Shallow/flat AC after CE (early post-op period)

AC = Anterior chamber
CE = Cataract extraction (surgery)
Shallow/flat AC after CE (early post-op period)

A key question
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

?  ?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

Normal or high
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE
(early post-op period)

Low

IOP?

Normal or high

? ?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

- Wound leak
- Choroidal detachment

Normal or high
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

Wound leak

Choroidal detachment

Normal or high

How is a wound leak diagnosed?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

Wound leak

Choroidal detachment

Normal or high

How is a wound leak diagnosed?
Via Seidel testing at the slit-lamp
How is a wound leak managed medically?

Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE
(early post-op period)

IOP?

Low

Wound leak

Choroidal detachment

Normal or high
How is a wound leak managed medically? It’s as simple as ABC(D):
--A
--B
--C
--D
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

- Low
  - Wound leak
  - Choroidal detachment

- Normal or high

*How is a wound leak managed medically? It’s as simple as ABC(D):*
  - Aqueous suppressants
  - Bandage contact lens (BCL)
  - Cycloplegia
  - Discontinue (or at least Diminish) topical steroids
How is a wound leak managed medically? It’s as simple as ABC(D):
--Aqueous suppressants
--Bandage contact lens (BCL)
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What is the purpose of the aqueous suppressants?
How is a wound leak managed medically? It’s as simple as ABC(D):
--Aqueous suppressants
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--Cycloplegia
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What is the purpose of the aqueous suppressants?
To promote closure of the leak by decreasing the flow of aqueous across it
How is a wound leak managed medically?

It's as simple as ABC(D):

- Aqueous suppressants
- Bandage contact lens (BCL)
- Cycloplegia
- Discontinue (or at least diminish) topical steroids

Normal or high IOP?

Low

Wound leak

Choroidal detachment

Which 3 drug classes are aqueous suppressants?

- -agonists (brimonidine probably best)
- -blockers
- CAIs

Shallow/flat AC after CE (early post-op period)

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How is a wound leak managed medically?

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- Discontinue (or at least diminish) topical steroids

Normal or high

Which 3 drug classes are aqueous suppressants?

- $\alpha$ agonists (brimonidine probably best)
- $\beta$ blockers
- Carbonic anhydrase inhibitors (CAIs)

What is the purpose of the aqueous suppressants?
To promote closure of the leak by decreasing the flow of aqueous across it
How is a wound leak managed medically? It’s as simple as ABC(D):

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Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

Low

Normal or high

IOP?

Wound leak

Choroidal detachment

What is the purpose of cycloplegia?
How is a wound leak managed medically? It’s as simple as ABC(D):
- Aqueous suppressants
- Bandage contact lens (BCL)
- Cycloplegia
- Discontinue (or at least diminish) topical steroids

What is the purpose of cycloplegia? To deepen the AC by rotating the ciliary body back.
How is a wound leak managed medically?

- **Aqueous suppressants**
- **Bandage contact lens (BCL)**
- **Cycloplegia**
- **Discontinue (or at least Diminish) topical steroids**

Why stop steroids? Won’t that increase inflammation?

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**Shallow Anterior Chamber After Cataract Surgery**

**Shallow/flat AC after CE (early post-op period)**

- **Low**
  - **Wound leak**
  - **Choroidal detachment**
- **Normal or high**
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE
(early post-op period)

IOP?

Low

Wound leak

Choroidal detachment

Normal or high

How is a wound leak managed?
-- Aqueous suppressants
-- Bandage contact lens (BCL)
-- Cycloplegia
-- Discontinue (or at least Diminish) topical steroids

Why stop steroids? Won’t that increase inflammation?
Yes, but it will also promote leak closure by removing any steroid-induced inhibition of wound healing
Shallow Anterior Chamber After Cataract Surgery

Under what circumstances should a wound leak be managed surgically?

1) Shallow/flat AC after CE (early post-op period)

- Low IOP
  - Wound leak
  - Choroidal detachment

- Normal or high IOP
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE
(early post-op period)

IOP?

Low
- Wound leak
- Choroidal detachment

Normal or high

Under what circumstances should a wound leak be managed surgically?
1) No improvement for 48 hours
2) Obvious wound gape
3) IOL-cornea touch
4) Iris prolapse
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

- **IOP?**
  - **Low**
    - Wound leak
    - Choroidal detachment
  - **Normal or high**

Under what circumstances should a wound leak be managed surgically?
-- No improvement for 48 hours
-- Obvious wound gape
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-- Iris prolapse

What stop-gap measure could you try for this?
Shallow Anterior Chamber After Cataract Surgery

Under what circumstances should a wound leak be managed surgically?
--No improvement for 48 hours
--Obvious wound gape
--IOL-cornea touch
--Iris prolapse

What stop-gap measure could you try for this?
Injection of viscoelastic to re-form the AC and push the IOL back

Shallow/flat AC after CE (early post-op period)

IOP?

Low

Wound leak

Normal or high

Choroidal detachment
What does the term ‘choroidal detachment’ mean?
What is detached from what?

Normally, the outer aspect of the choroid is closely apposed to the inner wall of the sclera. However, the choroid and sclera are actually attached to one another only at the vortex veins and around the ONH; everywhere else there is a potential space between them. If/when fluid accumulates in this space, the choroid detaches from the sclera.

Is choroidal detachment a common cause of low IOP + shallow/flat AC after CE?

This is a tricky question. Certainly, choroidal detachments are not an uncommon finding when a post-CE pt presents with a shallow AC and low IOP. However, it is likely that, in the majority of such cases, the choroidal detachment is a result of the low IOP, not a cause of it.

As for shallowing of the AC, detachments are certainly capable of contributing to this finding.
What does the term ‘choroidal detachment’ mean? What is detached from what?

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Shallow Anterior Chamber After Cataract Surgery

Shallow (early)

- Low
- Wound leak
- Choroidal detachment
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Low

Shallow Anterior Chamber After Cataract Surgery

Wound leak
Choroidal detachment
Shallow Anterior Chamber After Cataract Surgery

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Shallow Anterior Chamber (early post-op period)

Low

Wound leak

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Normally, the outer aspect of the choroid is closely apposed to the inner wall of the sclera. However, the choroid and sclera are actually attached to one another only at the vortex veins and around the ONH; everywhere else there is a potential space between them. If/when choroid detaches, What is the name of this potential space? The suprachoroidal space

Shallow Anterior Chamber After Cataract Surgery

Low

Shallow (early post-op period)

What is detached from what?

Wound leak

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There are two broad categories of fluid that are associated with choroidal detachment—what are they?

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Shallow Anterior Chamber After Cataract Surgery

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--Serum (via transudation)
--Blood (via hemorrhage)
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When a choroidal detachment is present in association with a shallow chamber and low IOP, is it typically serous, or hemorrhagic?
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--Serum (via transudation)
--Blood (via hemorrhage)

When a choroidal detachment is present in association with a shallow chamber and low IOP, is it typically serous, or hemorrhagic?
In this scenario, the detachment is virtually always serous.
What does the term ‘choroidal detachment’ mean?
What is detached from what?

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Shallow Anterior Chamber After Cataract Surgery

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This is a tricky question. Certainly, choroidal detachments are not an uncommon finding when a post-CE pt presents with a shallow AC and low IOP.

But to be clear: The BCSC Cataract book includes choroidal detachment as a possible cause of the ‘low IOP + shallow AC after CE’ state!

As for shallowing of the AC, detachments are certainly capable of contributing to this finding.
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

- Wound leak
- Choroidal detachment

Normal or high

How should a flat chamber owing to a choroidal detachment be managed?

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How should a flat chamber owing to a choroidal detachment be managed?
--Topical (+/- systemic) corticosteroids should be started (or increased)
--Mydriatics and cycloplegics should be employed in an attempt to rotate the lens-iris diaphragm posteriorly
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

- **IOP?**
  - **Low**
    - Wound leak
  - **Choroidal detachment**
  - **Normal or high**

How should a flat chamber owing to a choroidal detachment be managed?
--Topical (+/- systemic) corticosteroids should be started (or increased)
--Mydriatics and cycloplegics should be employed in an attempt to rotate the lens-iris diaphragm posteriorly

Under what circumstances should the detachment be addressed surgically?
How should a flat chamber owing to a choroidal detachment be managed?
--Topical (+/- systemic) corticosteroids should be started (or increased)
--Mydriatics and cycloplegics should be employed in an attempt to rotate the lens-iris diaphragm posteriorly

Under what circumstances should the detachment be addressed surgically?
There are no hard-and-fast rules in this regard, but indications include detachments refractory to medical management for a week or so.
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

Low

Wound leak

Choroidal detachment

IOP?

Normal or high

? ? ?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

- Low
  - Wound leak
  - Choroidal detachment
- Normal or high
  - Pupillary block
  - Aqueous misdirection
  - Suprachoroidal hemorrhage

IOP?
What is the mechanism underlying pupillary block?

AC after CE (early post-op period)

What is IOP?

Normal or high

Pupillary block
Aqueous misdirection
Suprachoroidal hemorrhage
What is the mechanism underlying pupillary block?
Apposition between the pupil margin and the IOL prevents the normal flow of aqueous from the posterior chamber to the AC. This results in a pressure gradient across the iris, causing it to bow forward. In doing so, the peripheral iris interferes with the egress of aqueous through the TM. The net result is a normal-to-high IOP and shallowed AC.

Which pt population is particularly prone to pseudophakic pupillary block?
The pediatric population. As a general rule, the younger the pt, the more likely they are to develop pseudophakic pupillary block.

In adults, what class of IOL is most likely to produce pseudophakic pupillary block?
AC IOLs, especially if the surgeon fails to perform an iridotomy at the time of IOL implantation.

Shallow Anterior Chamber After Cataract Surgery

IOP?

Normal or high

- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage
**What is the mechanism underlying pupillary block?**

Apposition between the pupil margin and the IOL prevents the normal flow of aqueous from the posterior chamber to the anterior chamber (AC). This results in a pressure gradient across the iris, causing it to bow inward. This inward bowing interferes with the egress of aqueous through the trabecular meshwork (TM). The net result is a normal-to-high IOP and shallowed AC.

**In the acute post-op period, what process commonly leads to the IOL being apposed to the pupillary margin?**

- **Wound leak**, which can allow the vitreous body to push the IOL up against the pupil, resulting in pseudophakic pupillary block.

In the acute post-op period, what process commonly leads to the IOL being apposed to the pupillary margin?
What is the mechanism underlying pupillary block?
Apposition between the pupil margin and the IOL prevents the normal flow of aqueous from the posterior chamber to the AC. This results in a pressure gradient across the iris, causing it to bow. Any factor that interferes with aqueous outflow through the trabecular meshwork (TM) will further increase IOP.

In the acute post-op period, what process commonly leads to the IOL being apposed to the pupillary margin?
One common cause is a wound leak, which can allow the vitreous body to push the IOL up against the pupil, resulting in pseudophakic pupillary block. So, a post-op eye that initially has a shallow chamber + a low IOP ends up having a shallow chamber + a normal/high IOP.

Wound leak

Pupillary block
Aqueous misdirection
Suprachoroidal hemorrhage

Shallow Anterior Chamber After Cataract Surgery
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In the late post-op period, what process commonly leads to the IOL being apposed to the pupillary margin?

- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage
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Apposition between the pupil margin and the IOL prevents the normal flow of aqueous from the posterior chamber to the AC. This results in a pressure gradient across the iris, causing it to bow forward. In doing so, the peripheral iris interferes with the egress of aqueous through the TM. The net result is a normal-to-high IOP and shallowed AC.

In the late post-op period, what process commonly leads to the IOL being apposed to the pupillary margin?
Severe/long-lasting post-op inflammation can result in posterior synechiae formation.

Shallow Anterior Chamber After Cataract Surgery

- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage
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Shallow Anterior Chamber After Cataract Surgery
**Shallow Anterior Chamber After Cataract Surgery**

- **What is the mechanism underlying pupillary block?**
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  AC IOLs, especially if the surgeon fails to perform an iridectomy at the time of IOL implantation.

**Diagram:**

- Normal or high IOP?
  - Pupillary block
  - Aqueous misdirection
  - Suprachoroidal hemorrhage

**Shallow Anterior Chamber after CE (early post-op period)**
What is aqueous misdirection syndrome?

A rare condition in which anterior rotation of the ciliary body causes newly-produced aqueous to be directed posteriorly, toward and perhaps into the vitreous body.

What is the chief risk factor?

Intraocular surgery in an eye with tight angles

By what other names is it known?

Malignant glaucoma; ciliary-block glaucoma

How is aqueous misdirection syndrome managed medically?

--Aqueous suppressants--Aggressive cycloplegia (atropine 1% and phenylephrine 10% qid)

What about surgical management? Is it usually necessary?

Yes; surgical or laser disruption of the vitreous face is often required for resolution.
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Shallow Anterior Chamber After Cataract Surgery

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Suprachoroidal hemorrhage

Normal or high

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What is the chief risk factor? Intraocular surgery in an eye with tight angles.
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Yes; surgical or laser disruption of the vitreous face is often required for resolution.
What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

- Low
  - Wound leak
  - Choroidal detachment

- Normal or high
  - Pupillary block
  - Aqueous misdirection
  - Suprachoroidal hemorrhage

What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
The pt will complain of the sudden onset of two words and two diff words.
What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
The pt will complain of the sudden onset of vision loss and excruciating pain.
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

Low
- Wound leak
- Choroidal detachment

Normal or high
- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage

What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
The pt will complain of the sudden onset of vision loss and excruciating pain

Is the vision loss usually mild, or severe?
What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
The pt will complain of the sudden onset of **vision loss** and **excruciating pain**

**Is the vision loss usually mild, or severe?**
**Severe**
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

- Wound leak
- Choroidal detachment

Normal or high

- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage

What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?
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What word classically characterizes the nature of the pain?
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low
- Wound leak
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Normal or high
- Pupillary block
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What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of? The pt will complain of the sudden onset of vision loss and excruciating pain.

What word classically characterizes the nature of the pain? ‘Throbbing’
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low

Serous Choroidal detachment

Normal or high

Is a serous choroidal detachment associated with pain?

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Is a **serous** choroidal detachment associated with pain?
No, it is almost always painless

Shallow/flat AC after CE (early post-op period)

- Low IOP?
- Normal or high IOP?

- Low
  - Wound leak
  - Serous Choroidal detachment

- Normal or high
  - Is a **serous** choroidal detachment associated with pain?
    - No, it is almost always painless

**Shallow Anterior Chamber After Cataract Surgery**

IOP?
Normal or high

Low

Wound leak

Serous Choroidal detachment

Shallow Anterior Chamber After Cataract Surgery

Is a **serous choroidal detachment** associated with pain?
No, it is almost always painless

Is it associated with severe vision loss?

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Shallow/flat AC after CE (early post-op period)
What is the classic presentation of a post-op suprachoroidal hemorrhage, ie, what will the pt complain of?

The pt will complain of the sudden onset of vision loss and excruciating pain.

Is a serous choroidal detachment associated with pain?
No, it is almost always painless.

Is it associated with severe vision loss?
It depends. If a serous choroidal detachment is very extensive, it can block light from reaching the fovea, in which case SVL would result.
What factors put an eye at risk for post-op suprachoroidal hemorrhage?

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---(as well as a number of others)
What factors put an eye at risk for post-op suprachoroidal hemorrhage?
--High myopia
--Nanophthalmia
--Sturge-Weber syndrome
--Hypertension
--Glaucoma
--(as well as a number of others)
What factors put an eye at risk for post-op suprachoroidal hemorrhage?
--High myopia

Do the others include being in anticoagulated state?

--(as well as a number of others)
What factors put an eye at risk for post-op suprachoroidal hemorrhage?
-- High myopia

Do the others include being in anticoagulated state?
Surprisingly, no. Long thought to be a risk factor for intra- and post-op hemorrhage, a large clinical trial found no evidence for this.

-- (as well as a number of others)
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE (early post-op period)

IOP?

Low
- Wound leak
- Choroidal detachment

Normal or high
- Pupillary block
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What is the classic precipitating event for a post-op suprachoroidal hemorrhage?
What is the classic precipitating event for a post-op suprachoroidal hemorrhage? A Valsalva maneuver on the part of the pt (eg, sneezing; coughing; straining at stool)
How is a suprachoroidal hemorrhage managed?

Shallow/flat AC after CE (early post-op period)

Low

- Wound leak
- Choroidal detachment

Normal or high

- Pupillary block
- Aqueous misdirection
- Suprachoroidal hemorrhage

IOP?
How is a suprachoroidal hemorrhage managed?
If not too severe (ie, the AC is not flat; the IOP not too high; the pt not in too much pain; no kissing choroidal present), medical management with aggressive cycloplegia and aqueous suppressants can be attempted. Otherwise, sclerotomy surgery is indicated.
With regard to an **intraoperative** shallowing of the AC, one of these entities is closely related to the most dreaded intraoperative complication of all. What is that most dreaded of complications?
Shallow Anterior Chamber After Cataract Surgery

With regard to an *intraoperative* shallowing of the AC, one of these entities is closely related to the most dreaded intraoperative complication of all. What is that most dreaded of complications? The *expulsive choroidal hemorrhage*
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign?
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign? Darkening of the red reflex.
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign?

- Darkening of the red reflex

What is the classic ‘late’ sign?
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign? Darkening of the red reflex

What is the classic ‘late’ sign? Expulsion of the intraocular contents through the wound
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What is the classic ‘late’ sign? Expulsion of the intraocular contents through the wound

How should it be managed intraoperatively?
1)  
2)  
3)
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign? **Darkening of the red reflex**

What is the classic ‘late’ sign? **Expulsion of the intraocular contents through the wound**

How should it be managed intraoperatively?

1) **Put your finger on the wound to seal it**
2) **Suture the wound closed**
3) **Consider posterior sclerotomies to drain blood**
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Post-op, how should IOP be managed?
Expulsive choroidal hemorrhage is the most feared intraoperative complication of CE surgery. What is the classic first sign? **Darkening of the red reflex**

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How should it be managed intraoperatively?
1) Put your finger on the wound to seal it
2) Suture the wound closed
3) Consider posterior sclerotomies to drain blood

Post-op, how should IOP be managed? **Leave it elevated (will tamponade the bleed)**
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE

Late (early post-op period)

What is the differential for a shallow AC in the late post-op period?

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Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE

*Late* (early post-op period)

What is the differential for a shallow AC in the *late* post-op period?

--RD
--Bleb formation
--Chronic uveitis
--Cyclodialysis
--Delayed choroidal hemorrhage
Shallow Anterior Chamber After Cataract Surgery

Shallow/flat AC after CE

_What is the differential for a shallow AC in the **late** post-op period?_

--RD

--Bleb formation

--Chronic uveitis

--Cyclodialysis

--Delayed choroidal hemorrhage

_What sort of incision makes inadvertent bleb formation more likely?_
Shallow Anterior Chamber After Cataract Surgery

What is the differential for a shallow AC in the late post-op period?

- RD
- Bleb formation
- Chronic uveitis
- Cyclodialysis
- Delayed choroidal hemorrhage

What sort of incision makes inadvertent bleb formation more likely?

- A limbal incision
Shallow Anterior Chamber After Cataract Surgery

**Shallow/flat AC after CE**

What is the differential for a shallow AC in the **late** post-op period?
--RD
--Bleb formation
--Chronic uveitis
--Cyclodialysis
--Delayed choroidal hemorrhage

**What sort of incision makes cyclodialysis more likely?**

A scleral-tunnel incision
What is the differential for a shallow AC in the late post-op period?
--RD
--Bleb formation
--Chronic uveitis
--Cyclodialysis
--Delayed choroidal hemorrhage

What sort of incision makes cyclodialysis more likely?
A scleral-tunnel incision