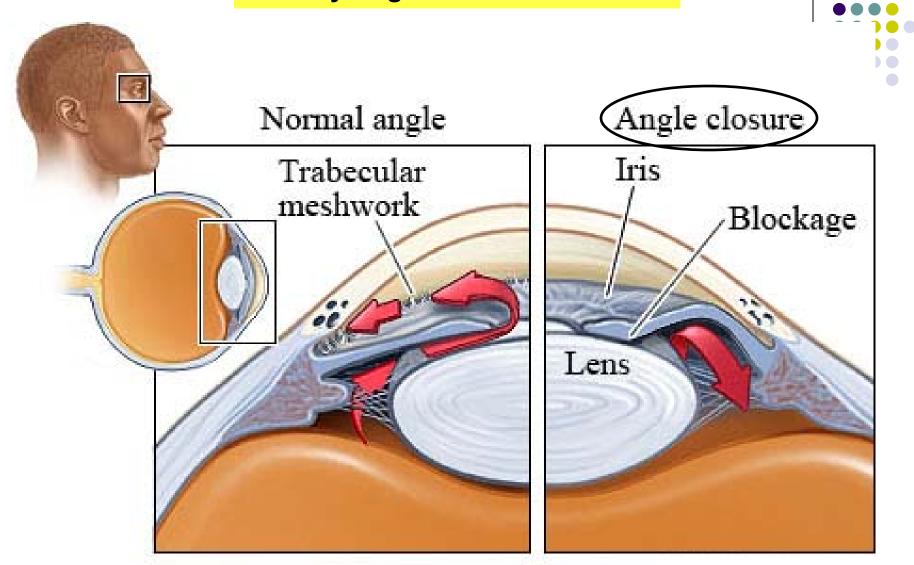


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Glaucoma

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It isn't. The posterior chamber is the space immediately behind the one and anterior to the two words.

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Glaucoma

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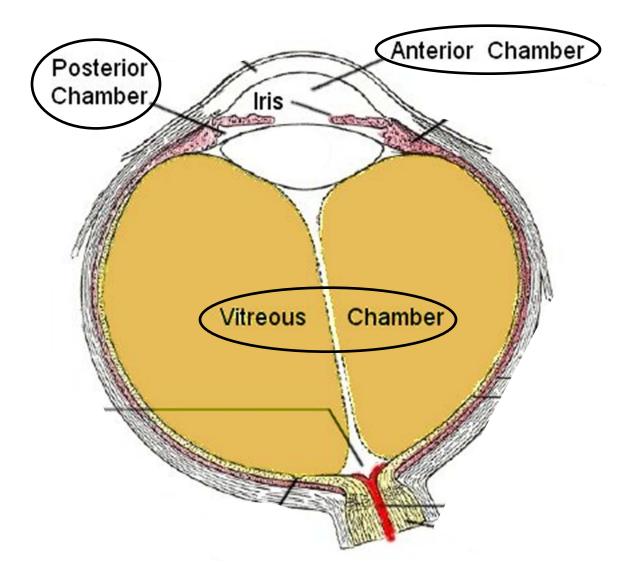
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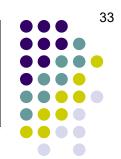
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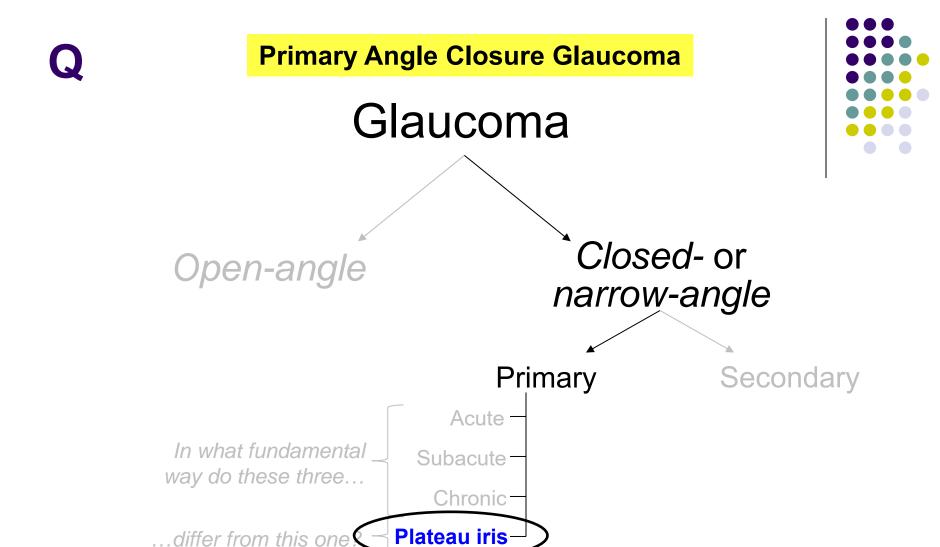
The posterior chamber? I didn't know the vitreous was involved. It isn't. The posterior chamber is the space immediately behind the iris and anterior to

the lens/zonules. Vitreous resides in the vitreous cavity.









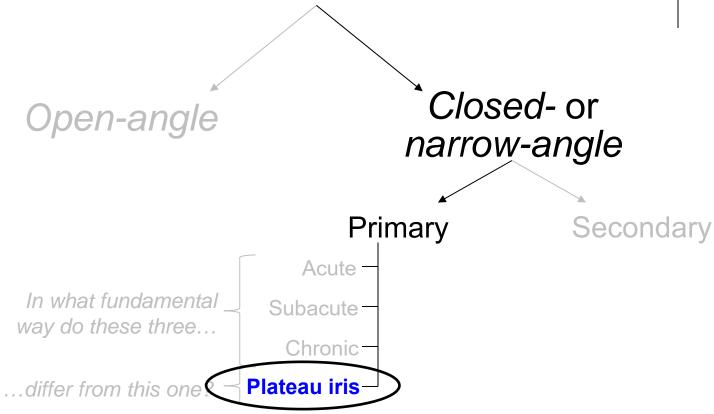
What's the dealio with plateau iris syndrome?

...differ from this one?



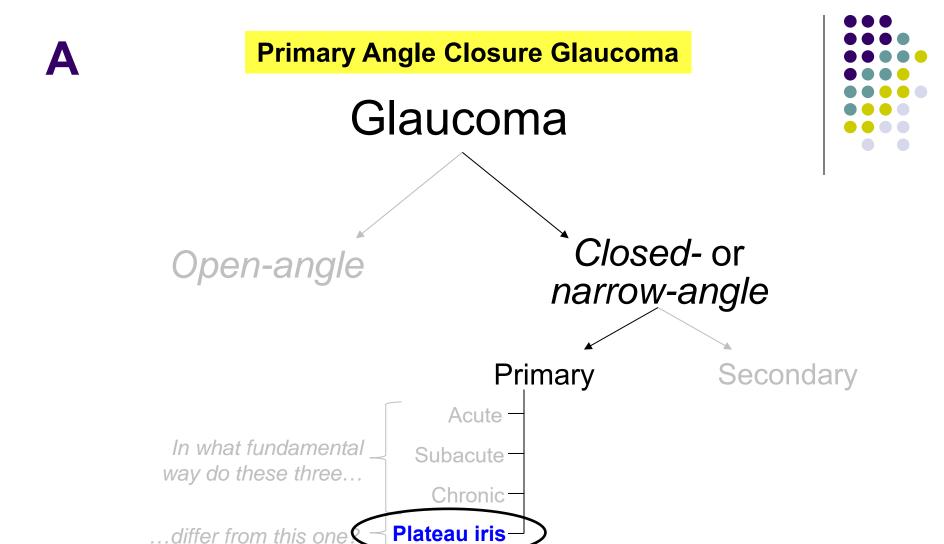






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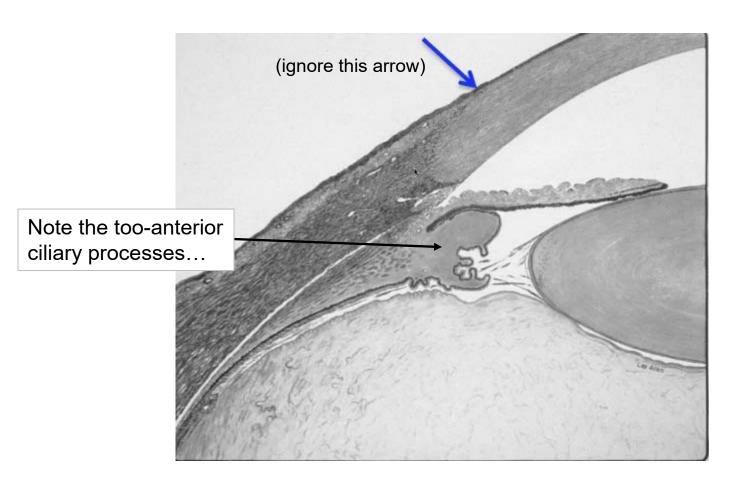
In plateau iris, angle closure is due to 'bad anatomy.' Specifically, the two words are more direction than normal, which in turn displace the two diff words perilously close to the two diff words. (Some plateau-iris cases have a pupillary block component as well.)



What's the dealio with plateau iris syndrome?

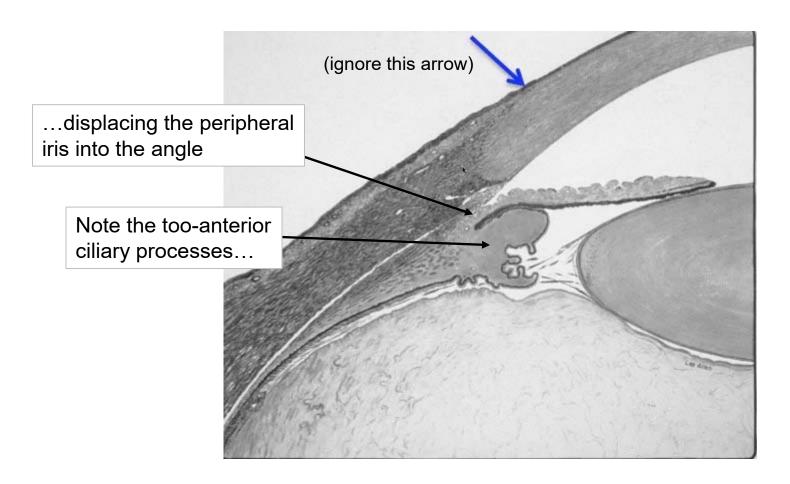
In plateau iris, angle closure is due to 'bad anatomy.' Specifically, the ciliary processes are more anterior than normal, which in turn displace the peripheral iris perilously close to the drainage angle. (Some plateau-iris cases have a pupillary block component as well.)



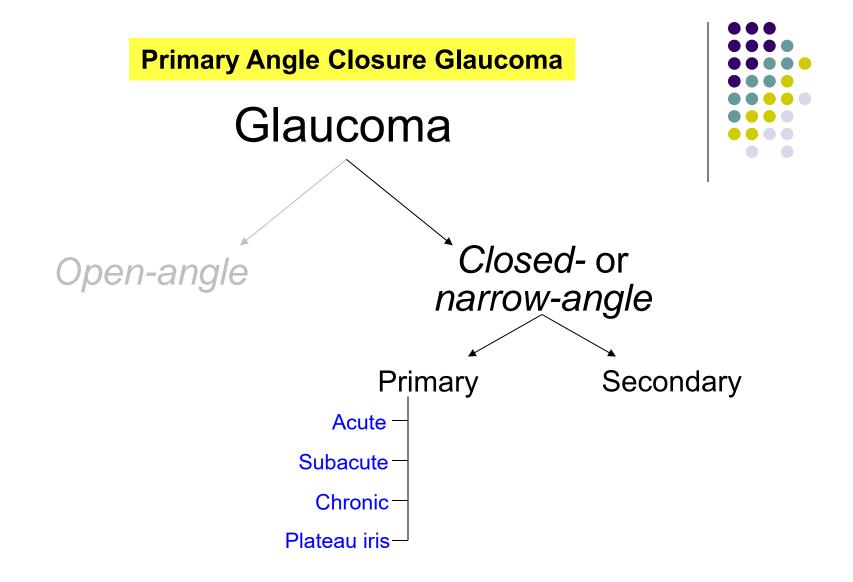


Plateau iris





Plateau iris



Next let's look at primary angle closure glaucoma in more detail





Is there a racial predilection regarding the risk of PACG?





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Yes, individuals of heritage have the highest known risk of PACG--their relative risk has been estimated to be as high as that of whites.





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Their relative risk is somewhere between that of the Inuit and whites





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Yes, the incidence with age





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Yes, are at higher risk





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Yes; PACG is more likely to occur in





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Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



• Pain is severe:



Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



Pain is severe: Acute

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

Pain is severe: Acute

Laser iridoplasty may be beneficial:

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

Pain is severe: Acute

Laser iridoplasty may be beneficial: Plateau iris; chronic

Q

For each statement, identify which form(s) of primary angle-closure glaucoma is/are associated

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris





- Pain is severe: Acute
 - Laser (iridoplasty) may be beneficial: Plateau iris; chronic

By what other name is iridoplasty called?

A

For each statement, identify which form(s) of primary angle-closure glaucoma is/are associated

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

Pain is severe: Acute

Laser (iridoplasty) may be beneficial: Plateau iris; chronic

By what other name is iridoplasty called? Gonioplasty

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

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By what other name is iridoplasty called? Gonioplasty

What is its purpose, ie, its therapeutic goal?

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

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By what other name is iridoplasty called? Gonioplasty

What is its purpose, ie, its therapeutic goal? To deepen the angle

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



of answers

- Pain is severe: Acute
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What is its purpose, ie, its therapeutic goal? To deepen the angle

In a nutshell, how is it performed, and how does it deepen the angle?

Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



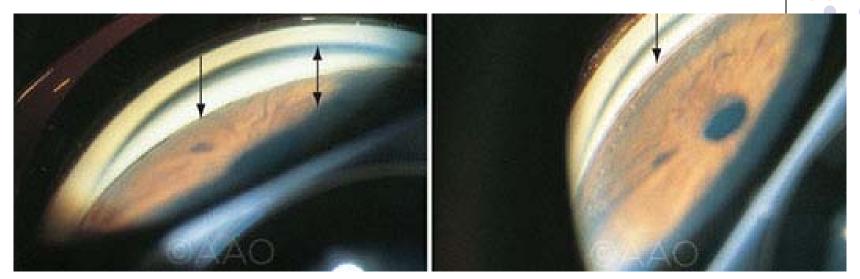
of answers

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By what other name is iridoplasty called? Gonioplasty

What is its purpose, ie, its therapeutic goal? To deepen the angle

In a nutshell, how is it performed, and how does it deepen the angle? Laser burns are placed in the peripheral iris stroma, and the resulting contraction causes the iris to flatten and pull away from the angle



Left: A flat iris plane but shallow angle recess (**arrow**). Note that the midperipheral angle appears deeper (**double arrow**) than the narrow angles associated with pupillary block. **Right:** A much deeper angle recess (**arrow**) following laser peripheral iridoplasty.

Plateau iris pre- and post-iridoplasty

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



- Pain is severe: Acute
- (>1) Laser iridoplasty may be beneficial: Plateau iris; chronic
 - IOP *low* after events:

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



- Pain is severe: Acute
- (>1) Laser iridoplasty may be beneficial: Plateau iris; chronic
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Why is IOP low after an acute angle-closure event?

Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



- Pain is severe: Acute
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```
Why is IOP low after an acute angle-closure event?

Very high IOP → → low IOP
```

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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Why is IOP low after an acute angle-closure event?

Very high IOP → CB ischemia → ↓ aqueous production → low IOP

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Why is IOP low after an acute angle-closure event?

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What is the implication for management?



Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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Why is IOP low after an acute angle-closure event? Very high IOP \rightarrow CB ischemia $\rightarrow \downarrow$ aqueous production \rightarrow low IOP

What is the implication for management?

Low IOP post-event should not be interpreted as evidence of an adequately functioning angle—follow-up with serial gonio must be performed!



- Pain is severe: Acute
- (>1) Laser iridoplasty may be beneficial: Plateau iris; chronic
 - IOP low after events: Acute
 - LPI does not help:

Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



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Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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What does LPI stand for?

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



- Pain is severe: Acute
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What does LPI stand for? Laser peripheral iridotomy

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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What is the rationale for performing LPI in PACG?

Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



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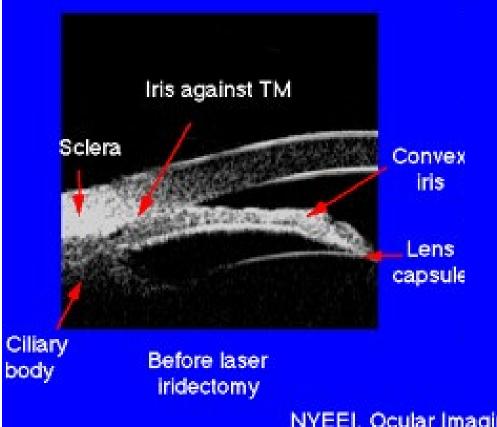
What does LPI stand for? Laser peripheral iridotomy

What is the rationale for performing LPI in PACG?
Recall the pathophysiology of pupillary block—it produces a pressure gradient across the iris, which causes it to bow forward and possibly obstruct the angle.

Primary Angle Closure Glaucoma



Angle Closure due to Relative Pupillary Block



NYEEI, Ocular Imaging Center



Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



- Pain is severe: Acute
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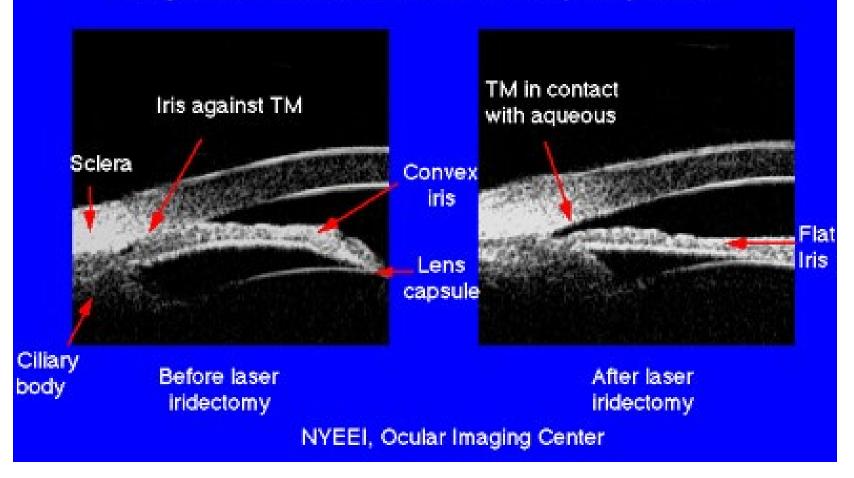
What is the rationale for performing LPI in PACG?

Recall the pathophysiology of pupillary block—it produces a pressure gradient across the iris, which causes it to bow forward and possibly obstruct the angle. The LPI provides an alternative route for aqueous to get from the PC to the AC. Re-establishment of aqueous flow dissipates the pressure gradient, causing the iris to fall back and away from the angle.

Primary Angle Closure Glaucoma



Angle Closure due to Relative Pupillary Block





Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



- Pain is severe: Acute
- (>1) Laser iridoplasty may be beneficial: Plateau iris; chronic
 - OP low after events: Acute
 - does not help: Plateau iris

What does LPI stand for? Laser peripheral iridotomy

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Why doesn't LPI help plateau iris?



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Why doesn't LPI help plateau iris? We'll get to that shortly



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If LPI doesn't help in plateau iris syndrome, why is it still important to do one?



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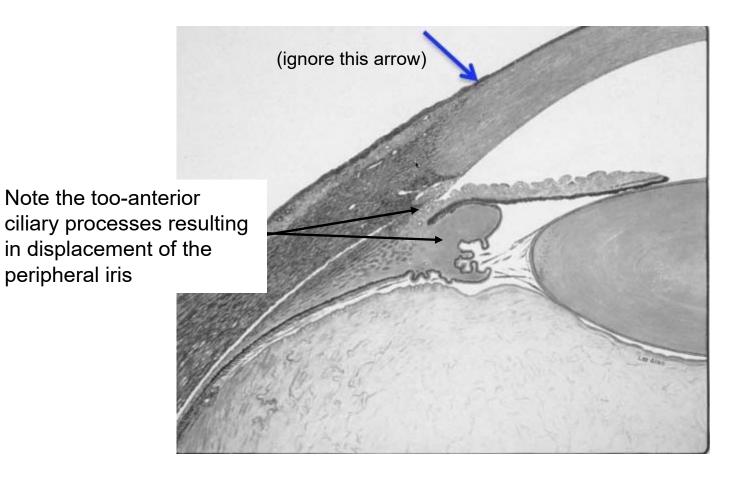
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PC = Posterior chamber: AC = Anterior chamber

If LPI doesn't help in plateau iris syndrome, why is it still important to do one? The fundamental problem in plateau iris is **not** pupillary block, with its resulting PC>AC pressure gradient. Rather, the problem is with the native configuration of the angle—the ciliary processes and peripheral iris are too anterior, resulting in an angle that is narrowed and prone to occlusion.

Primary Angle Closure Glaucoma





Plateau iris



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Acute angle closure
Sub-acute angle closure
Chronic angle closure
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Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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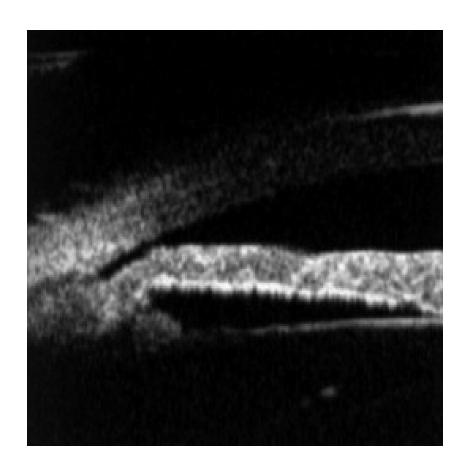
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rendered unless a patent PI has beer (In other words, it looks like a plateau)

Primary Angle Closure Glaucoma





Plateau iris looking all plateau-like

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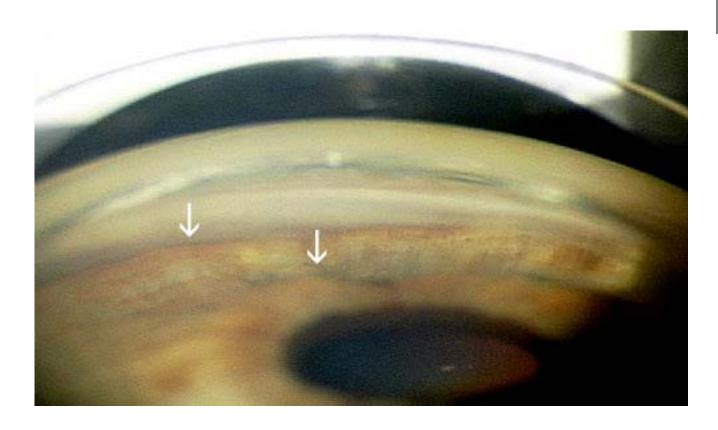
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Primary Angle Closure Glaucoma

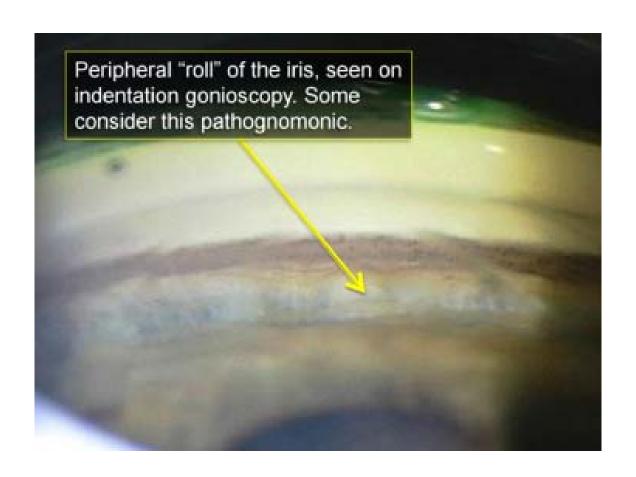




Plateau iris: 'Sine wave/double-hump sign'

Primary Angle Closure Glaucoma





Plateau iris: 'Sine wave/double-hump sign'

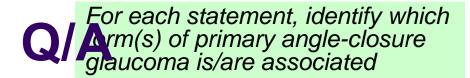
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Sub-acute angle closure
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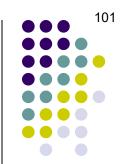


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What happens during sleep that leads to improvement?

Acute angle closure
Sub-acute angle closure
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What happens during sleep that leads to improvement? Sleep-induced miosis breaks the pupillary block

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What happens during sleep that leads to improvement? Sleep-induced miosis breaks the pupillary block

When you hear that periocular pain 'improves with sleep,' three conditions should come to mind. What are the other two? --Sub-acute angle-closure glaucoma

- --?
- --?

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When you hear that periocular pain 'improves with sleep,' three conditions should come to mind. What are the other two?

- --Sub-acute angle-closure glaucoma
- --Migraine
- --OIS

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Sub-acute angle closure
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Sleep-ind What does OIS stand for in this context?

When you three cond --Sub-acu - Migraine --**OIS**

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When you three cond In a nutshell, what is OIS?





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When you three cond

In a nutshell, what is OIS?

A constellation of signs and symptoms owing to chronic ocular



A

For each statement, identify which form(s) of primary angle-closure glaucoma is/are associated

Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



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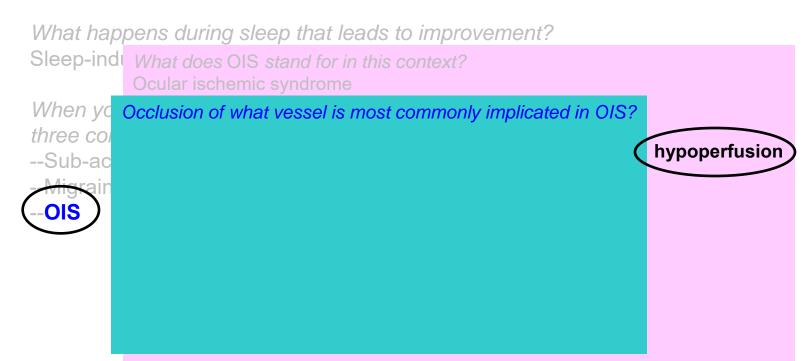
A constellation of signs and symptoms owing to chronic ocular hypoperfusion



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Sleep-ind

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When yo three colar-Sub-ac

Migrain

Ols

Migrain

Migrain

Ols

Migrain

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Ocular ischemic syndrome

When yo Occlusion of what vessel is most commonly implicated in OIS? three co. The ipsilateral internal carotid artery (ICA)

--Sub-ac

What is the term for the process that leads to ICA occlusion?

hypoperfusion



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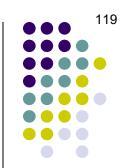


What is the term for the process that leads to ICA occlusion? **Atherosclerosis**

With what nonocular atherosclerotic conditions is OIS commonly associated?

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What is the term for the process that leads to ICA occlusion? **Atherosclerosis**

With what nonocular atherosclerotic conditions is OIS commonly associated?

- --CAD
- --CVA
- --PAD

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Signs:

Symptoms:

- --Intraretinal hemorrhages
- --NVI/NVA
- --AC cell/flare
- --Retinal vascular changes

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Sleep-ind

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Ocular ischemic syndrome

When you three conduction of signs and symptoms of or chronic ocular hypoperfusion

Migraine

What are the signs/symptoms of OIS?

Signs: Symptoms:

- --Intraretinal hemorrhages
- --NVI/NVA --Periocular pain
- --AC cell/flare

- -- -
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Sleep-ind What does OIS stand for in this context?

When you three cond --Sub-acu

OIS

In a nutshell, what

A constellation of signs and symptoms of ving to chronic ocular hypoperfusion

What are the signs/symptoms of OIS?

Signs:

- --Intraretinal hemorrhages
- --NVI/NVA
- --AC cell/flare
- --Retinal vascular changes

Symptoms:

- --Decreased vision
- --Periocular pain
- -- Prolonged photostress recovery time

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



- Pain is severe: Acute
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Does it present unilaterally, or bilaterally?

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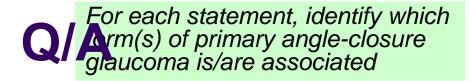
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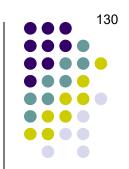


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Is there a relationship with age?



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What happens during sleep that leads to improvement? Sleep-induced miosis breaks the pupillary block

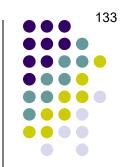
When you hear that periocular pain 'improves with sleep,

three conditions should come to mind. What are the other two?

--Sub-acu Circling back to the original point: By what mechanism does sleep improve the periocular pain associated with OIS?



Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



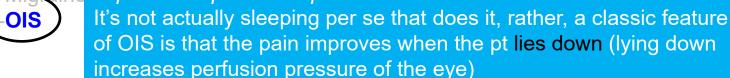
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Why is the cornea cloudy?

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Why is the cornea cloudy? It is edematous

Primary Angle Closure Glaucoma





Cloudy cornea in acute ACG



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Why is the cornea cloudy? It is edematous

What causes the edema?

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Chronic angle closure
Plateau iris



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What causes the edema?
Elevated IOP→endothelial-cell dysfunction

Q

For each statement, identify which form(s) of primary angle-closure glaucoma is/are associated

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What causes the edema?
Elevated IOP→endothelial-cell dysfunction

What is the classic one-word descriptor for the appearance of the cornea in ACG?

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Why is the cornea cloudy? It is edematous

What causes the edema?
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What is the classic one-word descriptor for the appearance of the cornea in ACG? 'Steamy'



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Why don't CACG pts get corneal edema?

Acute angle closure
Sub-acute angle closure
Chronic angle closure
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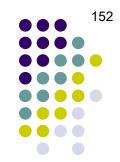
Why don't CACG pts get corneal edema?
Because their IOP doesn't get high enough

Q

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Why would sub-acute ACG be confused with migraines?

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Why would sub-acute ACG be confused with migraines? Think about it—these pts c/o intermittent terrible headaches that improve with sleep. Sounds like migraines to me...



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In what sense(s) does CACG present like POAG?



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In what sense(s) does CACG present like POAG? In that, like POAG, CNAG:

- --is painless
- --is associated with modestly elevated IOP (at least initially)
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What does this mean, 'at least initially'?

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In what sense(s) does CACG present like In that, like POAG, CNAG:

What does this mean, 'at least initially'? If unchecked, CACG can progress, and IOP can climb very high

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 - PAS are present in CACG. Early in the dz process, enough of the angle is
 - IOP normal betwee open to keep the IOP from getting too high. However, PAS progression is a common occurrence, and if the angle zips up sufficiently the IOP can Cornea always cle rise precipitously.
 - Often misdiagnoseu as migrames. Sub-acute
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In what sense(s) does CACG present like In that, like POAG, CNAG:

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What does PAS stand for in this context?

- Often misdiagnoseu as migraines. Sub-acute
- Presents like POAG: Chronic

In what sense(s) does CACG present like In that, like POAG, CNAG:

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What does PAS stand for in this context?

- Often misdiagnoseu as migraines. Sub-acute
- **Presents like POAG: Chronic**

In what sense(s) does CACG present like In that, like POAG, CNAG:

What does this mean, 'at least If unchecked CACG can progress, can climb very high

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Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



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The haloes are said to have a particular appearance—what is it?

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The haloes are said to have a particular appearance—what is it? They are 'rainbow-colored'



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 - What causes the haloes and blurry vision?

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 - What causes the haloes and blurry vision?
 - The corneal edema associated with these conditions
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Acute angle closure
Sub-acute angle closure
Chronic angle closure
Plateau iris



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Edema of which layer of the cornea is responsible for the visual symptoms?

Acute angle closure Sub-acute angle closure Chronic angle closure Plateau iris



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Edema of which layer of the cornea is responsible for the visual symptoms? The corneal epithelium



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Q

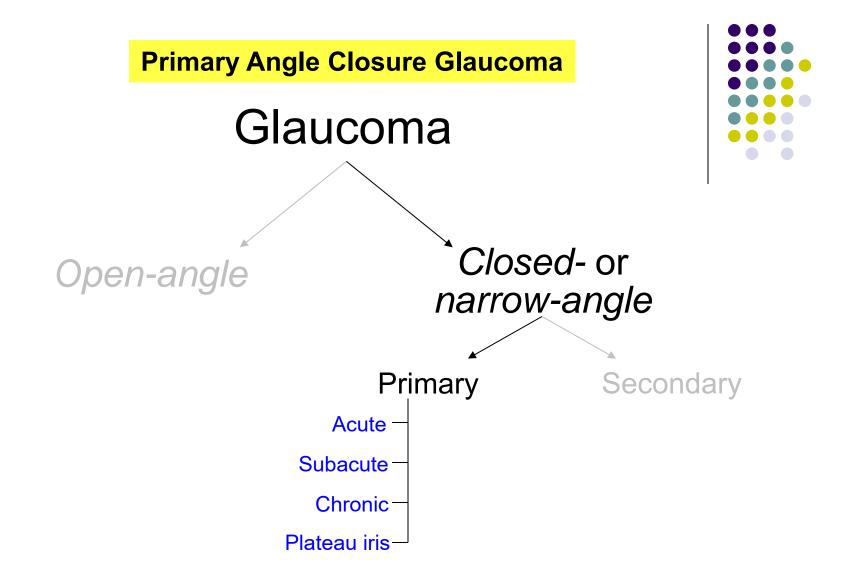
For each statement, identify which form(s) of primary angle-closure glaucoma is/are associated



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- Must be followed with serial gonio exams: All
 - May be accompanied by nausea, vomiting:



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- Must be followed with serial gonio exams: All
 - May be accompanied by nausea, vomiting: Acute



Primary Angle Closure Glaucoma Glaucoma



Open-angle

Closed- or

In **acute** ACG, the entire angle becomes occluded over a short period of time, producing a precipitous rise in IOP. The extremely high IOP causes severe eye pain and HA, N/V, and blurry vision. The event will not resolve without intervention.

Acute -

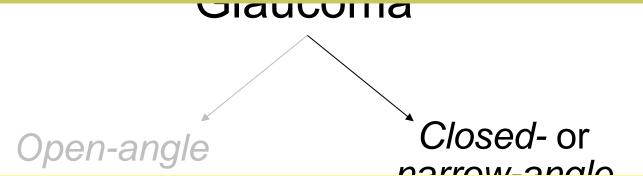
Subacute -

Chronic -

Plateau iris

In **acute** ACG, the entire angle becomes occluded over a short period of time, producing a precipitous rise in IOP. The extremely high IOP causes severe eye pain and HA, N/V, and blurry vision. The event will not resolve without intervention.





In **subacute** ACG, some *portion* of the angle occludes *episodically*, resulting in episodes of moderate (not extreme) IOP elevation. This IOP causes moderate eye pain and HA, and blurry vision. The episodes resolve spontaneously, often after sleep. IOP is normal between episodes, which can make diagnosis challenging.

Subacute —
Chronic —
Plateau iris—

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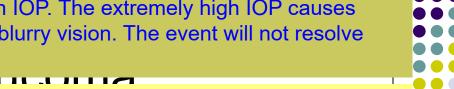
narrow-angle

In **chronic** ACG, some portion of the angle is *always* occluded via PAS, resulting in consistently modest IOP elevation. This IOP is not high enough to cause eye pain, HA or blurry vision. The consistently elevated IOP produces typical glaucomatous VF loss and ONH changes.

Chronic-

Plateau iris—

In acute ACG, the entire angle becomes occluded over a short period of time, producing a precipitous rise in IOP. The extremely high IOP causes severe eye pain and HA, N/V, and blurry vision. The event will not resolve without intervention.



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UNCII- alluic

In **chronic** ACG, some portion of the angle is *always* occluded via PAS, resulting in consistently modest IOP elevation. This IOP is not high enough to cause eye pain, HA or blurry vision. The consistently elevated IOP produces typical glaucomatous VF loss and ONH changes.

In plateau iris syndrome, anteriorly-positioned ciliary processes displace the peripheral iris into the angle, predisposing the eye to either chronic or acute ACG without the need for pupillary block (although it is often present). The diagnosis can only be made via gonio (or imaging).

Plateau iris─