RVO

Q

Is retinal vein occlusion *(RVO) an embolic condition?*

RVO

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RVO

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OK then, what is the mechanism underlying RVO?

RVO

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Thrombosis of the venous structure

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Thrombosis o

In CRVO, where does thrombosis typically occur?

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Thrombosis o

In CRVO, where does thrombosis typically occur?
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In BRVO, at what type of location does thrombosis typically occur?

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At an A-V crossing point

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What should you consider if a BRVO occurs at a **non***-crossing point?*

Q/A

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You should consider whether the pt has some form of condition

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eg, a retinochoroiditis or a vasculitis

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The data are split on this, suggesting it is a risk factor for central vs branch RVO, but not for central vs branch RVO

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*Regarding RVO risk factors—may I introduce '**the H**'s.'*
You know three already; what are the others?
--**H**ypertension
--**H**igh IOP (ie, OAG)
--**H**yperglycemia (in CRVO fer shur; not clear re BRVO)
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What is it?

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All that being said, the Retina *book emphasizes two risk factors for RVO.*
Which two? (Note: One of them is not on the list above.)

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HTN and advancing age

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HTN and **advancing age**

Which **one** *factor is the* strongest *for CRVO?*

RVO

Q/A

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Age. Over % of CRVO pts are older than #

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Which two? (Note: One of them is not on the list above.)
HTN and **advancing age**

Which **one** *factor is the* strongest *for CRVO?*
Age. Over 90% of CRVO pts are older than 50!

RVO

Q

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No! (How would an embolism get to the venous side of the retinal vascular bed?)

OK then, what is the mechanism underlying RVO?
Thrombosis of the venous structure

Do RVO pts tend to be vasculopaths?
Yes. HTN is mos def a risk factor for all forms of RVO

What role does vasculopathy play in the genesis of a RVO?

RVO

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What two DFE findings are the hallmark of an RVO event?
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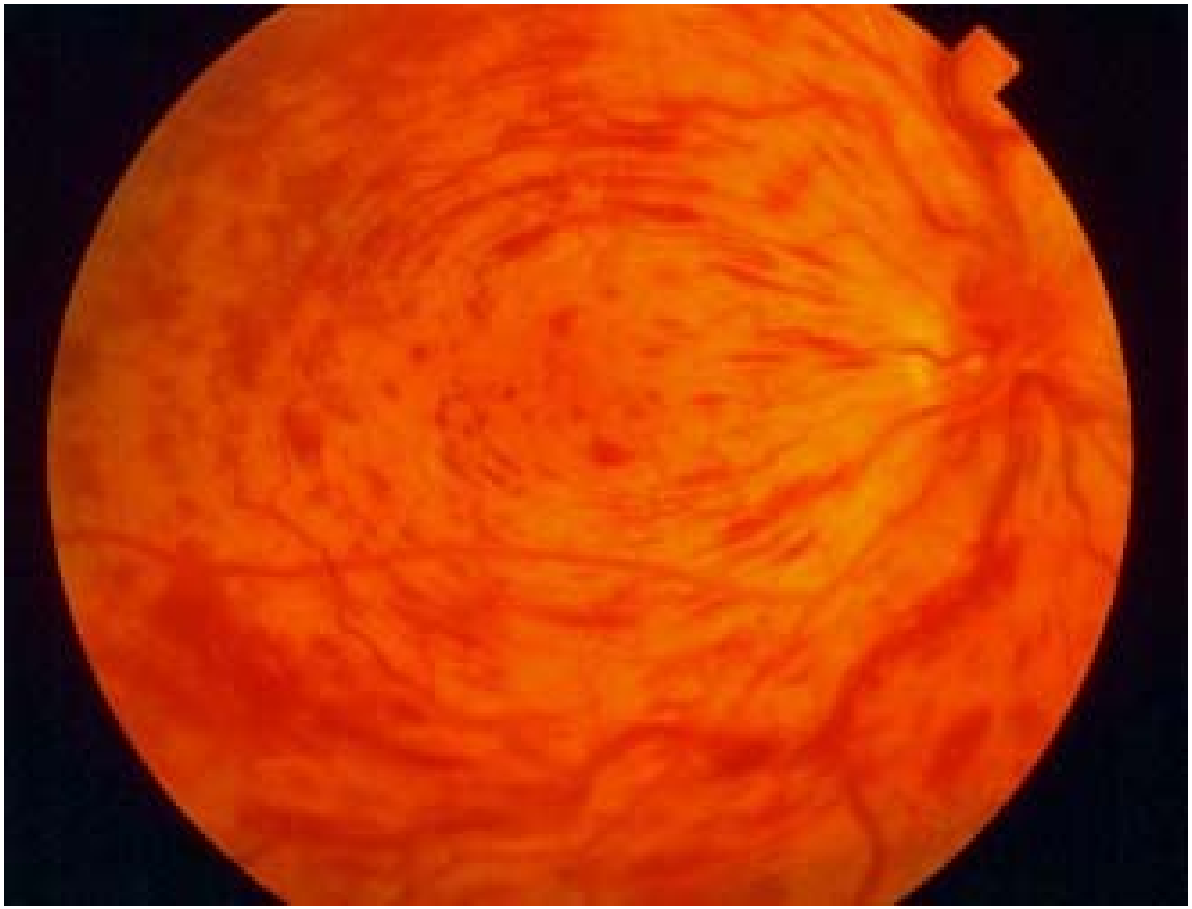
--Intraretinal hemorrhages
--Tortuosity of the involved retinal vasculature

RVO



CRVO: Tortuous veins; retinal hemorrhages

RVO

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In BRVO, the retinal findings are limited to a single quadrant. Which quadrant is most likely to be involved?

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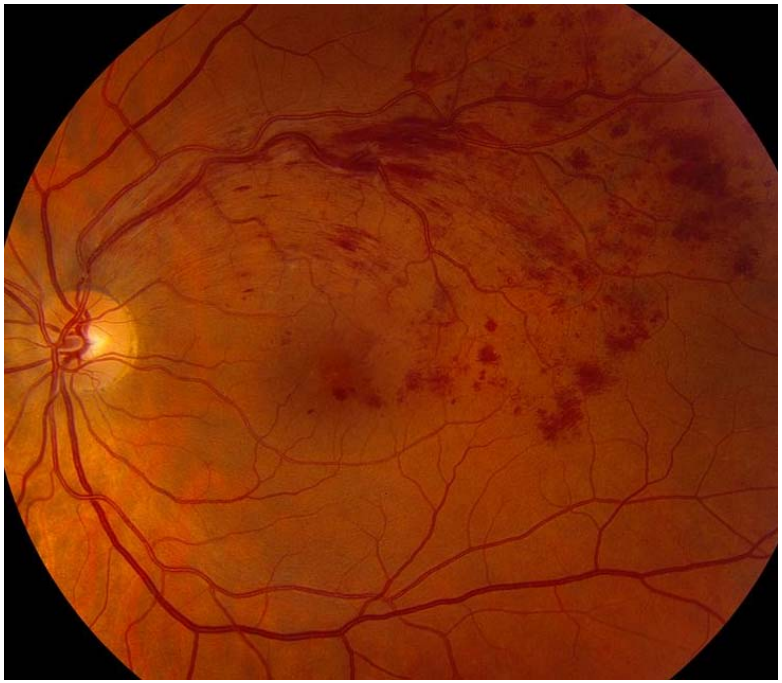

BRVO in the S-T quad

RVO

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Next we will look more closely at BRVO

What role doe
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Q

BRVO

In the present context, what does BVOS *stand for?*

BRVO

A

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Branch Vein Occlusion Study, a major clinical trial regarding BRVO mgmt

BRVO

Q

In the present context, what does BVOS *stand for?*
Branch Vein Occlusion Study, a major clinical trial regarding BRVO mgmt

What three questions did the BVOS seek to answer?
1)

2)
3)

BRVO

A

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3) If macular edema is present, will macular laser improve it?

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Why didn't the BVOS address the use of these agents?

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Why didn't the BVOS address the use of these agents?
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Note: Because the Retina *book runs through the BVOS findings/recs re laser tx for macular edema after BRVO, we will do the same*

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Note: Because the Retina *book runs through the BVOS findings/recs re laser tx for macular edema after BRVO, we will do the same. However, bear in mind that, as just stated,* **pharmacologic** tx is currently considered first-line!

Q

BRVO

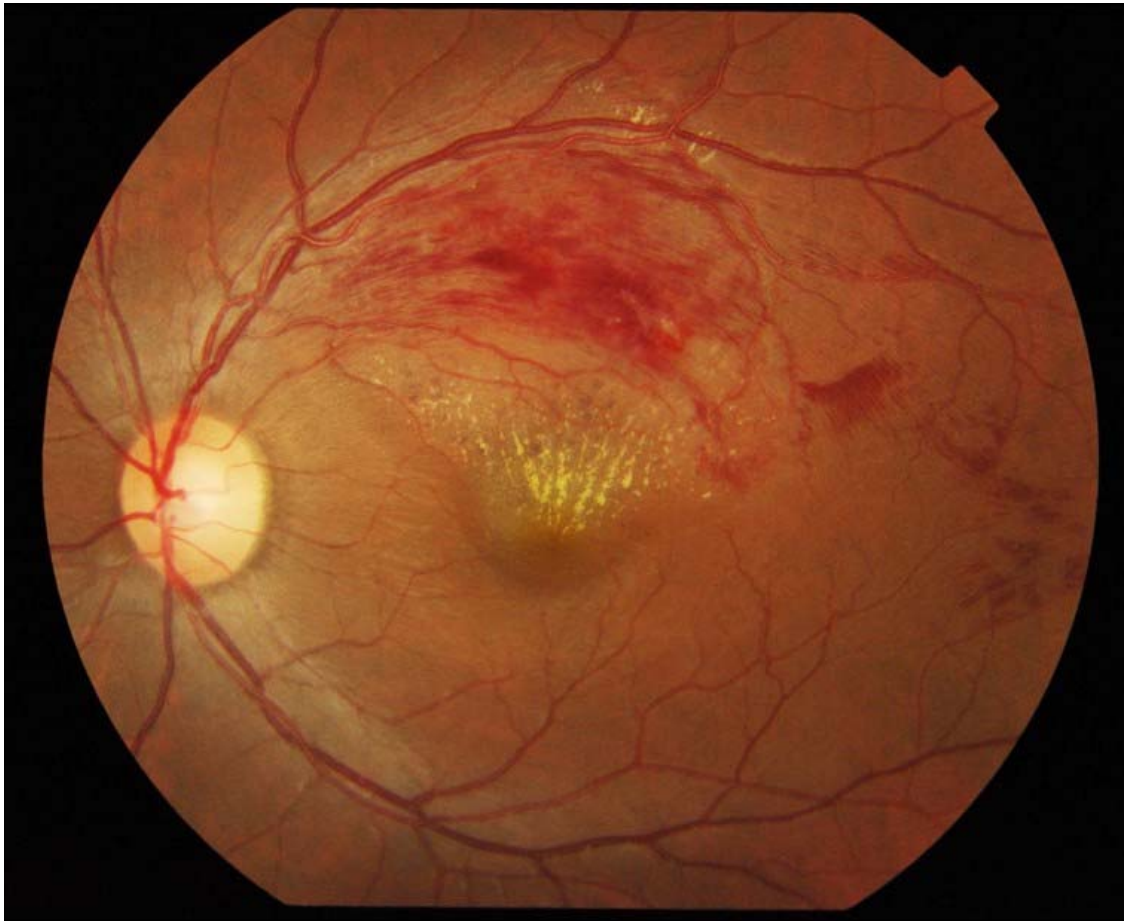
- BVOS recs re *macular edema* after BRVO:
  - Wait [length of time] for spontaneous resolution

A

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution

RVO



Macular edema after BRVO

BRVO

- BVOS recs re *macular edema* after BRVO:
  - **Wait 3 months for spontaneous resolution**

Apropos of what we just noted: We **don't** *wait 3 months hoping for spontaneous resolution any more. Rather, treat (pharmacologically) ME after BRVO* **immediately***!*

Q

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is Snellen to Snellen, **and**…

A

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is 20/40 to 20/200, **and**…

Q

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is 20/40 to 20/200, **and**…
    - FA reveals no

two words

A

BRVO

- BVOS recs re *macular edema* after BRVO:
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Q

BRVO

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  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is 20/40 to 20/200, **and**…
    - FA reveals no foveal ischemia
  - Per the BVOS, patients treated with GML are:
    - twice as likely to ?Gain VA? Not lose VA?, and

A

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is 20/40 to 20/200, **and**…
    - FA reveals no foveal ischemia
  - Per the BVOS, patients treated with GML are:
    - twice as likely to gain 2 lines of VA, and

Q

BRVO

- BVOS recs re *macular edema* after BRVO:
  - Wait 3 months for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is 20/40 to 20/200, **and**…
    - FA reveals no foveal ischemia
  - Per the BVOS, patients treated with GML are:
    - twice as likely to gain 2 lines of VA, and
    - twice as likely to have a final VA ≥ Snellen

A

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- Re *eyes with neovascularization* after BRVO…
  - Scatter photocoagulation reduces the risk of vitreous hemorrhage by %

A

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Q

BRVO

To what area/aspect of the retina should scatter laser be applied?

- BVO:
  - W
  - Pe
    -
    -
  - Pe:
    -
    -
- Re *eyes with neovascularization* after BRVO…
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A

BRVO

To what area/aspect of the retina should scatter laser be applied?
To areas of capillary nonperfusion

- BVO:
  - W
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    -
    -
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    -
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BRVO

BRVO: Scatter laser scars

Q

BRVO

- BVO O:
  - W
  - Pe
    -
    -
  - Pe :
    -
    -

To what area/aspect of the retina should scatter laser be applied?
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A

BRVO

- BVO O:
  - W
  - Pe
    -
    -
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    -
    -

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The presence of "extensive retinal ischemia"

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Q

BRVO

- BVO O:
  - W
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    -
    -
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How did the BVOS define 'extensive' in this regard?

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Q/A

BRVO

- BVO O:
  - W
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    -
    -
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It was defined as an area of nonperfusion # or more DDs in size

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Again per the BVOS: What proportion of eyes with extensive retinal ischemia went on the develop neo?

- Re *eyes with neovascularization* after BRVO…
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  - W
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Again per the BVOS: What proportion of eyes with extensive retinal ischemia went on the develop neo?
A little over a third

- Re *eyes with neovascularization* after BRVO…
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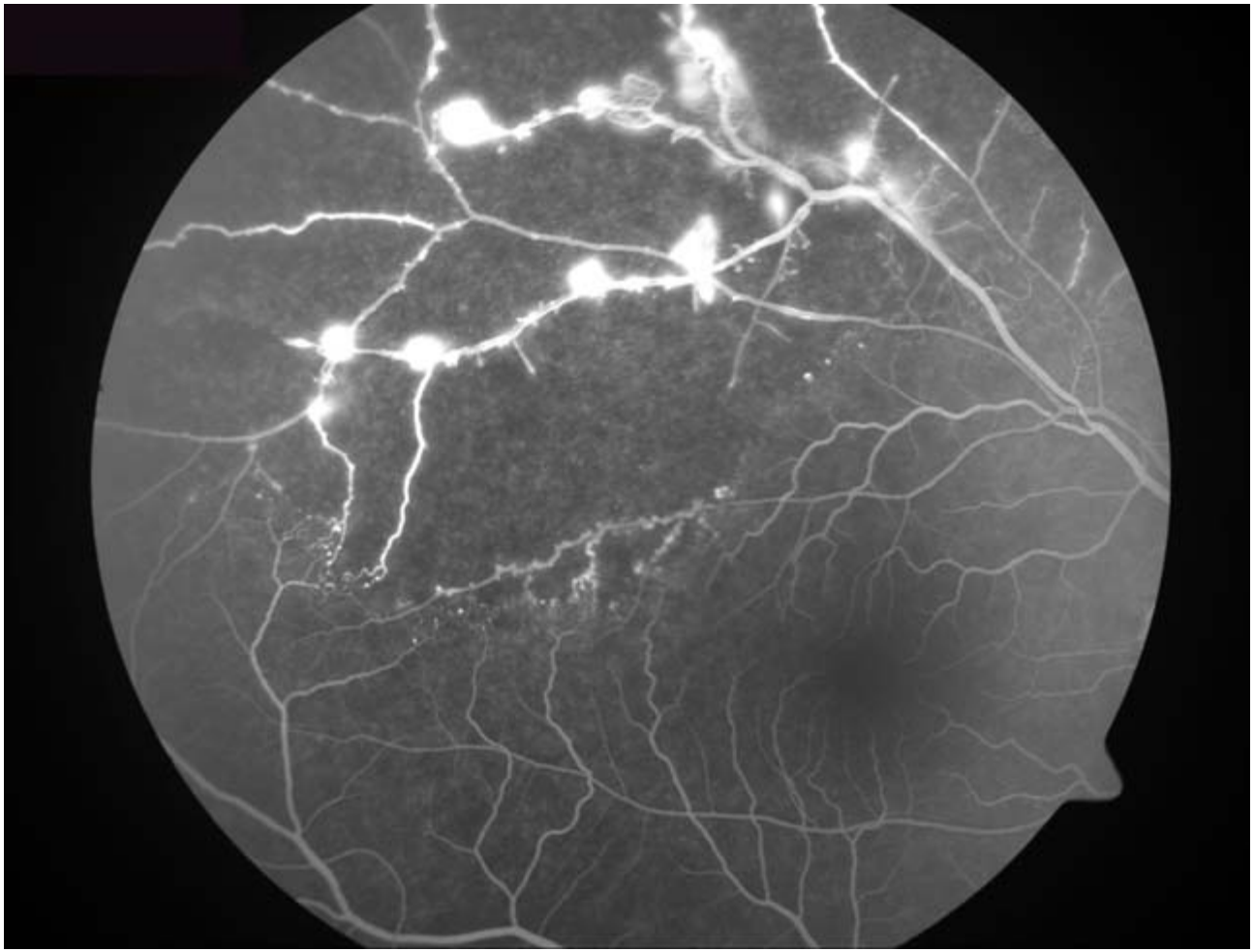
BRVO



BRVO: Neovascularization

Q

BRVO

- BVO O:
  - W
  - Pe
    -
    -
  - Pe :
    -
    -

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Finally, and yet again per the BVOS: What proportion of eyes that developed neo went on to have a vitreous hemorrhage?

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Q/A

BRVO

- BVO O:
  - W
  - Pe
    -
    -
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Finally, and yet again per the BVOS: What proportion of eyes that developed neo went on to have a vitreous hemorrhage?
Most—at least %, and perhaps as many as %

- Re *eyes with neovascularization* after BRVO…
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A

BRVO

- BVO O:
  - W
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A little over a third

Finally, and yet again per the BVOS: What proportion of eyes that developed neo went on to have a vitreous hemorrhage?
Most—at least 60% , and perhaps as many as 90%

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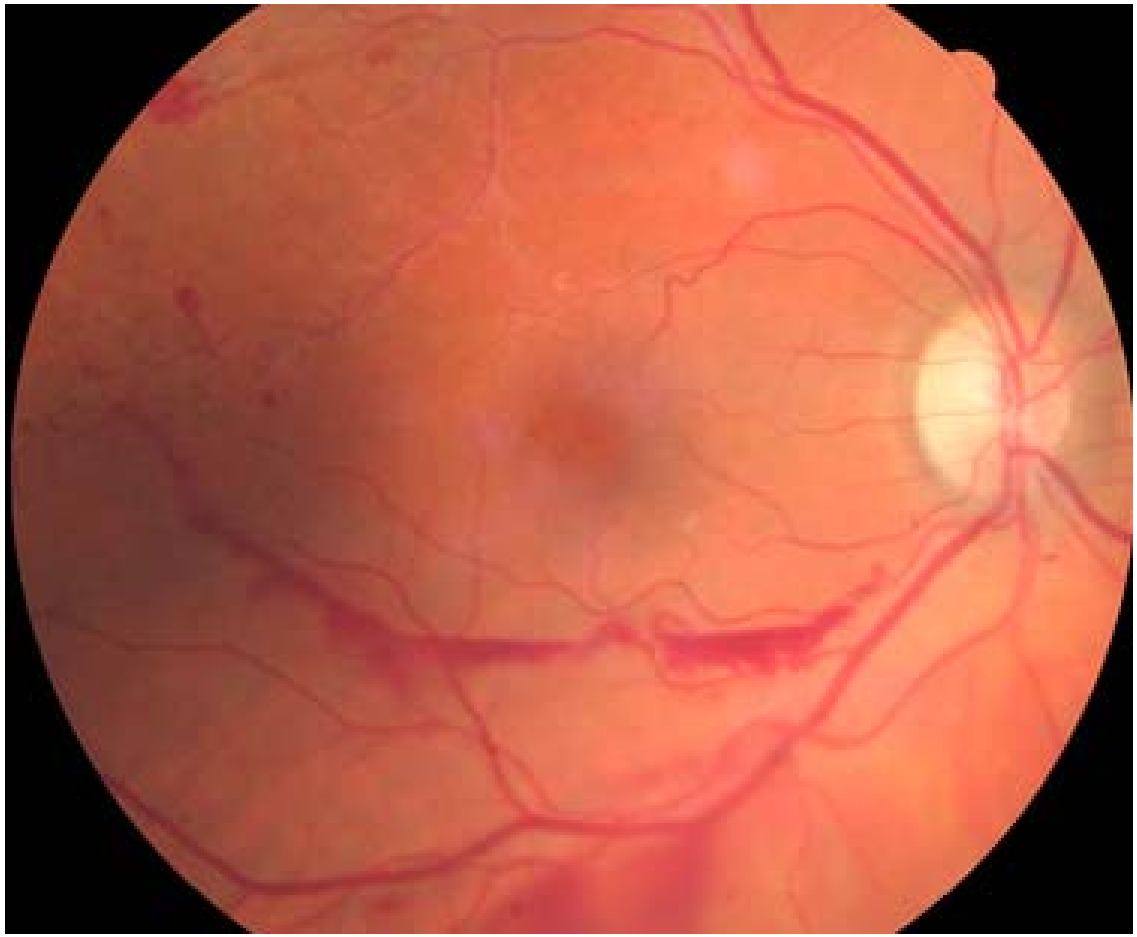
BRVO



BRVO: Neovascularization with vitreous hemorrhage

Q

BRVO

- BVO
  - W
  - Pe
    -
    -
  - Pe
    -
    -
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Finally, a
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Most—a

By what means did the BVOS determine that extensive nonperfusion was present?

A

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- BVO
  - W
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By what means did the BVOS determine that extensive nonperfusion was present?
By FA

BRVO

BRVO: Waaaaay more than 5DD nonperfusion

Q

BRVO

- BVO
  - W
  - Pe
    -
    -
  - Pe
    -
    -
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By FA

OK, so if a BRVO pt is found to have 5+ DD of nonperfusion on FA, should you go ahead and perform scatter?

A

BRVO

- BVO
  - W
  - Pe
    -
    -
  - Pe
    -
    -
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By FA

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No; what you should do is follow them closely, and be ready to scatter them if neo should occur

Q

BRVO

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  - W
  - Pe
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    -
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- Re eyes with neovascularization after BRVO…
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Speaking of neo…Is neovascularization of the iris (NVI) a common occurrence in BRVO?

Q/A

BRVO

- BVO
  - W
  - Pe
    -
    -
  - Pe
    -
    -
- Re eyes with neovascularization after BRVO…
  - Scatte risk of vitreous hemorrage by 50%

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Speaking of neo…Is neovascularization of the iris (NVI) a common occurrence in BRVO?
Not really—it only occurs in about % of cases

A

BRVO

- BVO
  - W
  - Pe
    -
    -
  - Pe
    -
    -
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No; what you should do is follow them closely, and be ready to scatter them **if neo should occur**

Speaking of neo…Is neovascularization of the iris (NVI) a common occurrence in BRVO?
Not really—it only occurs in about 2% of cases

A

BRVO

- BVO
  - W
  - Pe
    - It
    - went on
    - A little ov
  - Pe
    - neo wen
    - Most—a
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To areas of capillary nonperfusion

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How did the BVOS define 'extensive' in this regard?

Again per the BVOS: What proportion of eyes with extensive retinal ischemia

Finally, a

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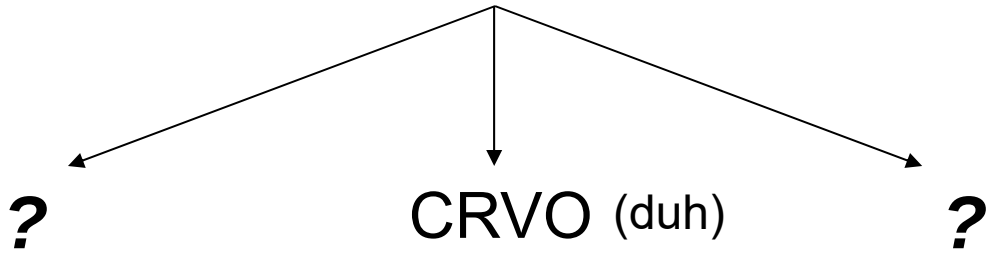
*Now we will turn our attention to **C**RVO*

Q

CRVO

DDx for a CRVO-like fundus



A

CRVO

DDx for a CRVO-like fundus

- Hyperviscosity syndrome
- CRVO
- OIS

Q

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What does OIS stand for in this context?

A

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What does OIS *stand for in this context?*
Ocular ischemic syndrome

Q

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What does OIS *stand for in this context?*
Ocular ischemic syndrome

In a nutshell, what is OIS?

A

CRVO

DDx for a CRVO-like fundus

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CRVO

OIS

What does OIS *stand for in this context?*
Ocular ischemic syndrome

In a nutshell, what is OIS?
A constellation of signs and symptoms owing to chronic ocular hypoperfusion

Q

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What does OIS stand for in this context?
Ocular ischemic syndrome

In a nutshell, what is OIS?
A constellation of **signs and symptoms** owing to chronic ocular hypoperfusion

What are the signs/symptoms of OIS?

Signs:	**Symptoms:**
--?	--
--?	--
--?	--

A

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What does OIS stand for in this context?
Ocular ischemic syndrome

In a nutshell, what is OIS?
A constellation of **signs and symptoms** owing to chronic ocular hypoperfusion

What are the signs/symptoms of OIS?

Signs:	**Symptoms:**
--Retinal hemorrhages	--
--NVI/NVA	--
--AC cell/flare	--

Q

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--Retinal hemorrhages
--NVI/NVA
--AC cell/flare

Symptoms:
--Decreased vision
--Pain
--Prolonged photostress recovery time

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What is 'photostress recovery time'*?*

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--Retinal hemorrhages
--NVI/NVA
--AC cell/flare

--Decreased vision
--Pain
--Prolonged photostress recovery time

What is 'photostress recovery time'?
It refers to the amount of time it takes for vision to recover after the retina has been subjected to a very bright light

Q

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In what way does the DFE appearance of OIS resemble that of CRVO?

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Q/A

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The retinal vasculature in OIS lacks the which characterizes that of CRVO

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Q

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OIS

What simple, noninvasive test can be performed that reliably differentiates between OIS and CRVO?

A

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

CRVO

OIS

What simple, noninvasive test can be performed that reliably differentiates between OIS and CRVO?
Ophthalmodynamometry

Q

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What does ophthalmodynamometry measure?

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Perfusion pressure of the retinal arterial tree

Q

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Q/A

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How does ophthalmodynamometry differentiate between OIS and CRVO?
Perfusion pressure will be low in one but normal in the other

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Perfusion pressure will be low in OIS but normal in CRVO

My ophthalmodynamometer is in the shop. Is there a way to check perfusion pressure without it?

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Perfusion pressure of the retinal arterial tree

How does ophthalmodynamometry differentiate between OIS and CRVO?
Perfusion pressure will be low in OIS but normal in CRVO

My ophthalmodynamometer is in the shop. Is there a way to check perfusion pressure without it?
Push gently on the globe while observing the central retinal artery. If it collapses with minimal applied pressure, perfusion pressure is low, and OIS rises to the top of the DDx

Q

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CRVO

OIS

?

?

?

The Retina *book mentions three causes of hyperviscosity syndrome—what are they?*

A

CRVO

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Hyperviscosity syndrome

- Waldenström macroglobulinemia
- Multiple myeloma
- Polycythemia vera

CRVO

OIS

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What key finding strongly suggests a CRVO-like presentation is in fact a manifestation of a hyperviscosity syndrome?

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CRVO

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If the CRVO is **bilateral**

Q

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What key finding strongly suggests a CRVO-like presentation is in fact a manifestation of a hyperviscosity syndrome?
If the CRVO is **bilateral**

If hyperviscosity syndrome is suspected, what tests should be ordered?
--?
--?
--?

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What key finding strongly suggests a CRVO-like presentation is in fact a manifestation of a hyperviscosity syndrome?
If the CRVO is **bilateral**

If hyperviscosity syndrome is suspected, what tests should be ordered?
--CBC
--Serum electrophoresis
--Measurement of whole-blood viscosity

Q

CRVO

DDx for a CRVO-like fundus

Hyperviscosity syndrome

- Waldenström macroglobulinemia
- Multiple myeloma
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CRVO

OIS

In addition to the H's, the Retina *book mentions two more risk factors specifically with regards to CRVO. What are they?*

--Hypertension
--High IOP (ie, OAG)
--Hyperglycemia
--Hyperlipidemia
--Hypercoagulability
--***?***
--***?***

(Unfortunately, neither starts with a 'H.')

A

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--Hypercoagulability
--**Oral contraceptive use**
--**Diuretics**

(Unfortunately, neither starts with a 'H.')

Q

CRVO

DDx for a CRVO-like fundus

What systemic medical conditions may contribute to or result in a hypercoagulable state?

Hyperviso
synd
Waldenströ
macroglobulinem
Multiple myelom
Polycythemia ve

tions two
o CRVO.

--Hyperlipidemia
--**Hypercoagulability**
--Oral contraceptive use
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A

CRVO

DDx for a CRVO-like fundus

What systemic medical conditions may contribute to or result in a hypercoagulable state?

Conditions that directly affect coagulation

Conditions that can incite vasculitis

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--?

--?

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What systemic medical conditions may contribute to or result in a hypercoagulable state?

Conditions that directly affect coagulation, including:

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--Protein S deficiency

--Protein C deficiency

Conditions that can incite vasculitis

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--*?*

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--SLE

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--Hyperlipidemia
--**Hypercoagulability**
--Oral contraceptive use
--Diuretics

So does every CRVO pt need a hypercoagulability workup?

Q/A

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--Hyperlipidemia
--**Hypercoagulability**
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So does every CRVO pt need a hypercoagulability workup?
No, only those who:
--are younger than , and/or
--have none of the common risk factors

A

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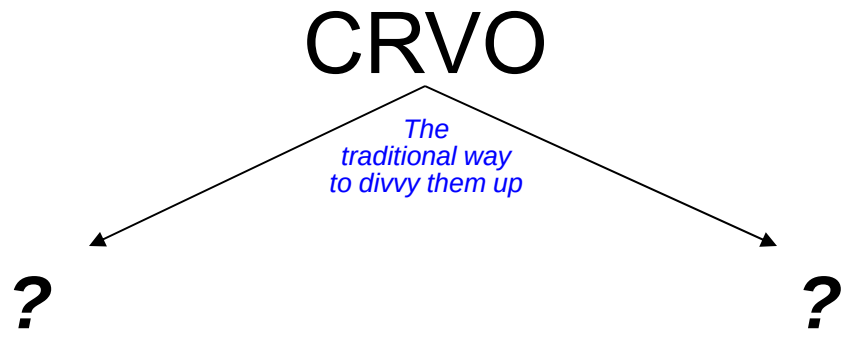
Conditions that can incite vasculitis, including:
--Sarcoid
--SLE

--Hyperlipidemia
--**Hypercoagulability**
--Oral contraceptive use
--Diuretics

So does every CRVO pt need a hypercoagulability workup?
No, only those who:
--are younger than 50 , and/or
--have none of the common risk factors

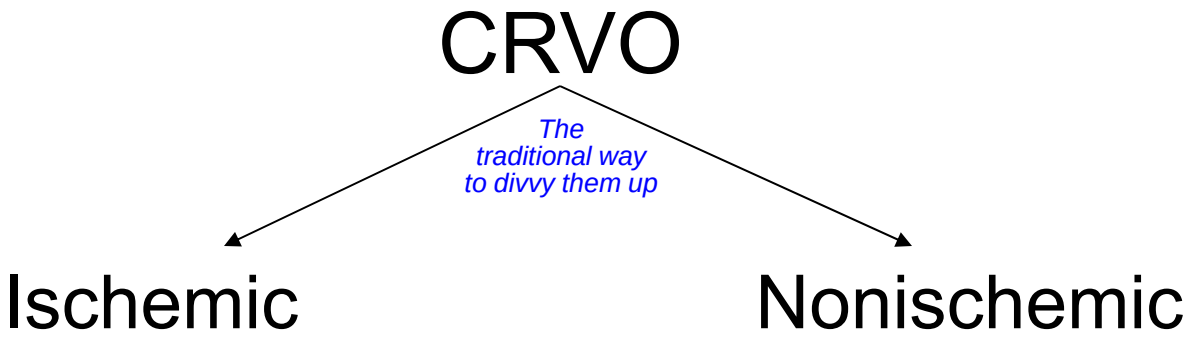
Q

CRVO



A

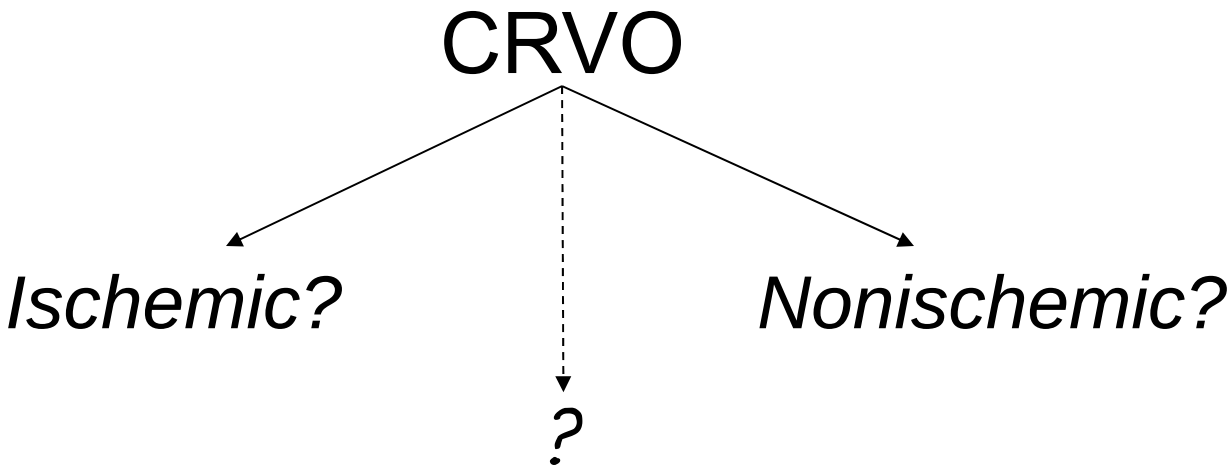
CRVO



(We'll define *ischemic* and *nonischemic* shortly)

Q

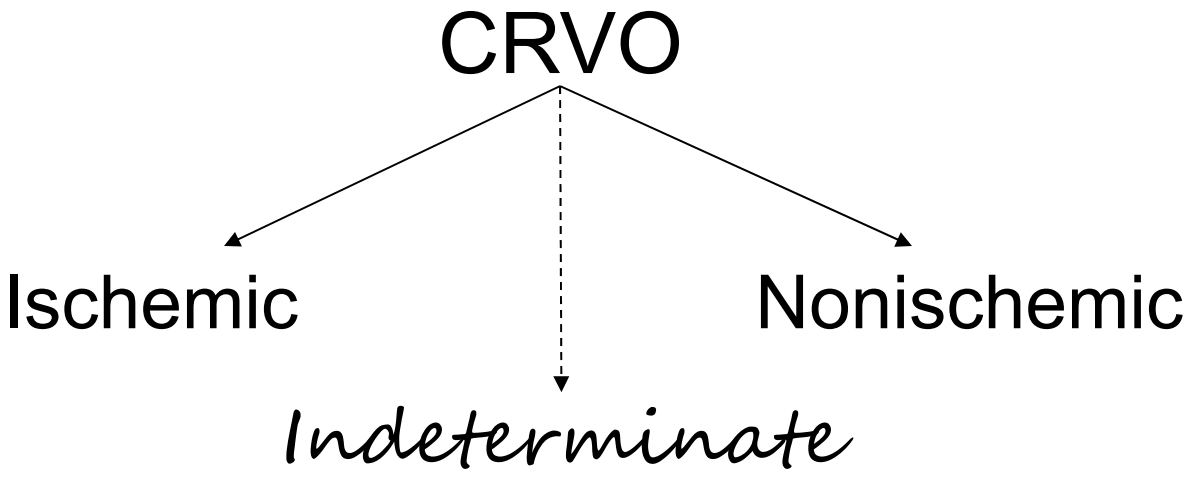
CRVO



What if, for whatever reason, a CRVO's ischemia-status cannot be determined?

A

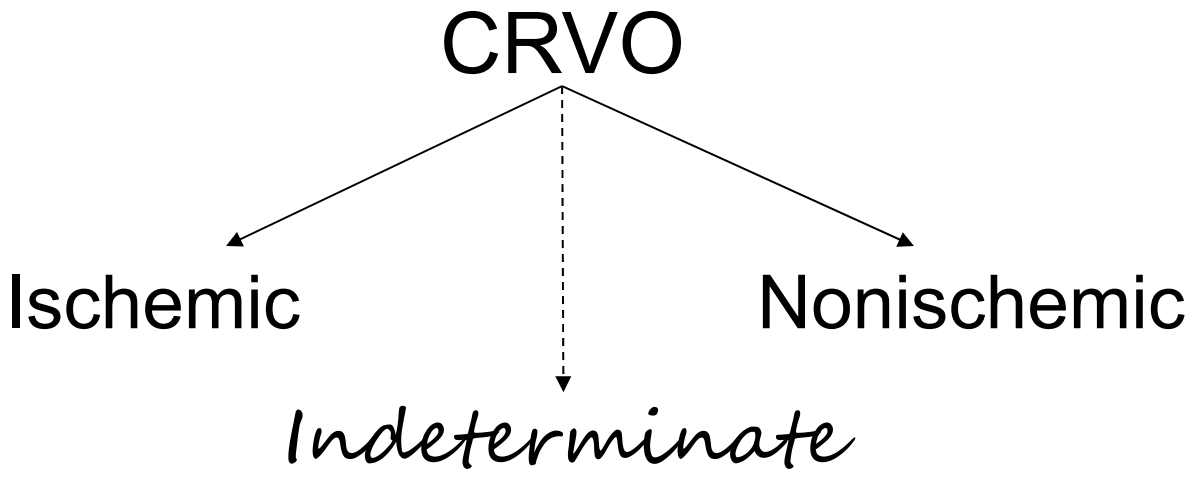
CRVO



What if, for whatever reason, a CRVO's ischemia-status cannot be determined?
Such a CRVO is classified as *indeterminate*

Q

CRVO



What if, for whatever reason, a CRVO's ischemia-status cannot be determined?
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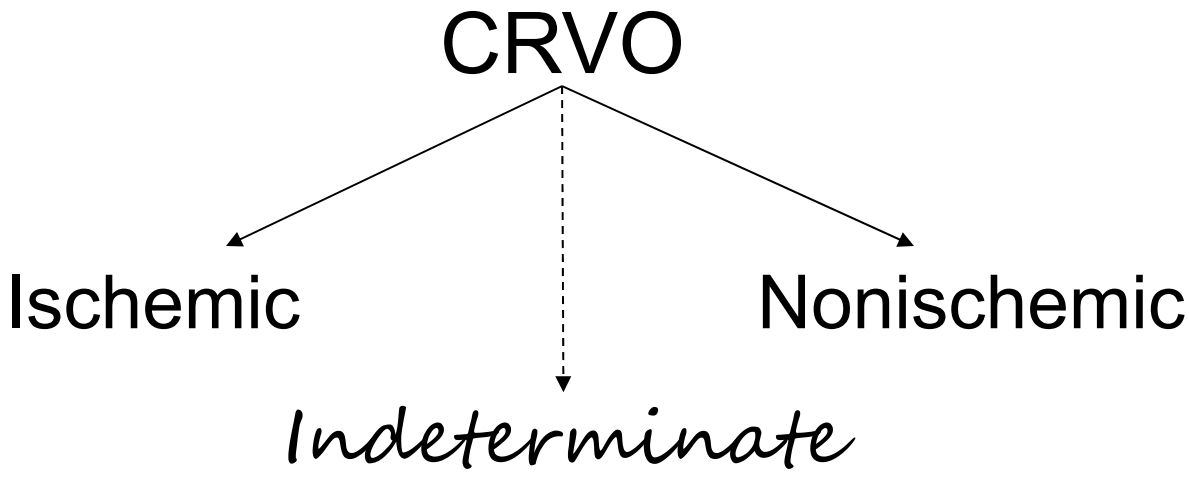
What is the natural history of indeterminate CRVOs?

Q/A

CRVO

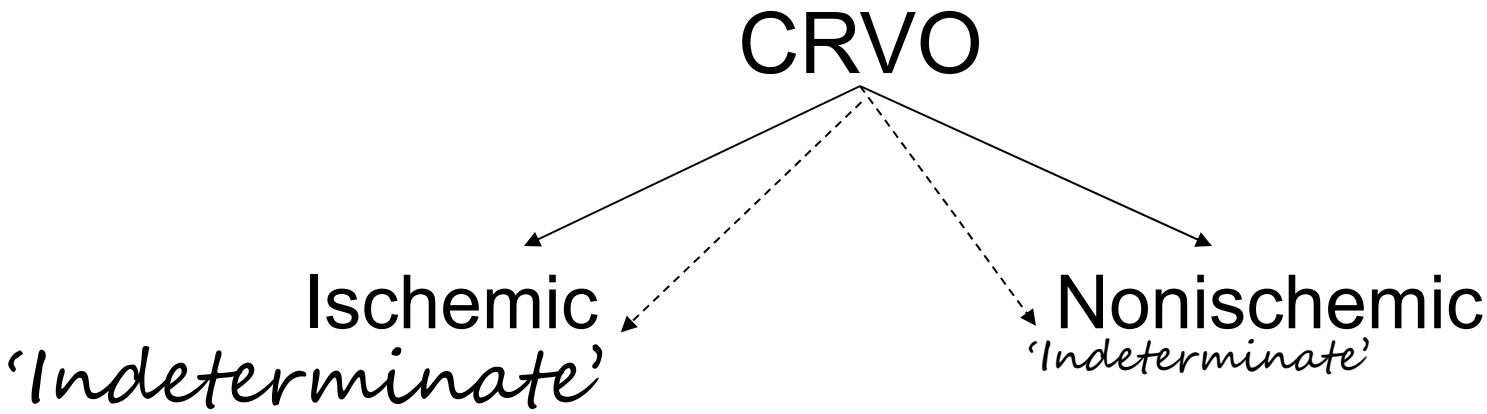


What if, for whatever reason, a CRVO's ischemia-status cannot be determined?
Such a CRVO is classified as *indeterminate*

What is the natural history of indeterminate CRVOs?
big % of them turn out to be you got a 50:50 shot…

A

CRVO

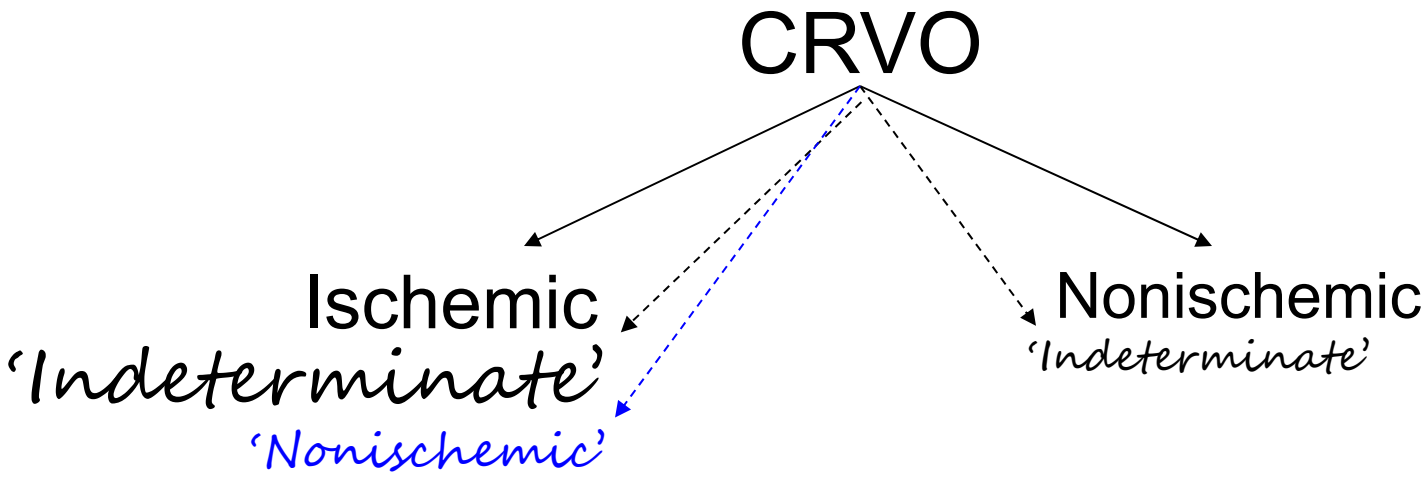


What if, for whatever reason, a CRVO's ischemia-status cannot be determined?
Such a CRVO is classified as *indeterminate*

What is the natural history of indeterminate CRVOs?
~80 of them turn out to be ischemic

Q

CRVO



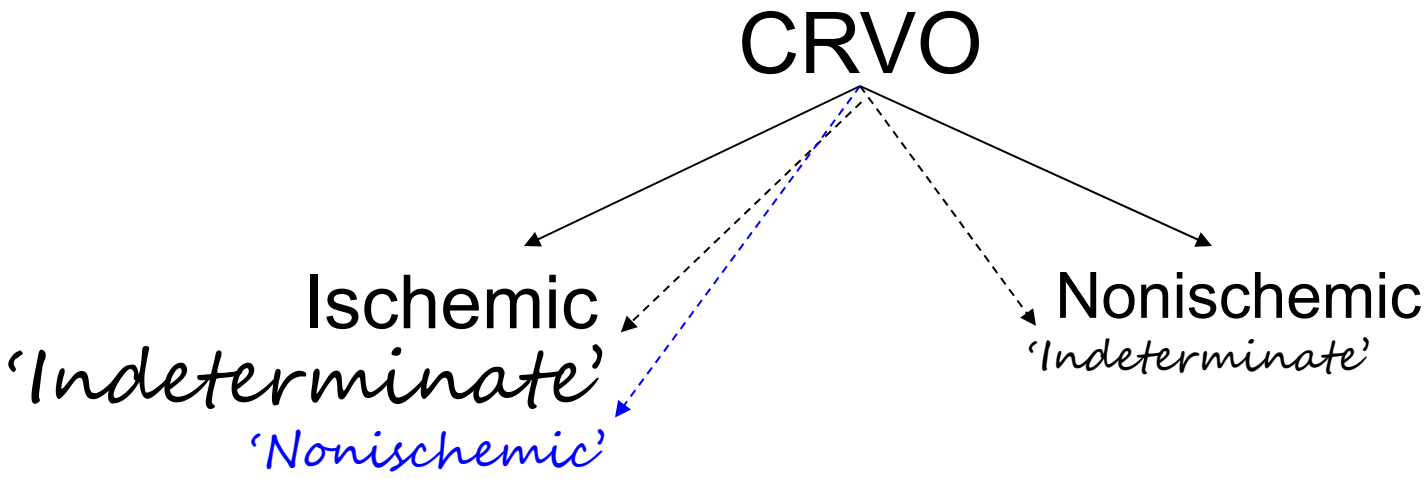
As an (important) aside: A number of CRVOs initially classified as nonischemic will 'convert' to ischemic. What depressingly-high percentage will do so by 36 months post-event?

What is the natural history of indeterminate CRVOs?

~80 of them turn out to be ischemic

A

CRVO



As an (important) aside: A number of CRVOs initially classified as nonischemic will 'convert' to ischemic. What depressingly-high percentage will do so by 36 months post-event?
About a third

What is the natural history of indeterminate CRVOs?

~80 of them turn out to be ischemic

Q

CRVO

Ischemic *CRVO*				
Nonischemic *CRVO*				

What test must be run to determine whether a CRVO is ischemic or nonischemic?

A

CRVO

				FA
Ischemic *CRVO*				
Nonischemic *CRVO*				

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

Q

CRVO

				FA
Ischemic CRVO	What is the classic description of the fundus in CRVO?			
Nonischemic CRVO				

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

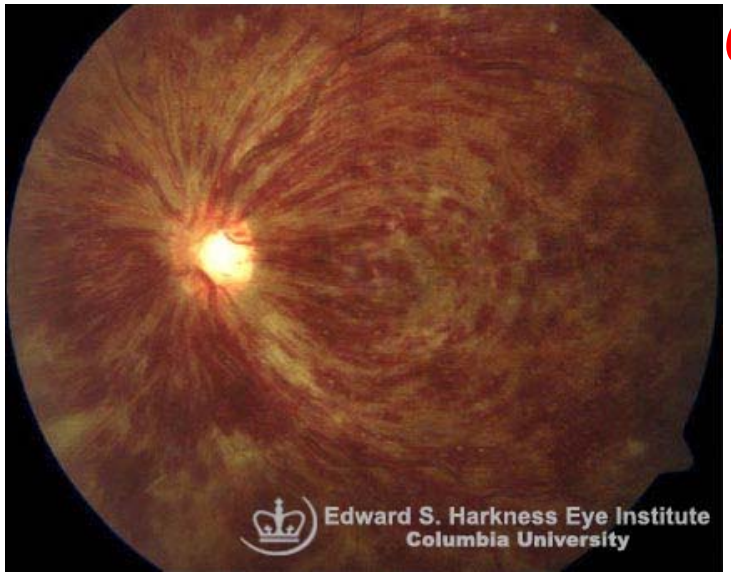
A

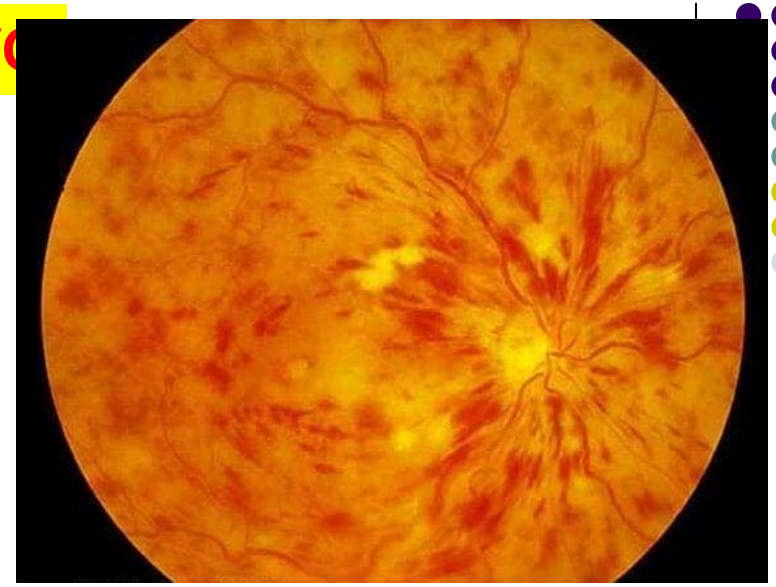
CRVO

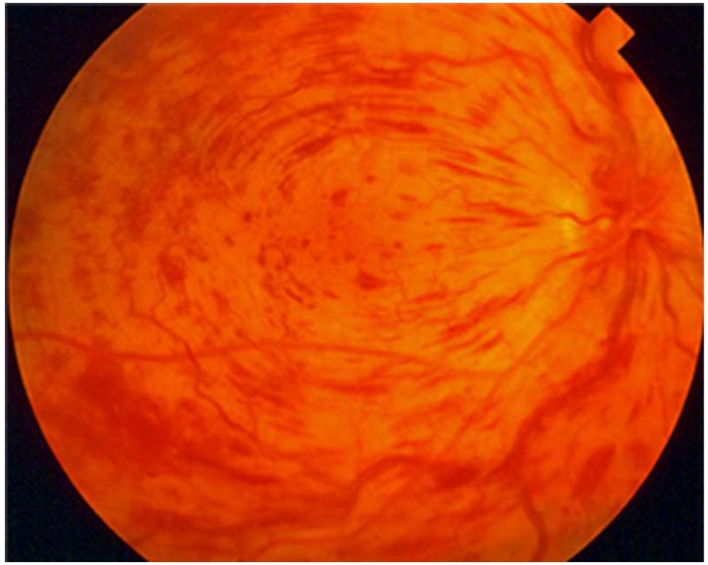
				FA
Ischemic CRVO	What is the classic description of the fundus in CRVO? Blood and thunder			
Nonischemic CRVO				

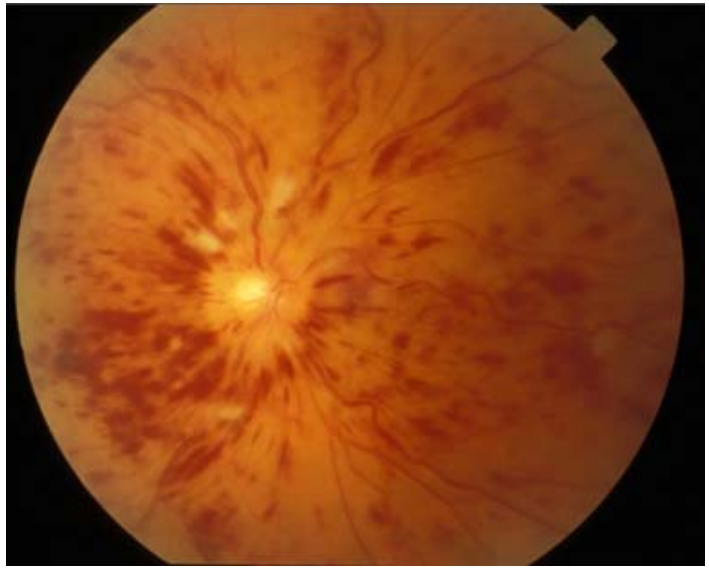
What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

CRVO









CRVO: Blood and thunder

Q

CRVO

				FA
Ischemic CRVO	What is the classic description of the fundus in CRVO? **Blood and thunder** *What impact does this frequently have on attempts to determine whether a CRVO is ischemic or not?*			
Nonischemic CRVO				

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

A

CRVO

				~~FA~~
Ischemic CRVO	What is the classic description of the fundus in CRVO? **Blood and thunder**			
Nonischemic CRVO	*What impact does this frequently have on attempts to determine whether a CRVO is ischemic or not?* **Heme** and cotton-wool spots (**CWS**) may obscure FA hyperfluorescence, rendering FA interpretation problematic			

What test must be run to determine whether a CRVO is ischemic or nonischemic?

~~Fluorescein angiography~~

Q

CRVO

				~~FA~~
Ischemic CRVO?	What is the classic description of the fundus in CRVO? **Blood and thunder**			
Nonischemic CRVO?	*How are such CRVOs classified?*			*to determine whether a CRVO is ischemic or not?* **Heme and cotton-wool spots (CWS) may obscure FA hyperfluorescence, rendering FA interpretation problematic**

What test must be run to determine whether a CRVO is ischemic or nonischemic?

~~Fluorescein angiography~~

A

CRVO

				~~FA~~
Ischemic CRVO Indeterminate CRVO Nonischemic CRVO	What is the classic description of the fundus in CRVO? **Blood and thunder** *How are such CRVOs classified?* As *indeterminate*, as mentioned previously *to determine whether a CRVO is ischemic or not?* **Heme and cotton-wool spots (CWS) may obscure FA hyperfluorescence, rendering FA interpretation problematic**			

What test must be run to determine whether a CRVO is ischemic or nonischemic?

~~Fluorescein angiography~~

Q

CRVO

				FA findings?
Ischemic *CRVO*				
Nonischemic *CRVO*				

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

What FA finding is common to both ischemic and nonischemic subtypes?

A

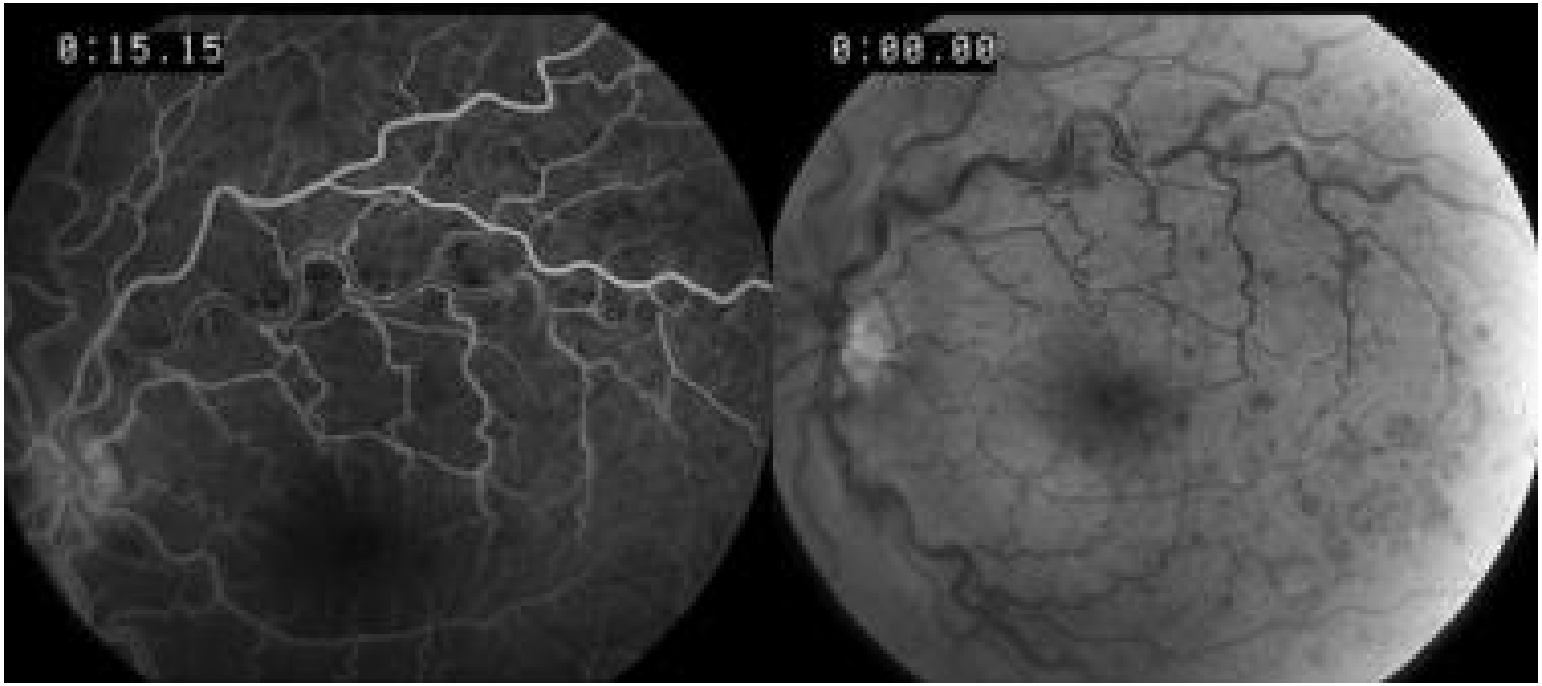
CRVO

				FA findings?
Ischemic *CRVO*				Prolonged retinal circ time
Nonischemic *CRVO*				Prolonged retinal circ time

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

What FA finding is common to both ischemic and nonischemic subtypes?
Prolonged retinal circulation time

CRVO



CRVO: Prolonged circ time (note the timer)

Q

CRVO

				FA findings?
Ischemic *CRVO*				Prolonged retinal circ time with…
Nonischemic *CRVO*				Prolonged retinal circ time with…

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

What FA finding is common to both ischemic and nonischemic subtypes?
Prolonged retinal circulation time

What FA finding differentiates ischemic from nonischemic CRVO?

A

CRVO

				FA findings?
Ischemic *CRVO*				Prolonged retinal circ time with… capillary nonperfusion
Nonischemic *CRVO*				Prolonged retinal circ time with… capillary nonperfusion

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

What FA finding is common to both ischemic and nonischemic subtypes?
Prolonged retinal circulation time

What FA finding differentiates ischemic from nonischemic CRVO?
The extent of capillary nonperfusion.

A

CRVO

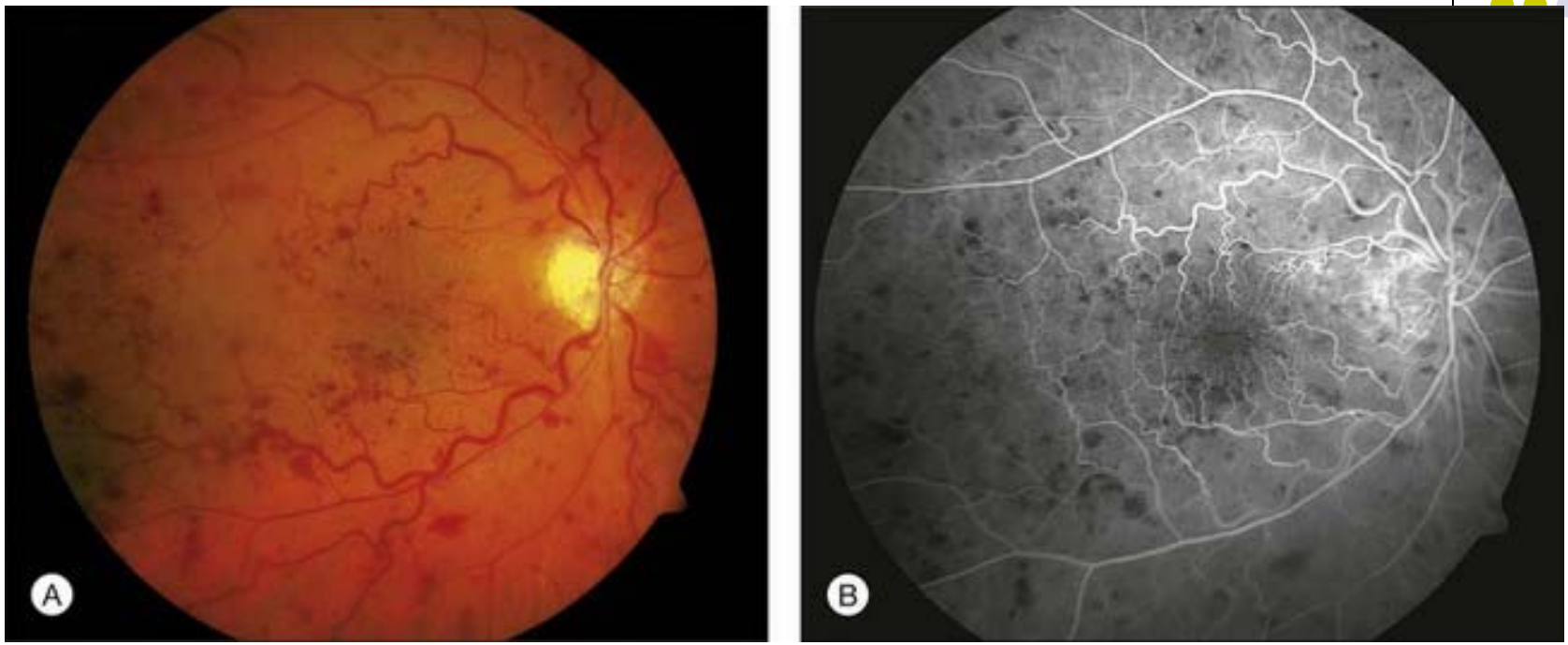
				FA findings?
Ischemic *CRVO*				Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*				Prolonged retinal circ time with…**minimal** capillary nonperfusion

What test must be run to determine whether a CRVO is ischemic or nonischemic?
Fluorescein angiography

What FA finding is common to both ischemic and nonischemic subtypes?
Prolonged retinal circulation time

What FA finding differentiates ischemic from nonischemic CRVO?
The extent of capillary nonperfusion. In ischemic CRVO, at least 10 disc diameters of capillary nonperfusion are present, whereas in nonischemic, only a minimal amount (if any) is present.

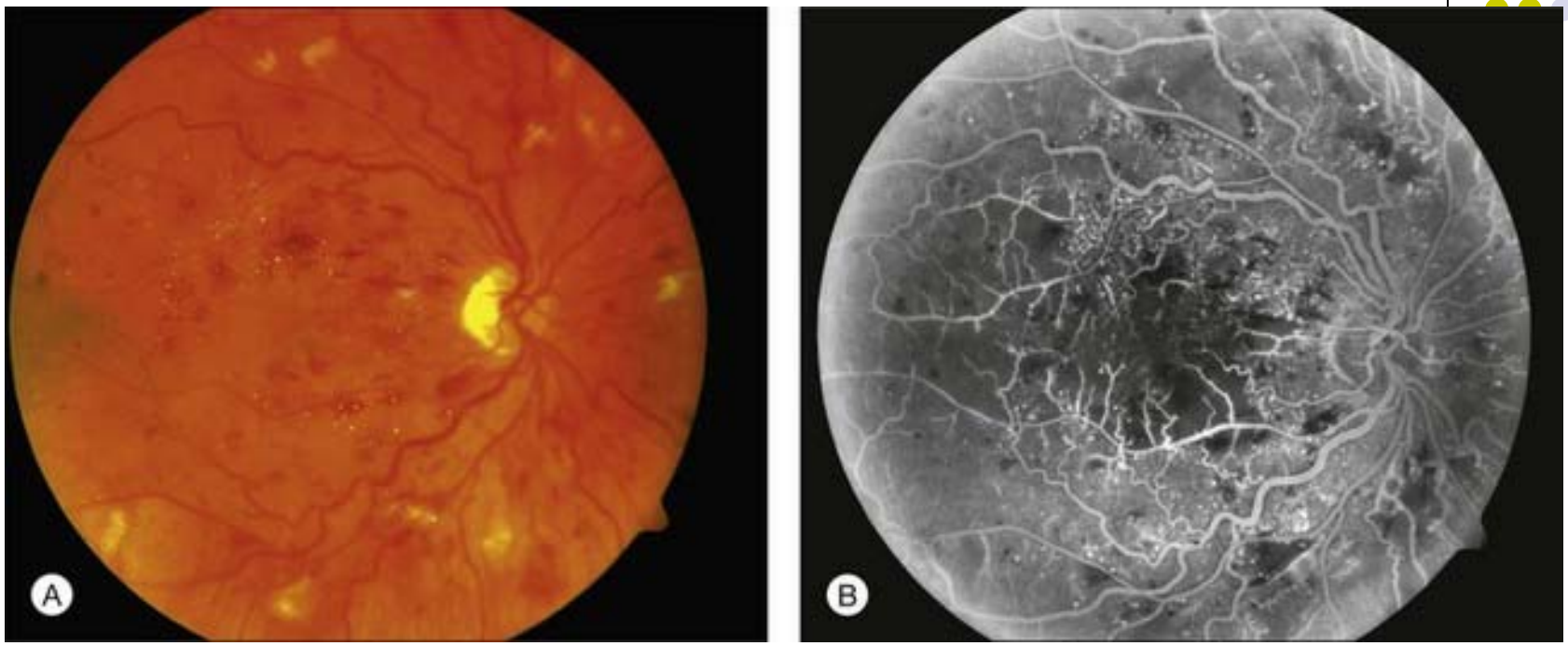
CRVO



(A) Fundus photograph of a central retinal vein occlusion demonstrating typical features of venous tortuosity, macular thickening, and intraretinal hemorrhage in all four quadrants of the fundus. (B) Early-phase angiogram of the fundus depicted in A, demonstrating an intact parafoveal capillary network in this perfused central retinal vein occlusion

CRVO: Nonischemic

CRVO



(A) Fundus photograph of an eye with central retinal vein occlusion demonstrating scattered retinal hemorrhages, venous engorgement, and cotton-wool spots. (B) Midphase fluorescein angiogram of the eye shown in A, demonstrating capillary nonperfusion involving the foveal center. This eye also had extensive peripheral nonperfusion and is an example of the nonperfused form of central retinal vein occlusion.

CRVO: Ischemic

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	***Yes? No?***			Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	***Yes? No?***			Prolonged retinal circ time with…**minimal** capillary nonperfusion

Next Q

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	**Yes**			Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	**No**			Prolonged retinal circ time with…**minimal** capillary nonperfusion

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	***Good? Bad?***		Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	***Good? Bad?***		Prolonged retinal circ time with…**minimal** capillary nonperfusion

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**		Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**		Prolonged retinal circ time with…**minimal** capillary nonperfusion

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	Bad	***Yes? No?***	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	Good	***Yes? No?***	Prolonged retinal circ time with…**minimal** capillary nonperfusion

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	Bad	**Yes**	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	Good	**No**	Prolonged retinal circ time with…**minimal** capillary nonperfusion

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…	**≥20/40**		

(Question is on the next slide—proceed when ready)

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…	**≥20/40**		
…final VA is likely to be…	***Good? Bad?***	The question	

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…	**≥20/40**		
…final VA is likely to be…	**Good**		

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…			**≤20/200**
…final VA is likely to be…	Good		***Good? Bad?***

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…			**≤20/200**
…final VA is likely to be…	Good		**As bad, or even worse**

Q

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…		**20/50 - 20/200**	≤20/200
…final VA is likely to be…	Good	***Good? Bad?***	As bad, or even worse

A

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD** capillary nonperfusion
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

When initial VA is…		**20/50 - 20/200**	≤20/200
…final VA is likely to be…	Good	**50% stabilize 20% improve 30% worsen**	As bad, or even worse

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD**
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

tl;dr for Final VA after CRVO:

When initial VA is…	≥20/40	20/50 - 20/200	≤20/200
…final VA is likely to be…	Good	50% stabilize 20% improve 30% worsen	As bad, or even worse

(No question—proceed when ready)

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD**
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

***tl;dr for Final VA after CRVO**: Good vision stays good…*

When initial VA is…	**≥20/40**	20/50 - 20/200	≤20/200
…final VA is likely to be…	**Good**	50% stabilize 20% improve 30% worsen	As bad, or even worse

(No question—proceed when ready)

CRVO

	APD?	VA	CWS?	FA findings
Ischemic *CRVO*	Yes	**Bad**	Yes	Prolonged retinal circ time with…**10+ DD**
Nonischemic *CRVO*	No	**Good**	No	Prolonged retinal circ time with…**minimal** capillary nonperfusion

***tl;dr for Final VA after CRVO**: Good vision stays good…Bad vision stays bad*

When initial VA is…	**≥20/40**	20/50 - 20/200	**≤20/200**
…final VA is likely to be…	**Good**	50% stabilize 20% improve 30% worsen	**As bad, or even worse**

(No question—proceed when ready)

Q

CRVO

What physiological process accounts for improvement in such cases?

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q/A

CRVO

What physiological process accounts for improvement in such cases?

The development of collaterals (aka two words)

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The **development** of collaterals (aka *shunt vessels*)

Does 'development' here refer to the creation of new vessels, ie, neovascularization?

			findings
			ged etinal circ with…**10+ DD** y nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The **development** of collaterals (aka *shunt vessels*)

Does 'development' here refer to the creation of new vessels, ie, neovascularization?
No, it refers to small, native vessels expanding enough to allow the timely egress of normal retinal inflow

			findings
			ged etinal circ with…**10+ DD** y nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

			findings
			onged etinal circ e with… **10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?

			findings
			onged etinal circ e with… **10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the choroidal circulation

			findings
			onged etinal circ e with… **10+ DD** lary non erfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the **choroidal circulation**

But the choroid is still 'in the eye.' Where does the blood go from there?

			findings
			onged etinal circ e with… **10+ DD** lary non erfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q/A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the **choroidal circulation**

But the choroid is still 'in the eye.' Where does the blood go from there?
The choroidal circulation drains into the [two words], which in turn drain into the inferior and superior [two diff words]

			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the **choroidal circulation**

But the choroid is still 'in the eye.' Where does the blood go from there?
The choroidal circulation drains into the vortex veins , which in turn drain into the inferior and superior ophthalmic veins

			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?

[redacted]

m there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with… **10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?
Usually four, occasionally five

m there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?
Usually four, occasionally five

One aspect of the vortex veins is visible on DFE. What is it?

m there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with… **10+ DD** lary non erfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q/A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
In

How many vortex veins are there?
Usually four, occasionally five

One aspect of the vortex veins is visible on DFE. What is it?
Their collecting channels (aka)

But the choroid is still in the eye. Where does the blood go from there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?
Usually four, occasionally five

One aspect of the vortex veins is visible on DFE. What is it?
Their collecting channels (aka *ampullae*)

But the choroid is still in the eye. Where does the blood go from there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

CRVO

Vortex vein ampullae

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?
Usually four, occasionally five

One aspect of the vortex veins is visible on DFE. What is it?
Their collecting channels (aka *ampullae*)

Where (as in anterior, posterior, *etc) are the ampullae located?*

But the choroid is still in the eye! Where does the blood go from there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged retinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted?
It omic
p he eye

W
Ir

How many vortex veins are there?
Usually four, occasionally five

One aspect of the vortex veins is visible on DFE. What is it?
Their collecting channels (aka *ampullae*)

Where (as in anterior, posterior, *etc) are the ampullae located?*
Usually right at the retina's equator

But the choroid is still in the eye. Where does the blood go from there?
The choroidal circulation drains into the **vortex veins** which in turn drain into the inferior and superior ophthalmic veins

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

CRVO

COURTESY OF RETINA CONSULTANTS OF SAN DIEGO

Vortex vein ampullae (blue circle indicates the equator)

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the choroidal circulation

Where are the shunt vessels typically located?

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the choroidal circulation

Where are the shunt vessels typically located?
In the peripapillary region

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

Q

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

Where does the blood go instead of into the CRV?
Into the choroidal circulation

Where are the shunt vessels typically located?
In the peripapillary region

By what name are these collaterals known?

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

A

CRVO

What physiological process accounts for improvement in such cases?
The development of collaterals (aka *shunt vessels*)

What does it mean to say the blood is shunted*?*
It means blood entering the retinal circulation finds an anatomic pathway by which to bypass the occluded CRV and leave the eye

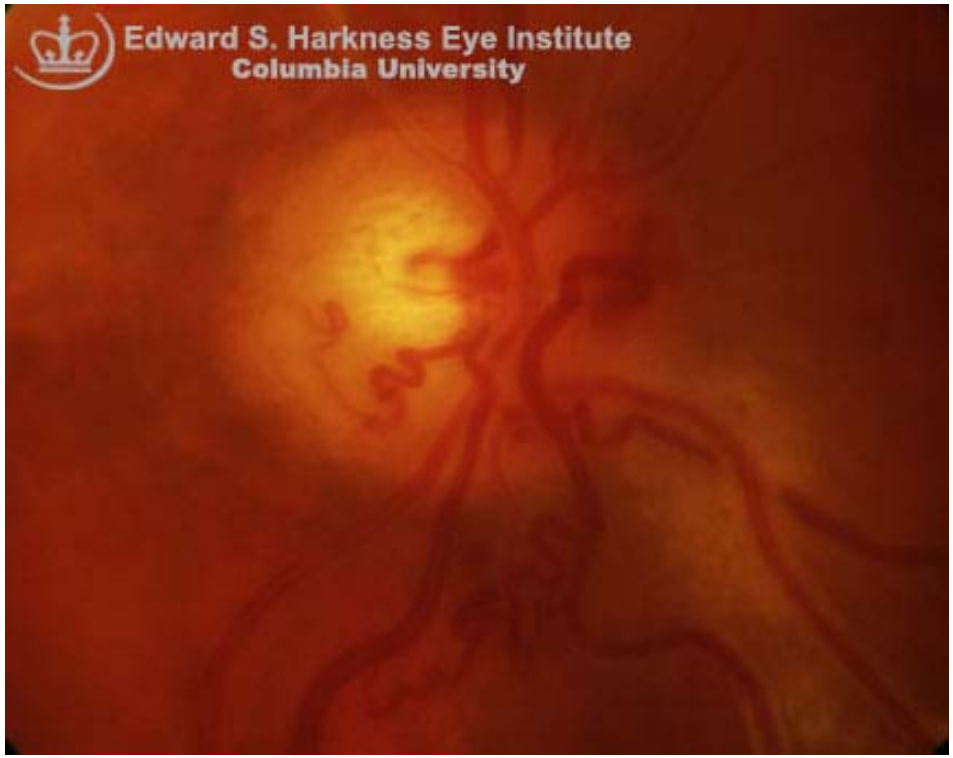
Where does the blood go instead of into the CRV?
Into the choroidal circulation

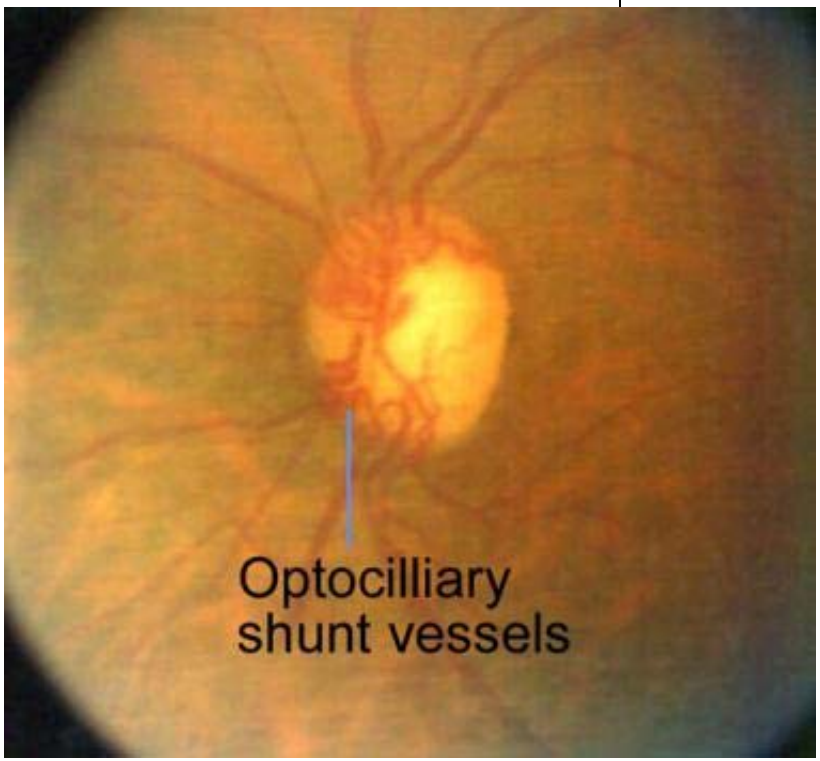
Where are the shunt vessels typically located?
In the peripapillary region

By what name are these collaterals known?
'Optociliary shunt vessels'

			findings
			onged etinal circ e with…**10+ DD** lary nonperfusion
			onged retinal circ e with…**minimal** lary nonperfusion
			≤20/200
…final VA is likely to be…	Good	50% stabilize **20% improve** 30% worsen	bad, or even worse

CRVO



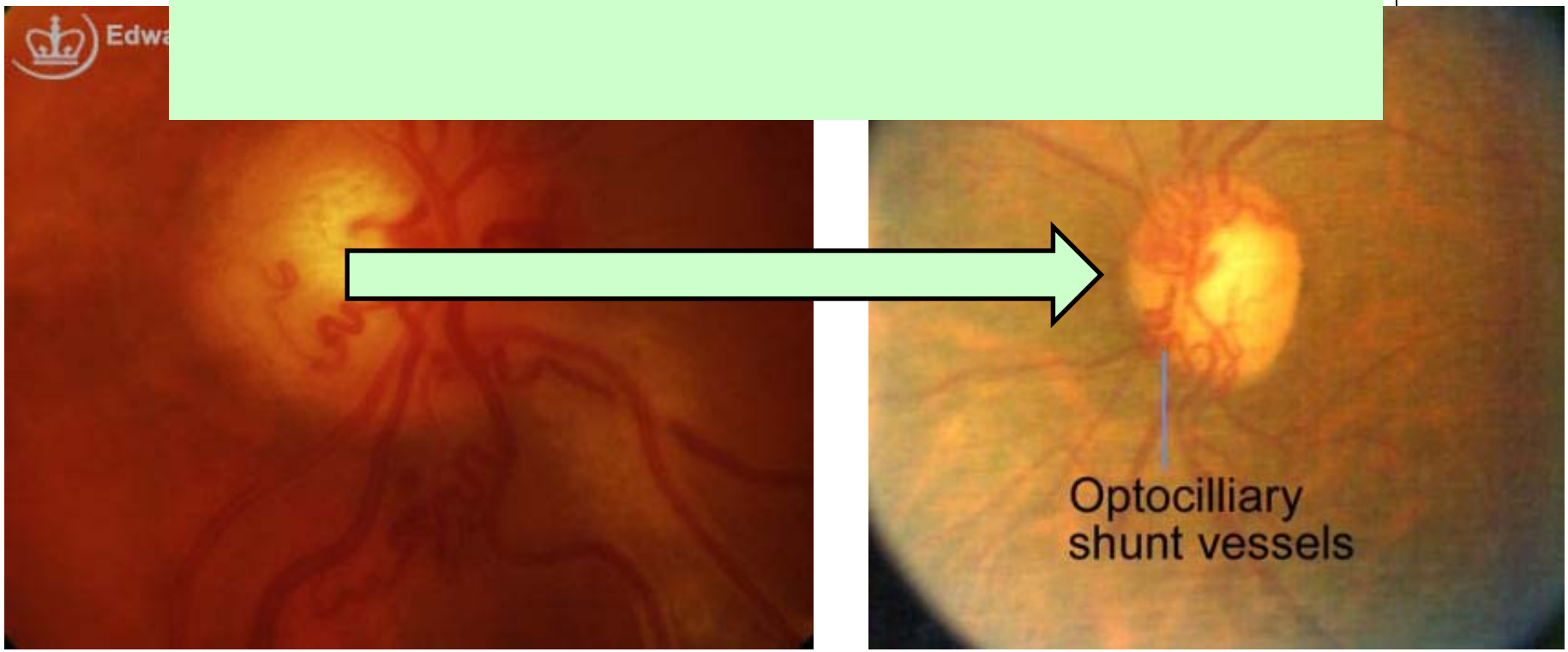


Optociliary shunt vessels

Q

CRVO

Bruh, that sure looks like NVD to me. How could you distinguish between optociliary shunt vessels and NVD?



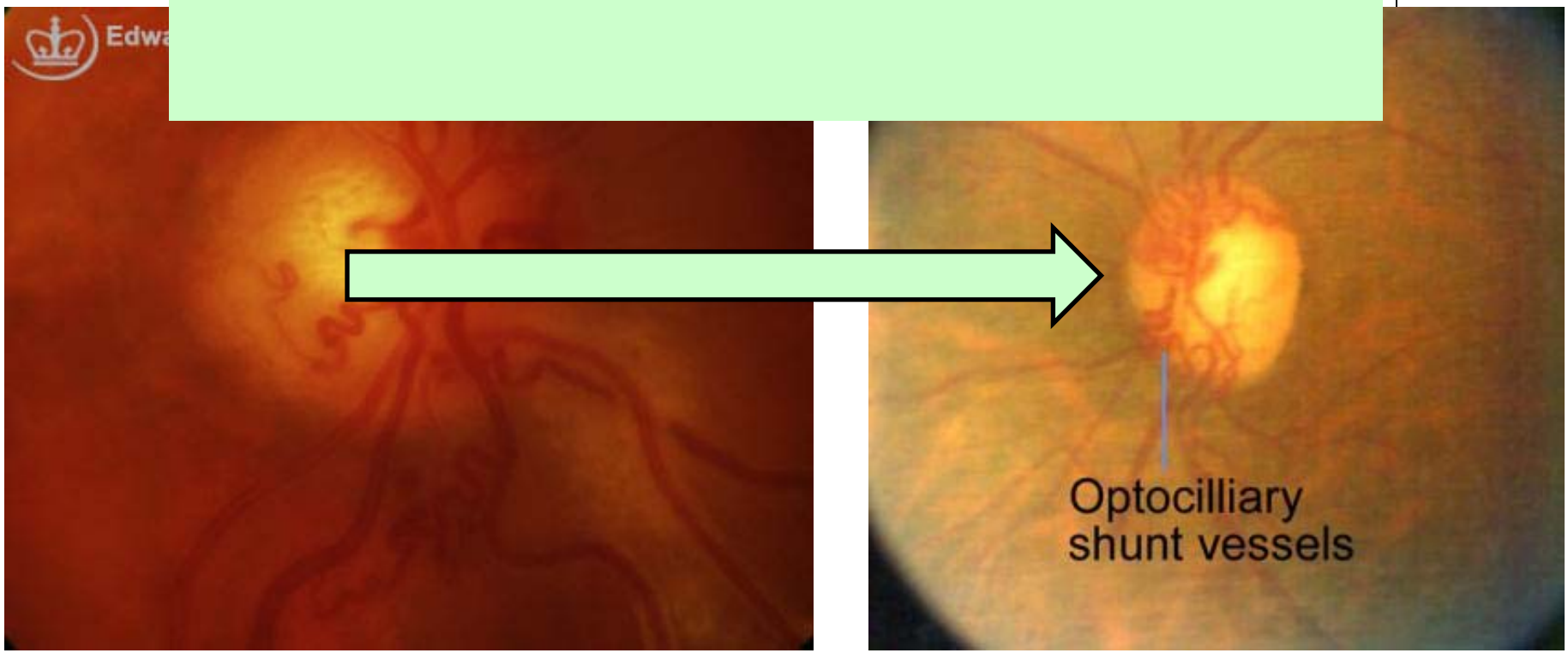
Optociliary shunt vessels

Q/A

CRVO

Bruh, that sure looks like NVD to me. How could you distinguish between optociliary shunt vessels and NVD?

You could perform test (abb.)



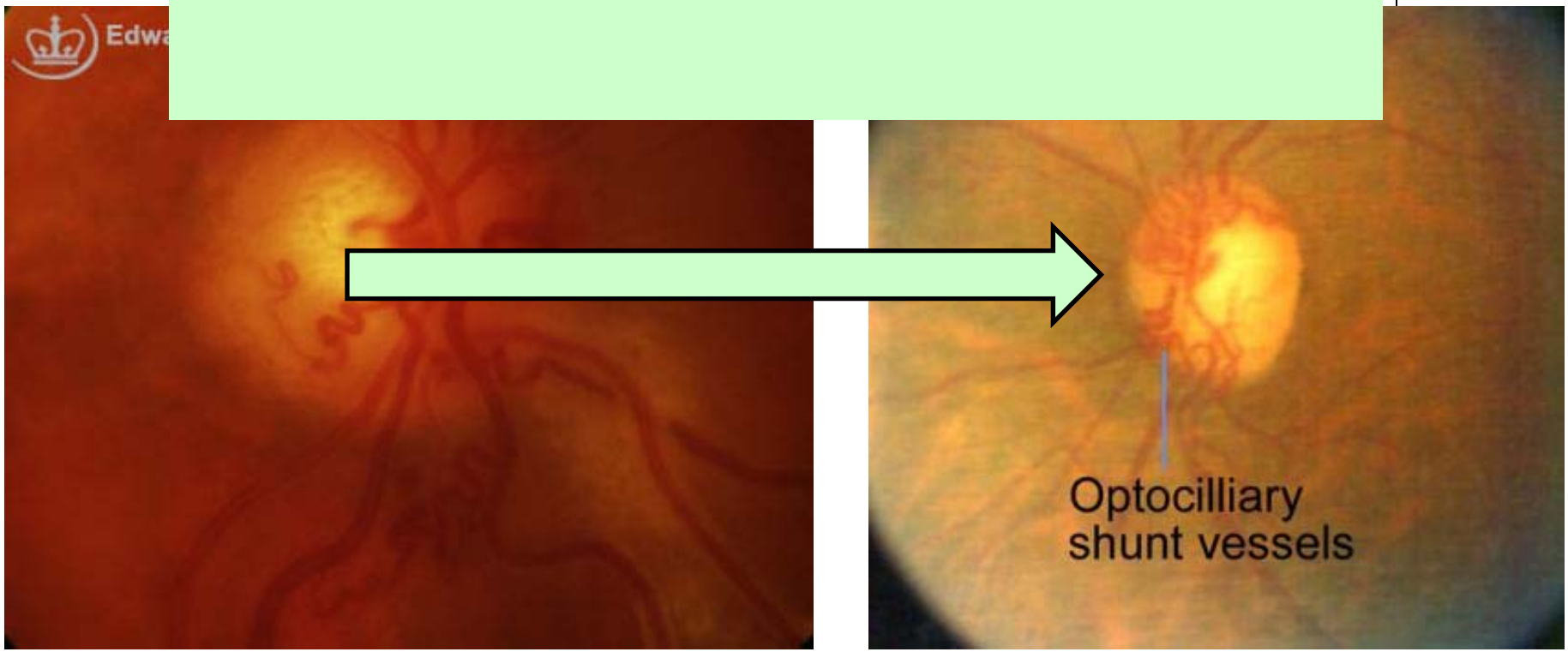
Optociliary shunt vessels

A

CRVO

Bruh, that sure looks like NVD to me. How could you distinguish between optociliary shunt vessels and NVD?

You could perform FA



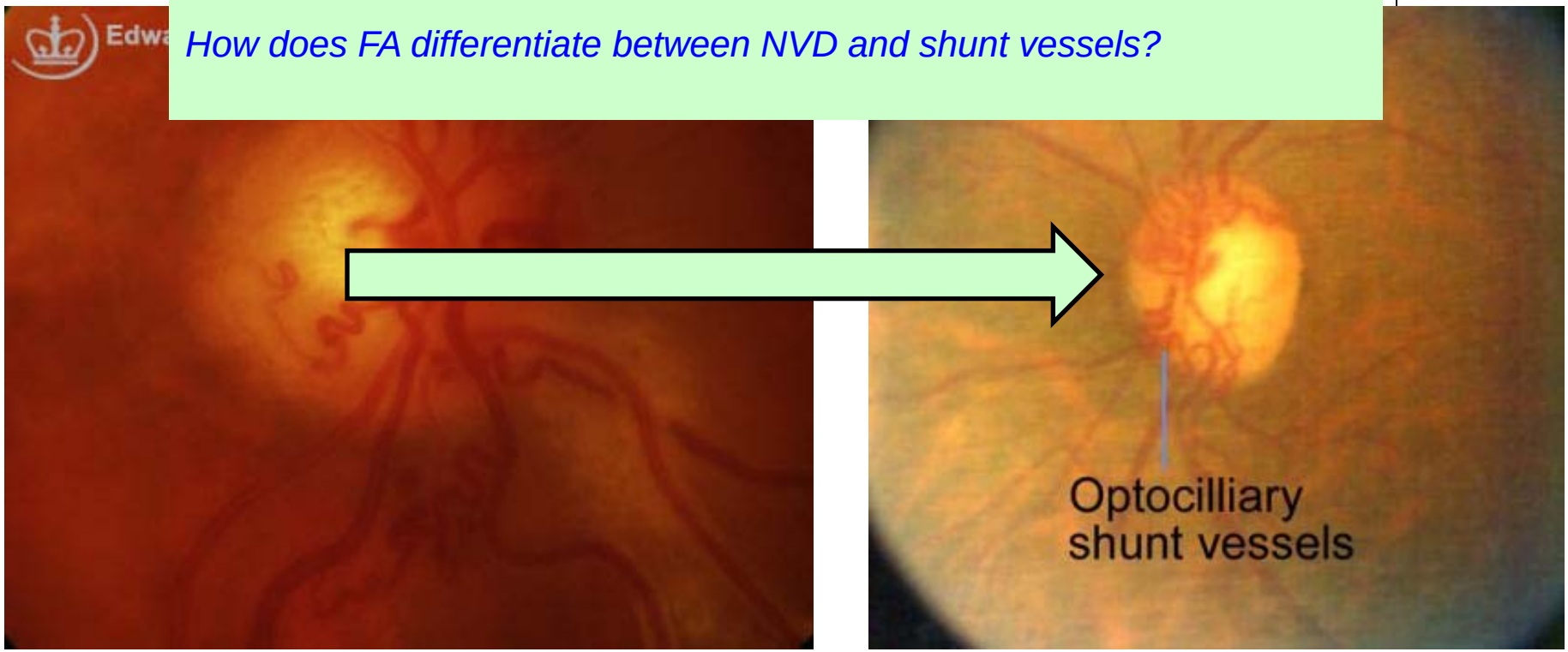
Optociliary shunt vessels

Q

CRVO

Bruh, that sure looks like NVD to me. How could you distinguish between optociliary shunt vessels and NVD?
You could perform FA

How does FA differentiate between NVD and shunt vessels?



Optociliary shunt vessels

Q/A

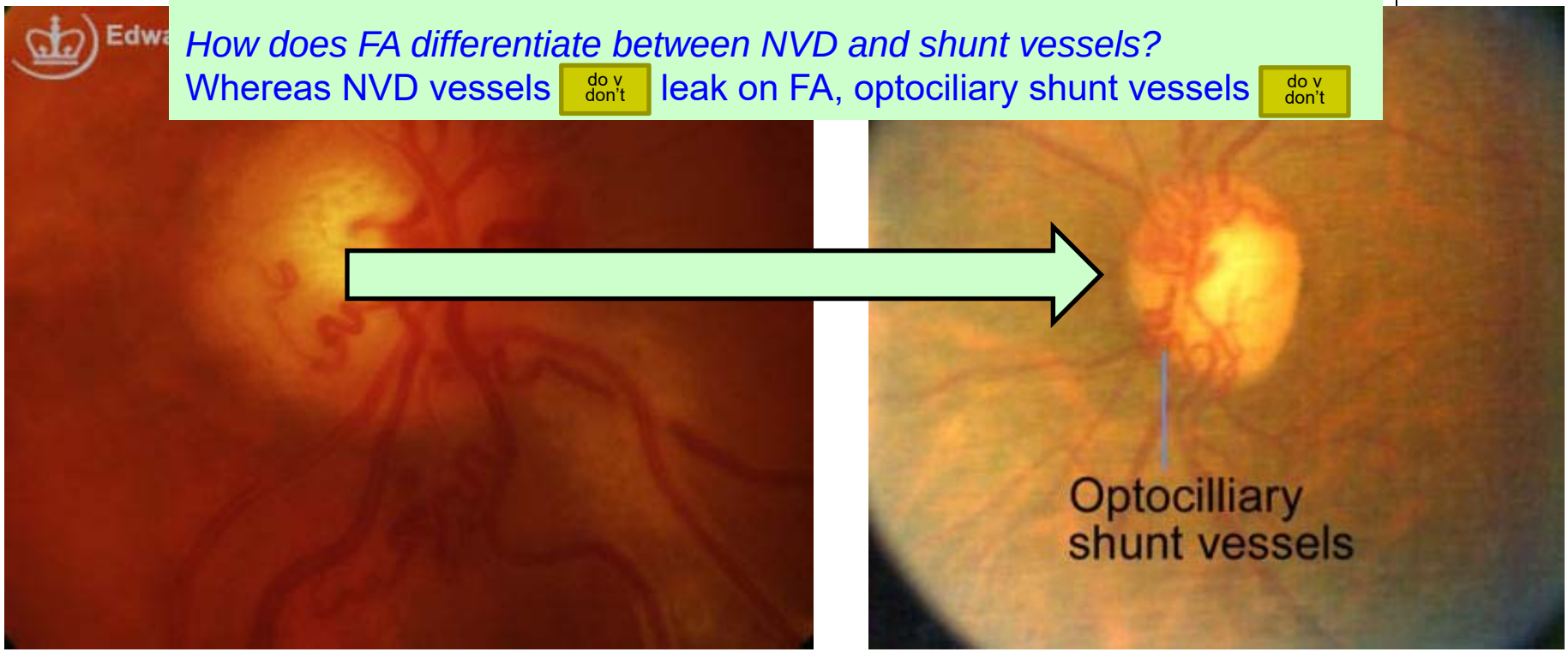
CRVO

Bruh, that sure looks like NVD to me. How could you distinguish between optociliary shunt vessels and NVD?

You could perform FA

How does FA differentiate between NVD and shunt vessels?

Whereas NVD vessels do v don't leak on FA, optociliary shunt vessels do v don't



Optociliary shunt vessels

A

CRVO

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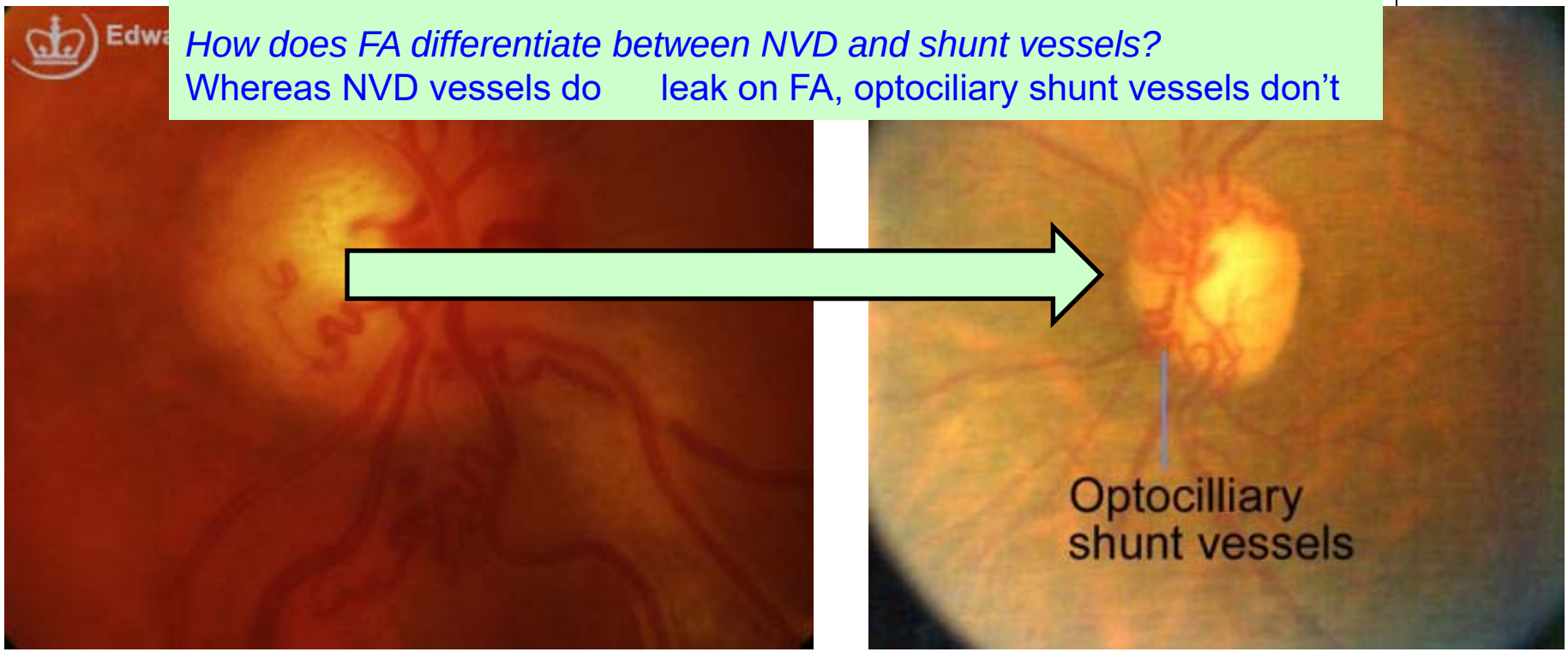

Optociliary shunt vessels

A

CRVO

- Re NVI after CRVO: According to the CVOS…

What does CVOS stand for in this context?

A

CRVO

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What does CVOS stand for in this context?
Central Vein Occlusion Study

Q

CRVO

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  - *What is the #1 predictor for neo?*

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CRVO

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    If not prophylactically, at what point should PRP be applied?

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    If not prophylactically, at what point should PRP be applied?
    Most clinicians perform PRP at the first sign of NVI

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For many reasons, not least of which is the fact that so many CRVO pts have glaucoma

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3-5 months later…This explains the name by which post-CRVO NVG is known. What is that name?

Is an … *mic CRVO?*
Very-

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3-5 months later…This explains the name by which post-CRVO NVG is known. What is that name?
'One-hundred-day glaucoma'

Typically, how much time passes after an ischemic CRVO until NVG appears?
Somewhere in the ~~**3-5 month**~~ 100-day **range**

Why … *ot*
For r

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  - *W*
  - *If*

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In … *pears?* … **ot**
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(No question—proceed when ready)

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So, in CRVO NVI occurs in the absence of NVD/NVE, and *NVA occurs in the absence of NVI*

OK, it … *every visit. better*

No, th

Why is iris surveillance inadequate?

Because in some cases, NVA in CRVO occurs without neovascularization of the iris

Why is DFE inadequate as a surveillance method in CRVO?

Because very frequently, anterior-seg neo in CRVO occurs **without** neovascularization of the posterior segment

Why … *ot*

For r … *pears?*

In …

Gon …

The development of NVA (which could result in NVG, a disastrous sequelae)

What are you checking for via gonioscopy?

First is a basic assessment of the status of the angle. After that is an **ongoing evaluation for the development of NVA** . … ent

- *When is the follow-up visit after PRP?* One week; **check IOP** and assess response; re-treat if needed

(No question—proceed when ready)

Q

CRVO

- Re NVI after CRVO: According to the CVOS…
  - *W*
    - *If*

OK then, it makes sense that to preclude NVG in CRVO, we need to monitor the anterior segment directly for signs of neo. That being said (and assuming gonioscopy at the initial vis… at su… No… every visit.

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Why …
Beca…
of the posterior segment

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So, in CRVO NVI occurs in the absence of NVD/NVE, and *NVA occurs in the absence of NVI*

How does this compare with neovascularization following a **branch** *RVO?*

- *When is the follow-up visit after PRP?* One week; **check IOP** and assess response; re-treat if needed

A

CRVO

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OK, it… better… No, th…

Why is iris surveillance inadequate?

Why… For r…

Why… Beca… of the posterior segment

In ac… Gon…

How does this compare with neovascularization following a **branch** *RVO?*
In BRVO the pattern is the **opposite** of what it is in CRVO—that is, neo will develop in the posterior segment, but only rarely in the anterior segment

The development of NVA (which could result in NVG, a disastrous sequelae)

What are you checking for via gonioscopy?
First is a basic assessment of the status of the angle. After that is an **ongoing evaluation for the development of NVA** .

- *When is the follow-up visit after PRP?* One week; **check IOP** and assess response; re-treat if needed

Q

CRVO

- CVOS recs re macular edema after CRVO…
  - Wait _____ for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is _____ to _____, and
    - FA reveals _____
  - Per CVOS, patients treated with GML are:
    - twice as likely to _____, and
    - twice as likely to _____

A

CRVO

- CVOS recs re macular edema after CRVO…
  - Wait _____ for spontaneous resolution
  - Perform grid macular laser (GML) if:
    - VA is _____ to _____, and
    - FA reveals _____
  - Per CVOS, patients treated with GML are:
    - twice as likely to _____, and
    - twice as likely to _____

Trick question! The CVOS demonstrated that GML improved macular edema *angiographically*, but did **not** improve vision. For this reason, ***GML is contraindicated in CRVO!***

CRVO

Q

What are the
options for CRVO tx?

Two categories of treatment

?

?

A

CRVO

What are the
options for CRVO tx?

Two categories of treatment

Surgical

Pharmacologic

CRVO

Q

What are the
options for CRVO tx?

Surgical

Pharmacologic

Two specific treatments

?

?

A

CRVO

What are the
options for CRVO tx?

Surgical

Pharmacologic

Two specific treatments

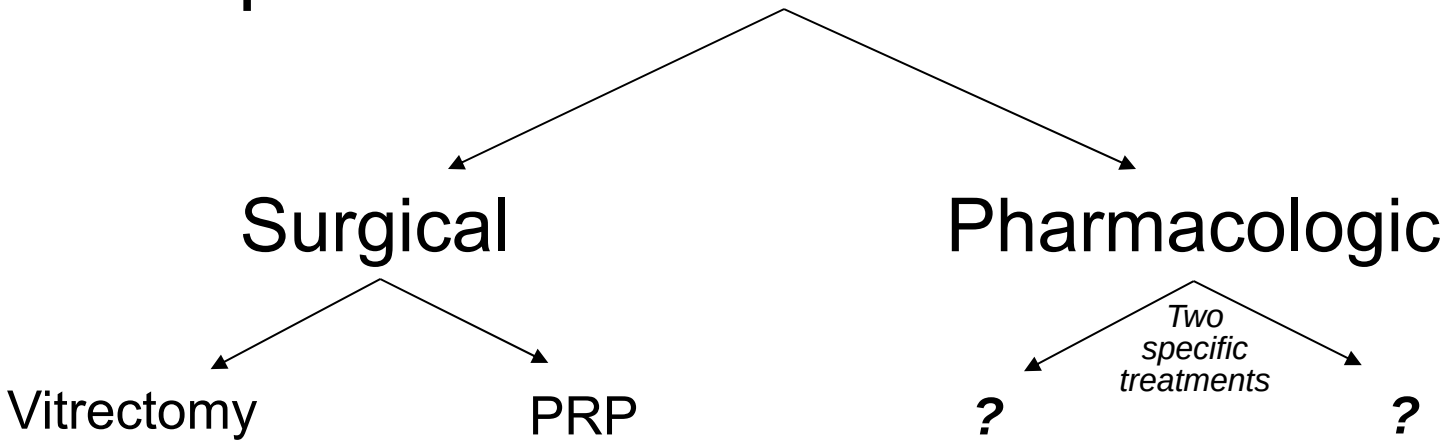
Vitrectomy

PRP

CRVO

Q

What are the options for CRVO tx?



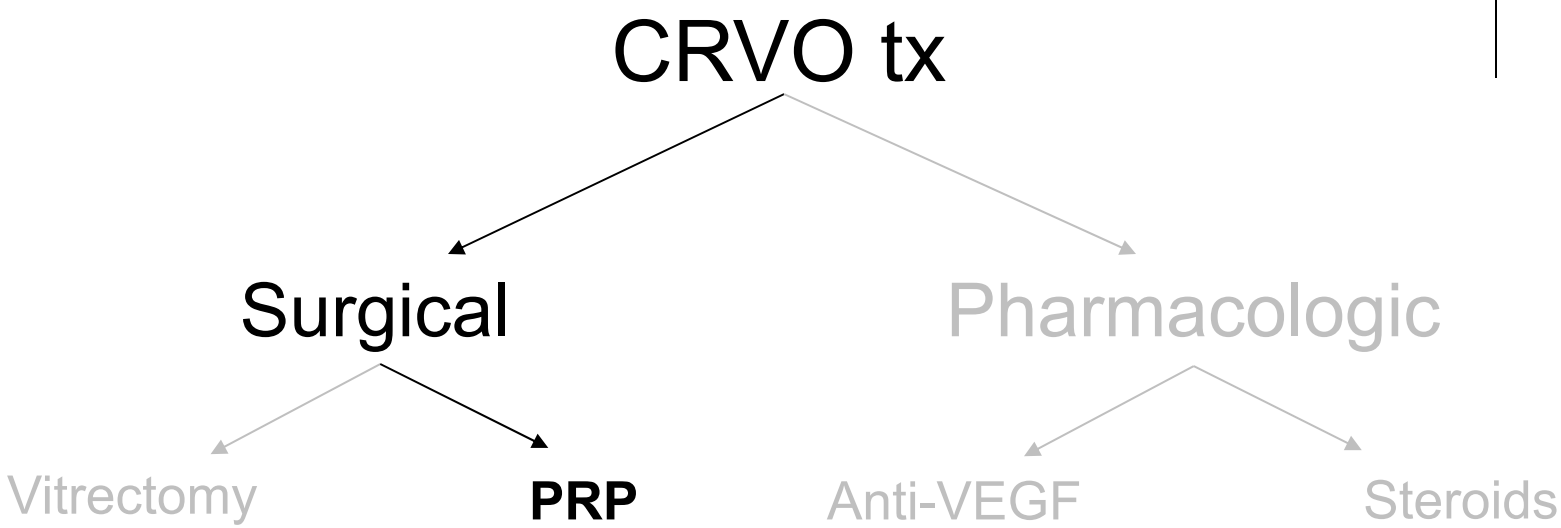
A

CRVO

What are the
options for CRVO tx?

- Surgical
  - Vitrectomy
  - PRP
- Pharmacologic
  - *Two specific treatments*
  - Anti-VEGF
  - Steroids

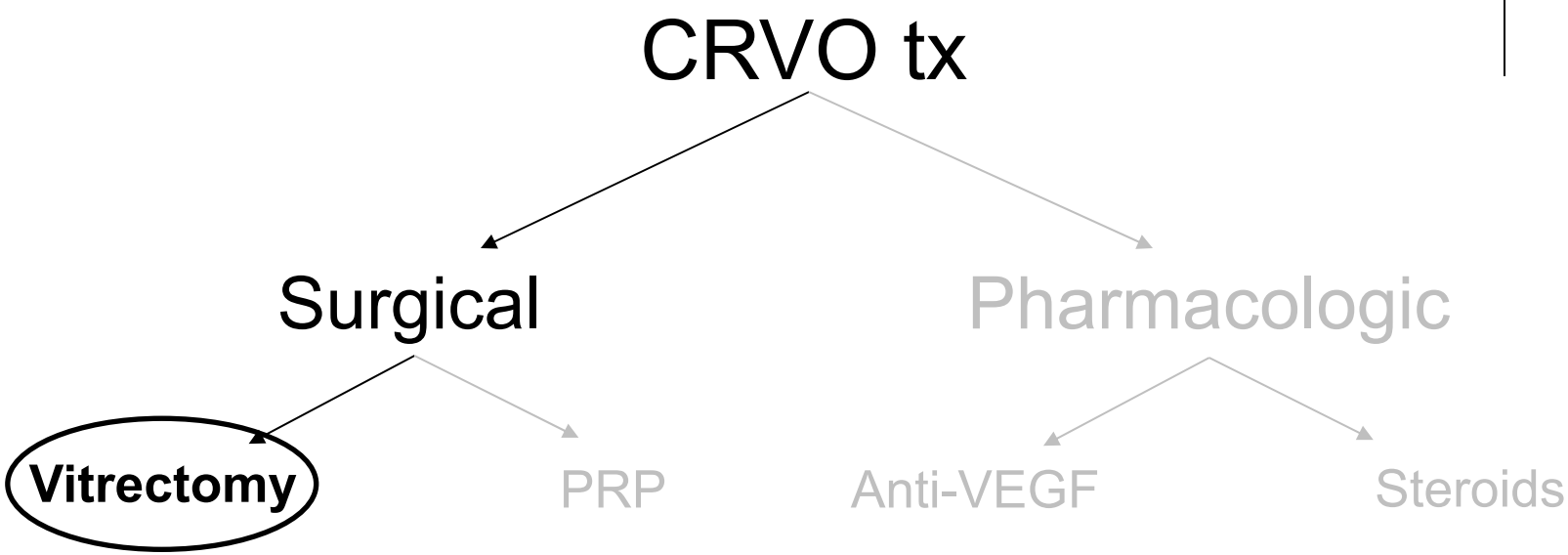
CRVO



We've already addressed PRP
(tl;dr Do it at the first sign of NVI)

Q

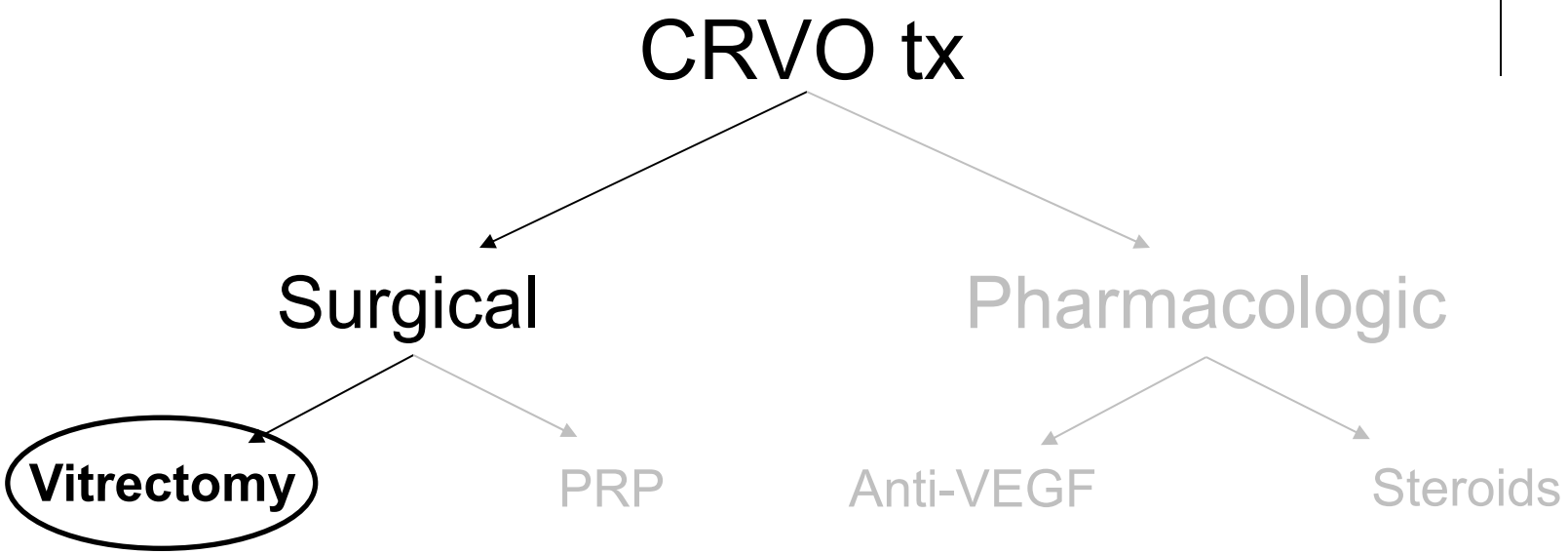
CRVO



What is the most common indication for vitrectomy after CRVO?

A

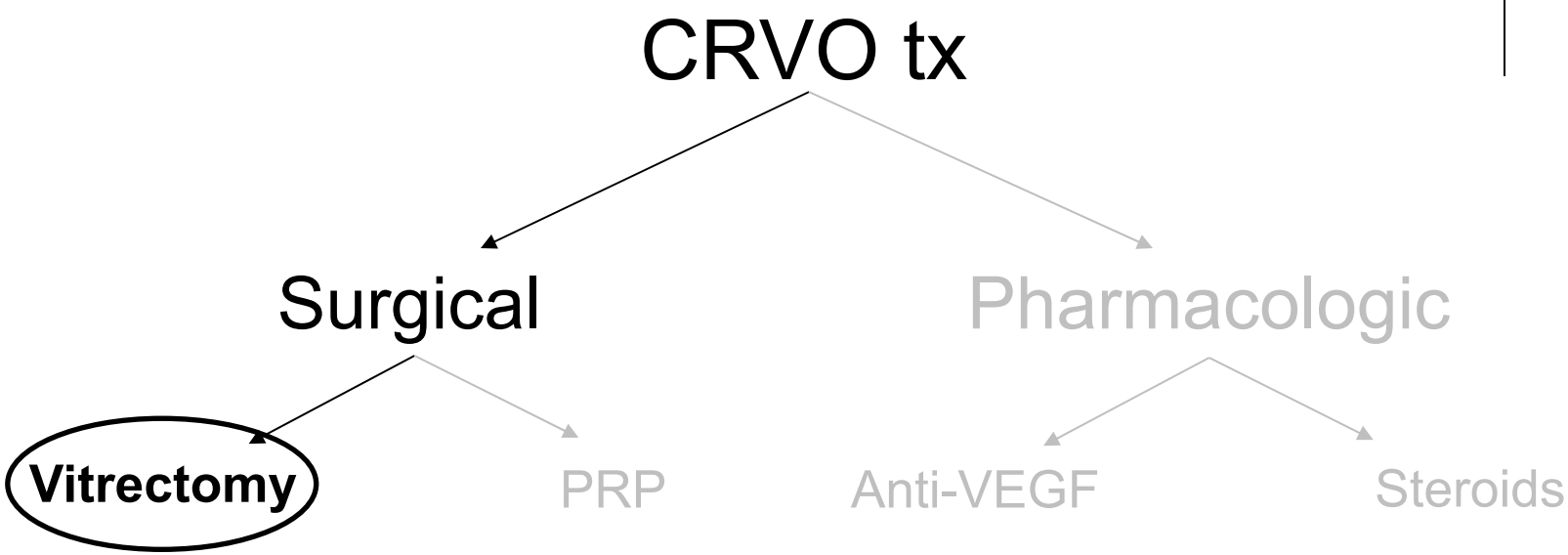
CRVO



What is the most common indication for vitrectomy after CRVO?
Vitreous hemorrhage interfering with either vision, or treatment
(eg, preventing PRP in the setting of NVI)

Q

CRVO



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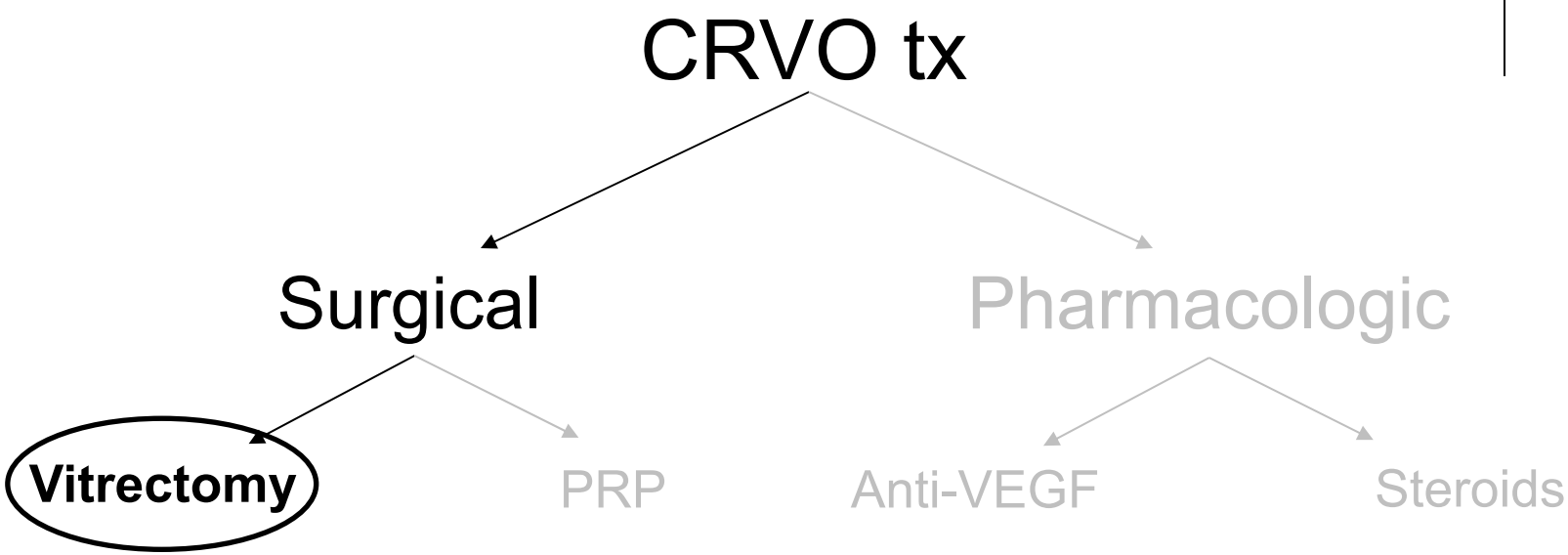
Can vitreous hemorrhage occur even in the absence of clinically apparent posterior segment neo?

A

CRVO



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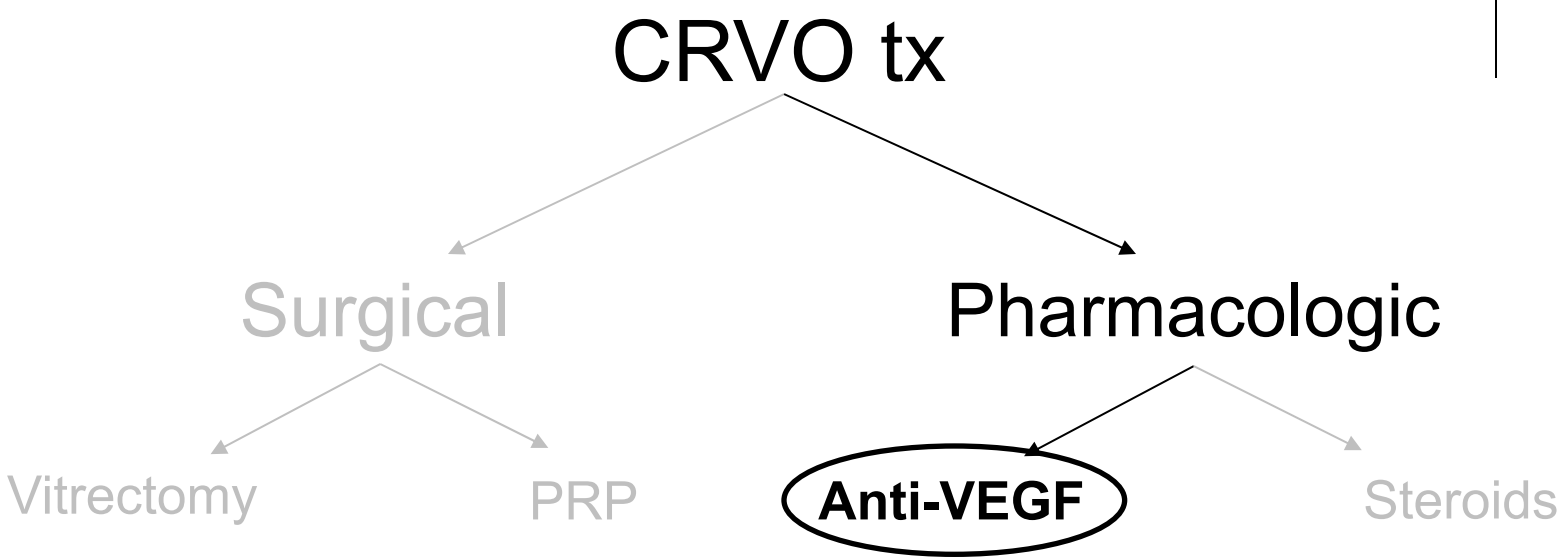
Can vitreous hemorrhage occur even in the absence of clinically apparent posterior segment neo?
Indeed it can

Q

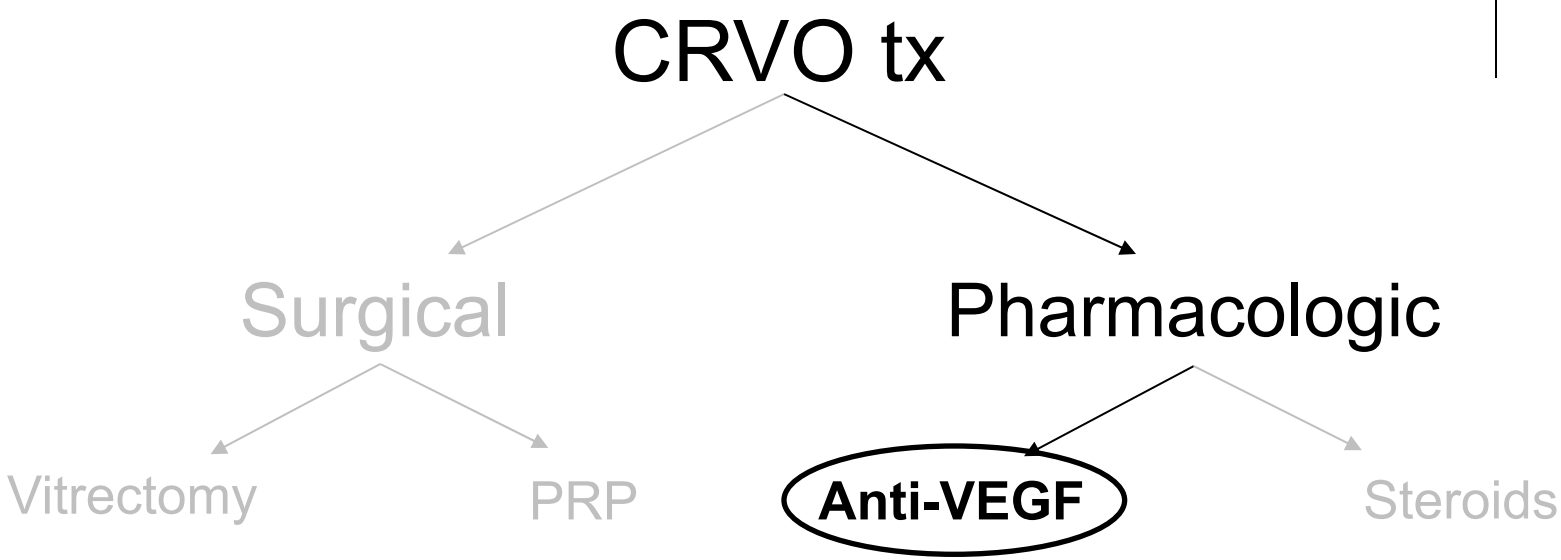
CRVO



What is the indication for intravitreal anti-VEGF therapy in CRVO?

A

CRVO

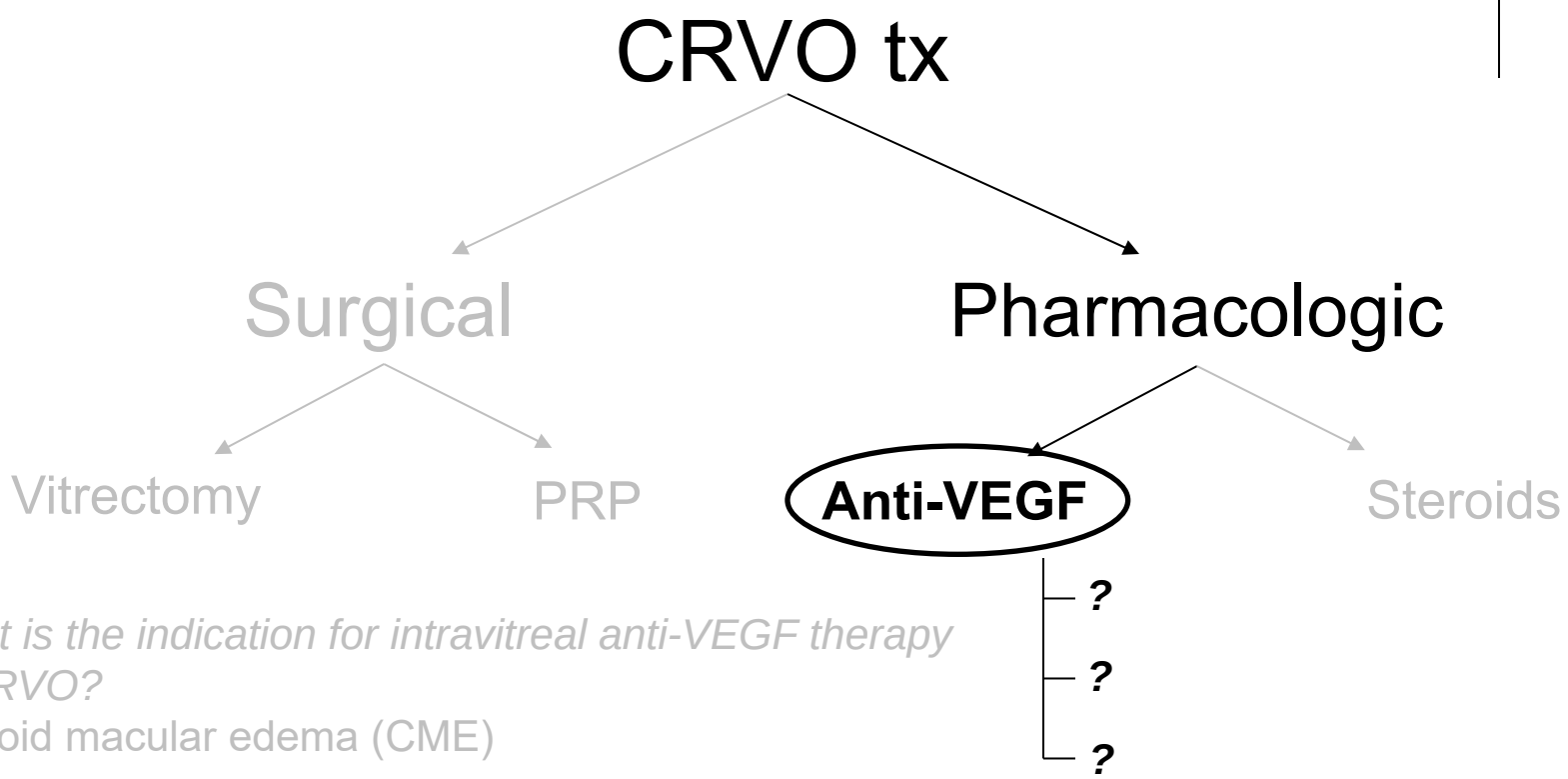


What is the indication for intravitreal anti-VEGF therapy in CRVO?

Cystoid macular edema (CME)

Q

CRVO



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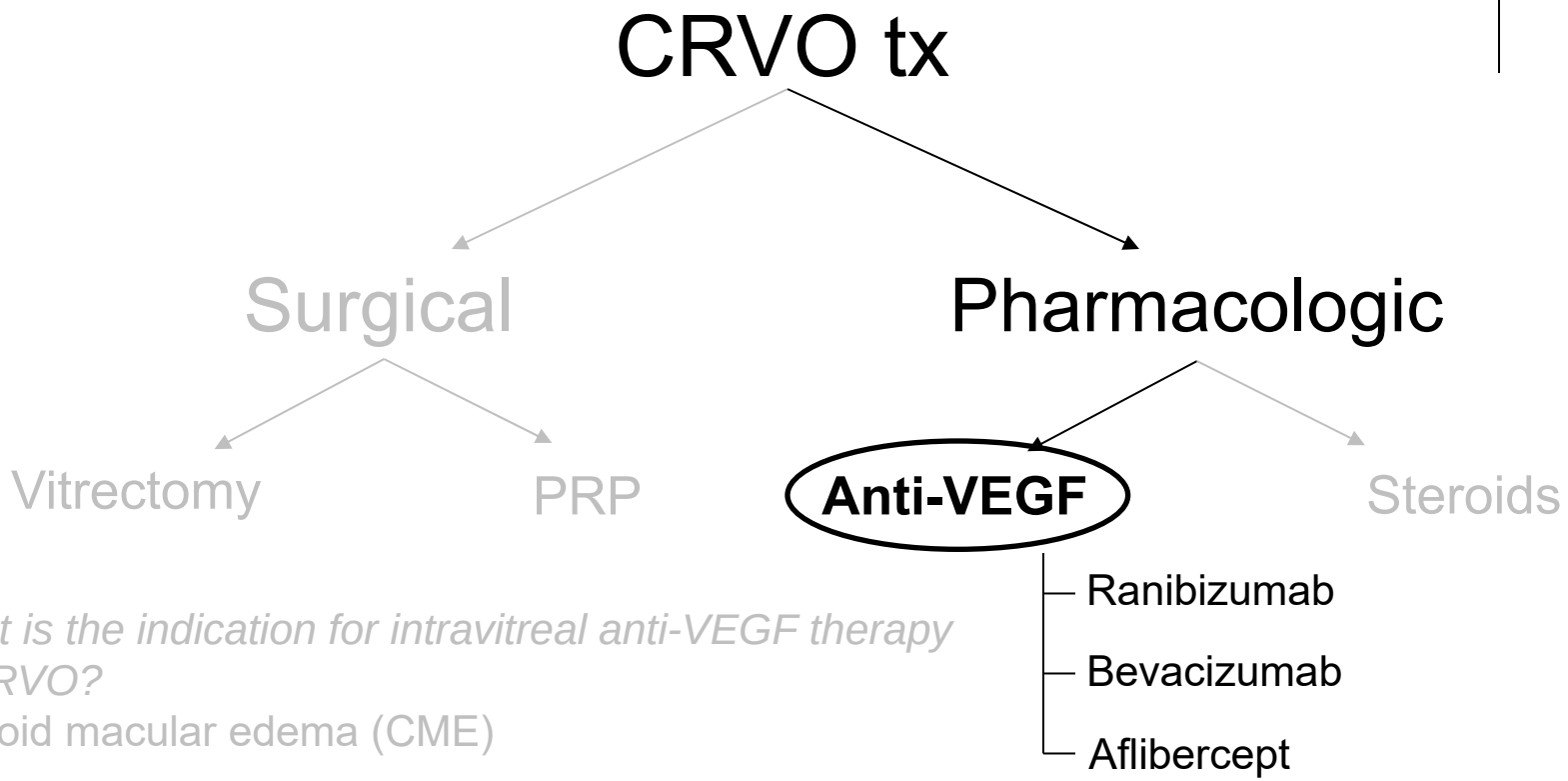
What are the three anti-VEGF meds that have been used in clinical trials for the tx of CRVO?

A

CRVO



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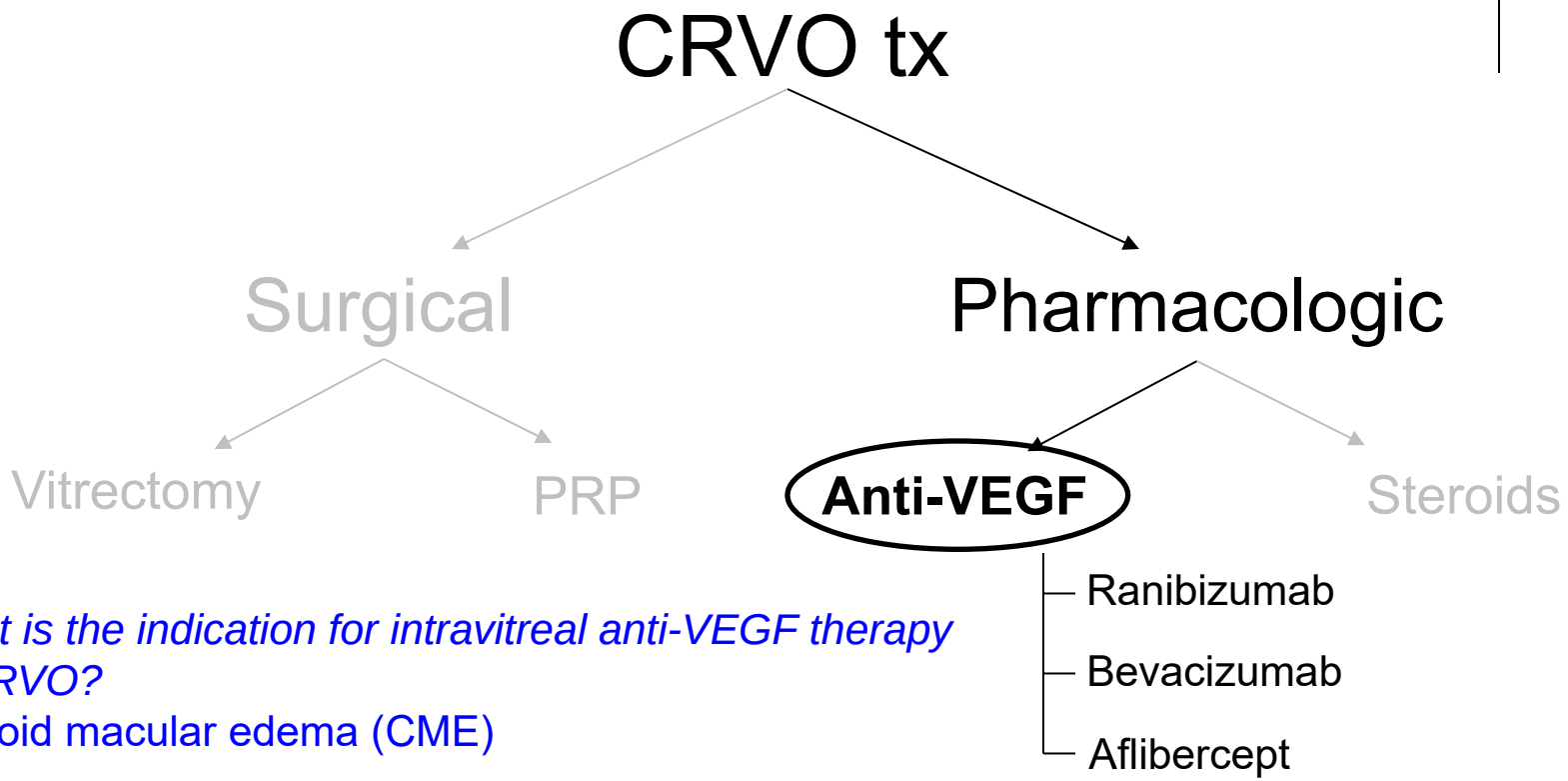

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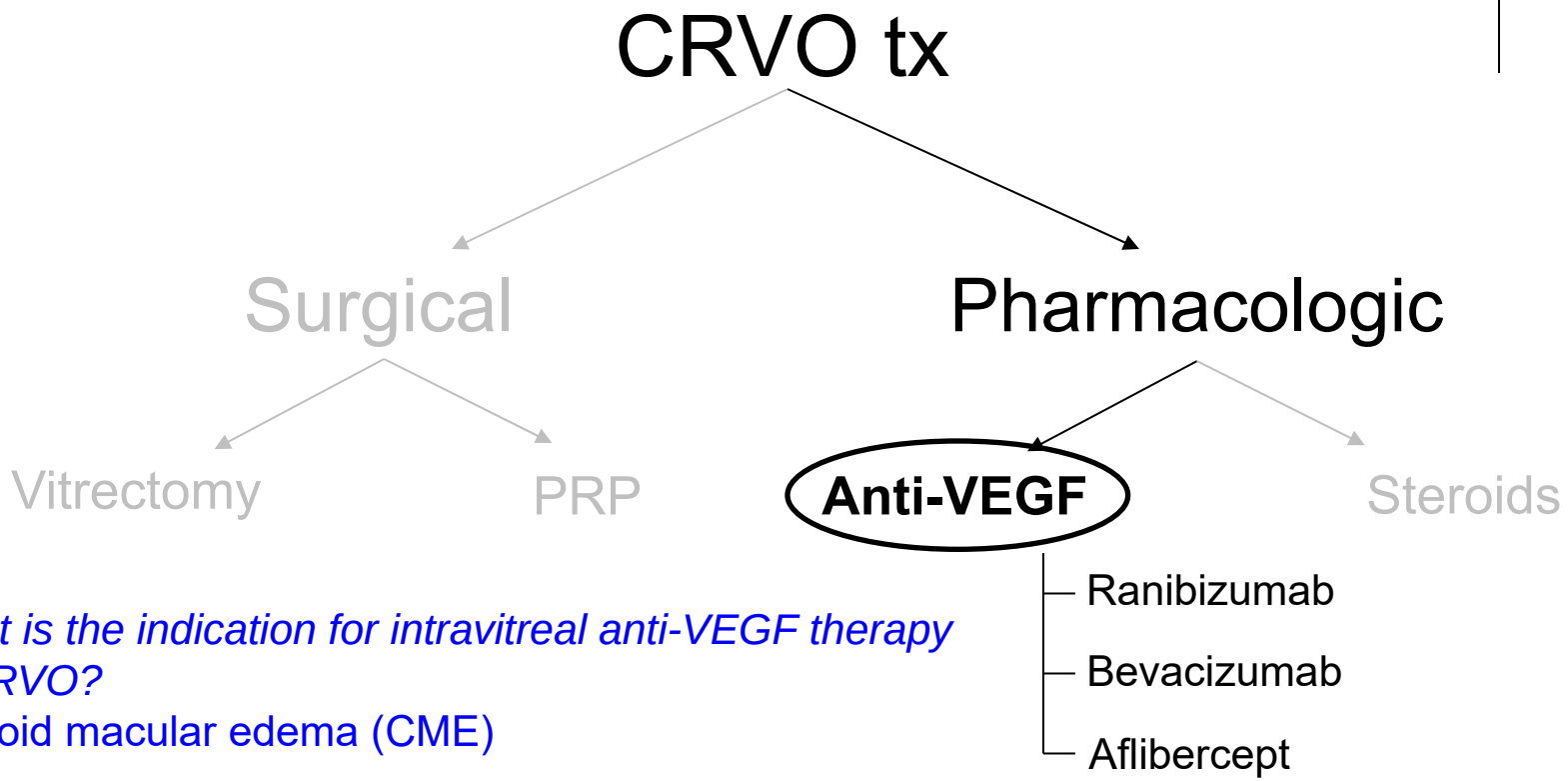
Are IVit anti-VEGF meds effective?

Q/A

CRVO



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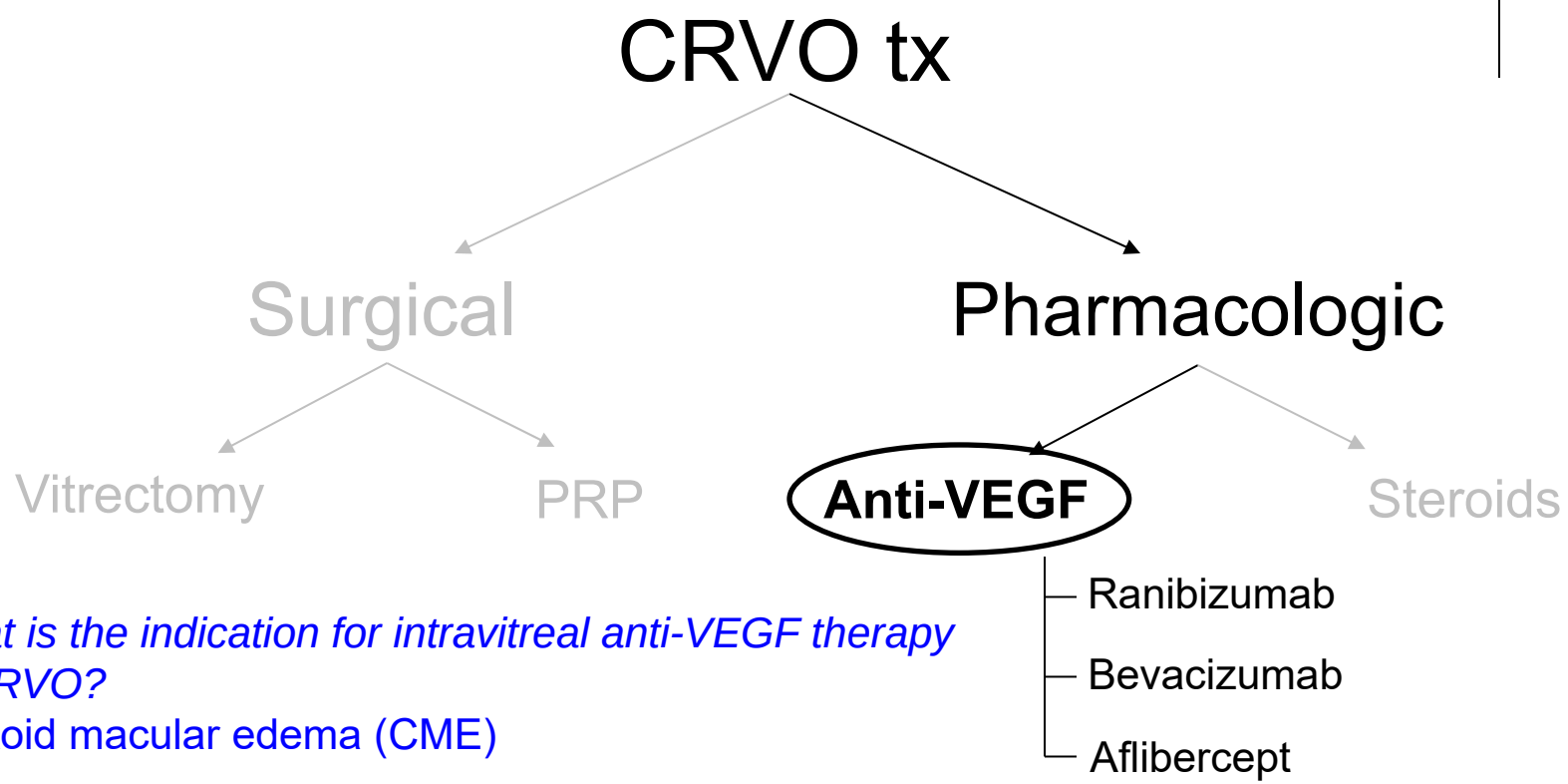
Are IVit anti-VEGF meds effective?
Indeed they are—at 6 months post-event, about % of CRVO pts will gain # or more ETDRS letters above baseline

A

CRVO



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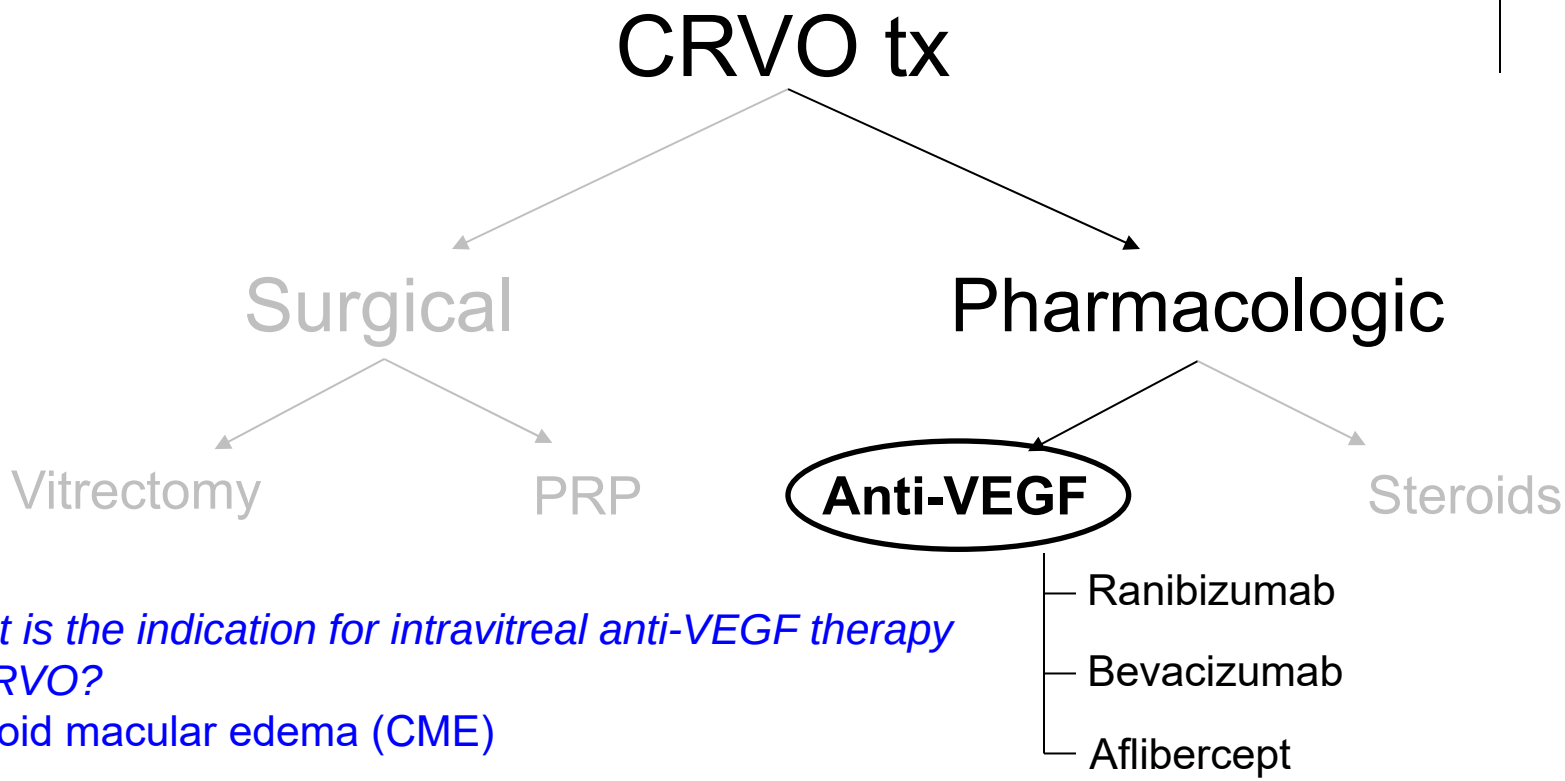

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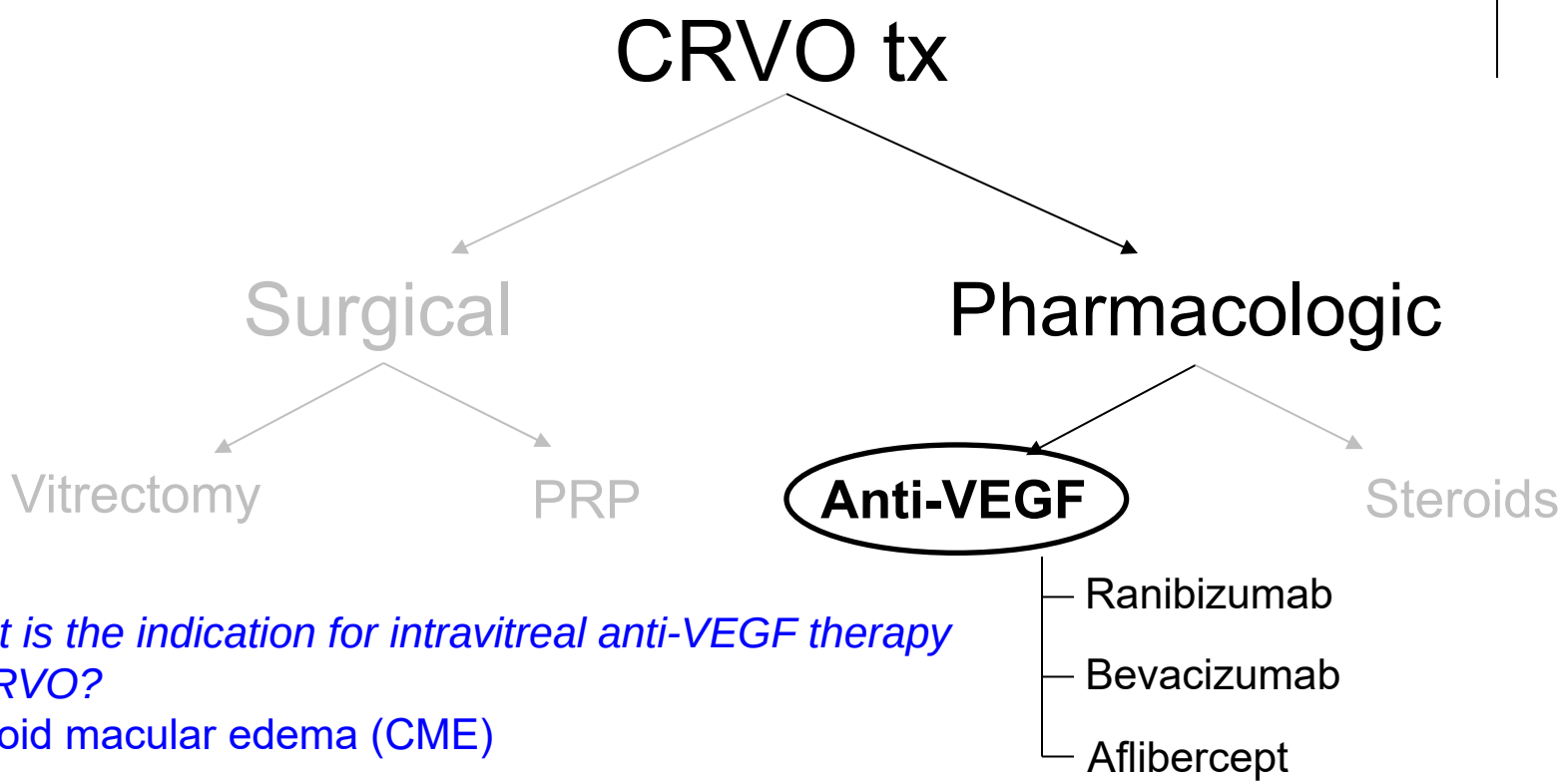
CRVO



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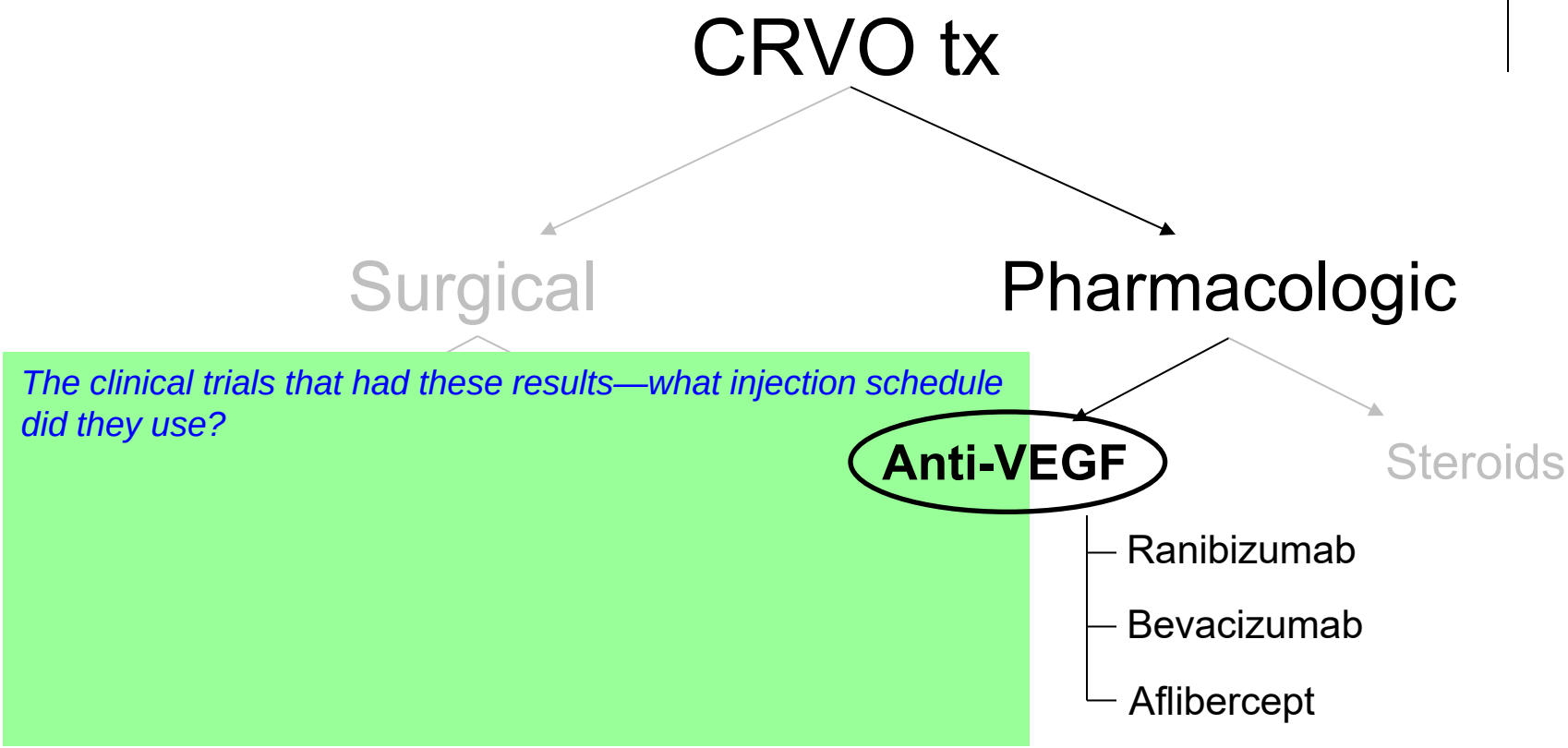

The clinical trials that had these results—what injection schedule did they use?

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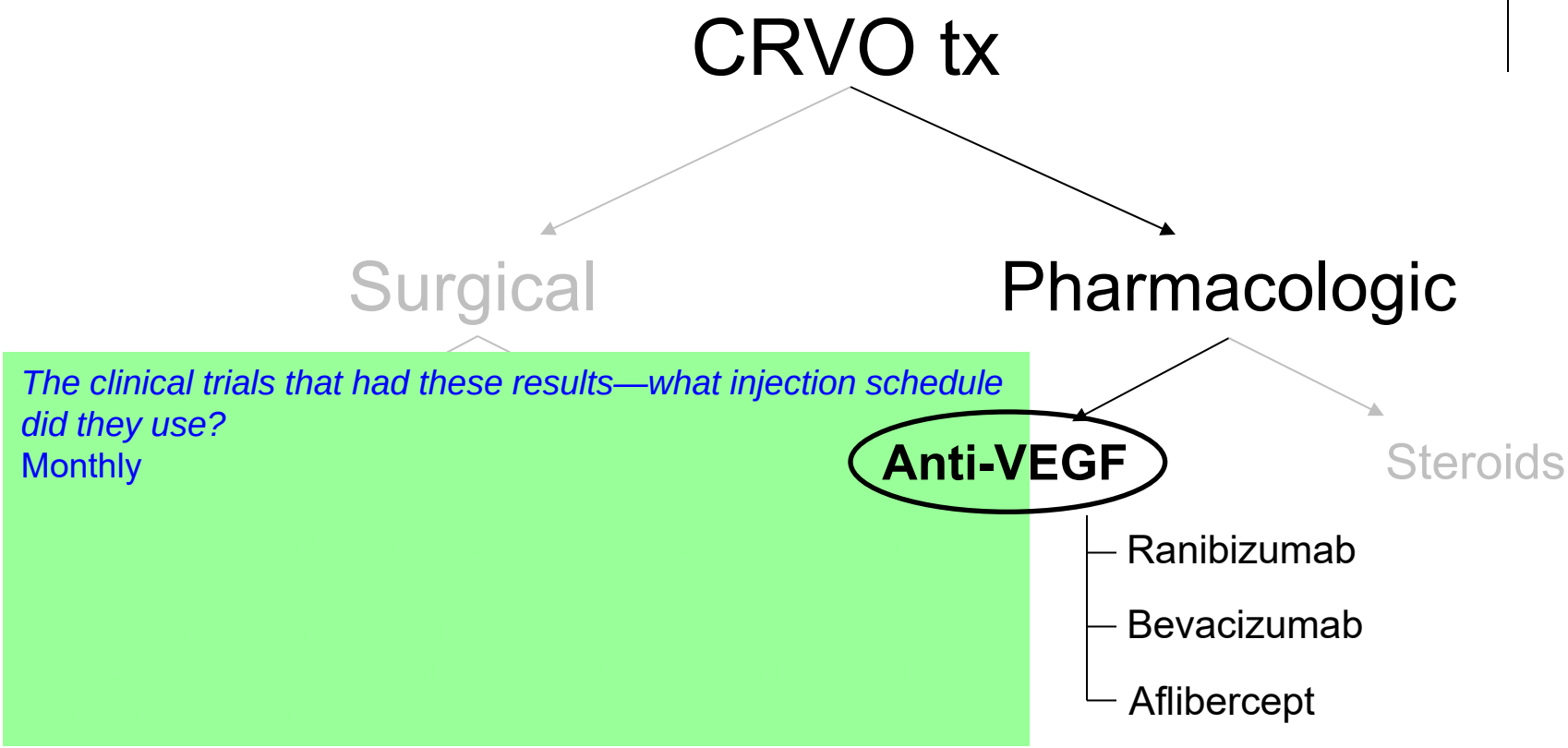

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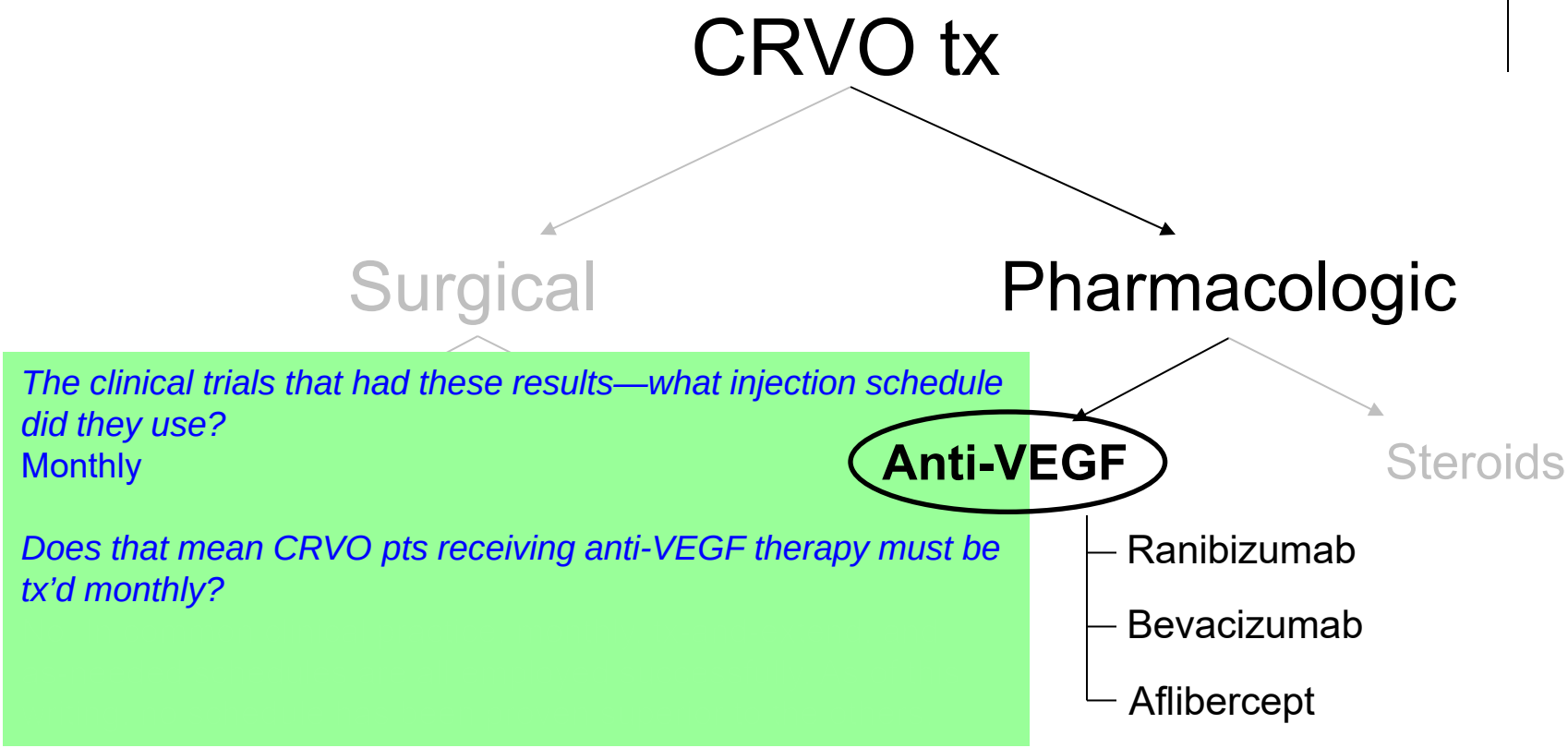

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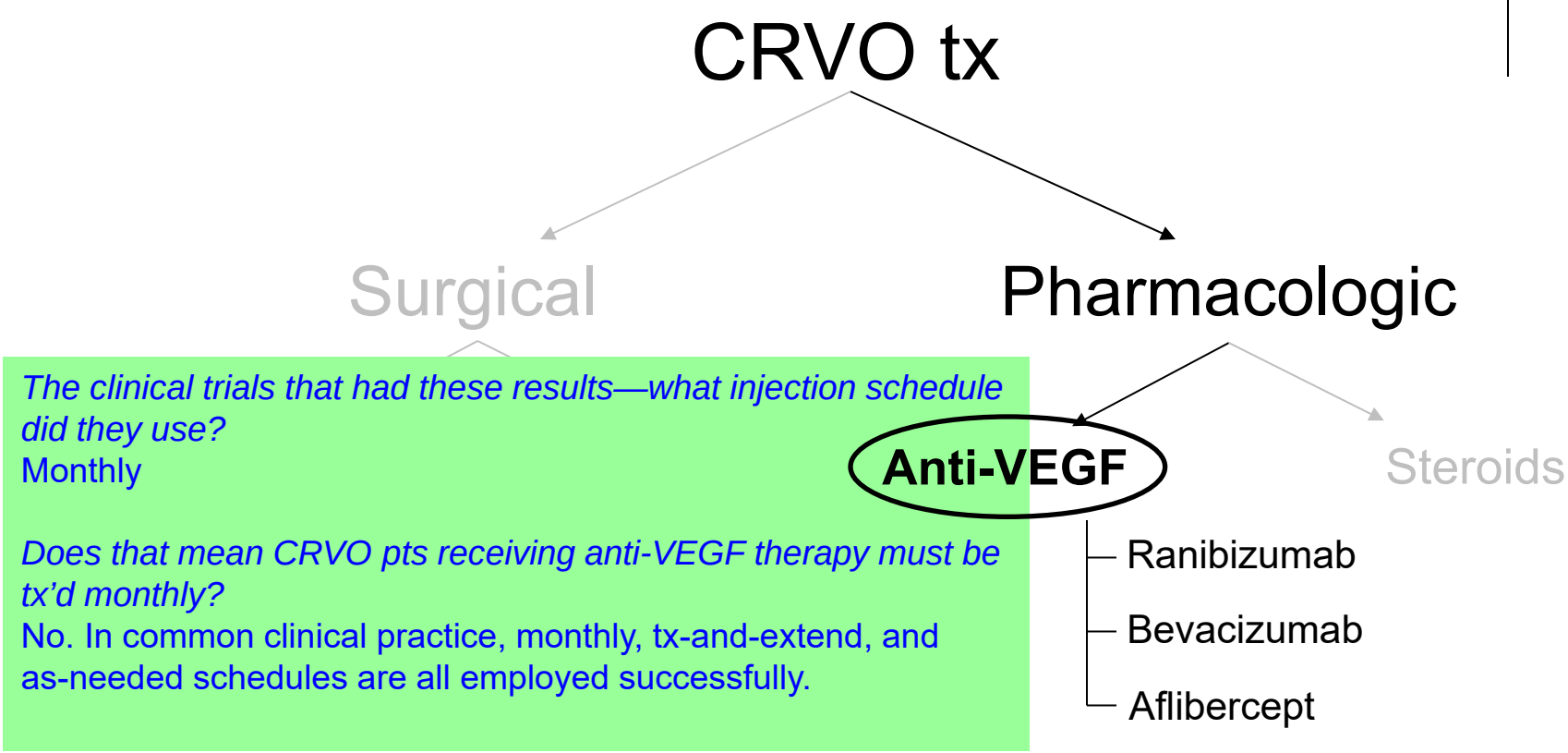

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A

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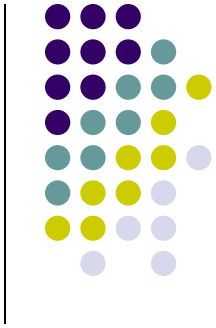


CRVO tx

- Surgical
- Pharmacologic
  - **Anti-VEGF**
    - Ranibizumab
    - Bevacizumab
    - Aflibercept
  - Steroids

The clinical trials that had these results—what injection schedule did they use?
Monthly

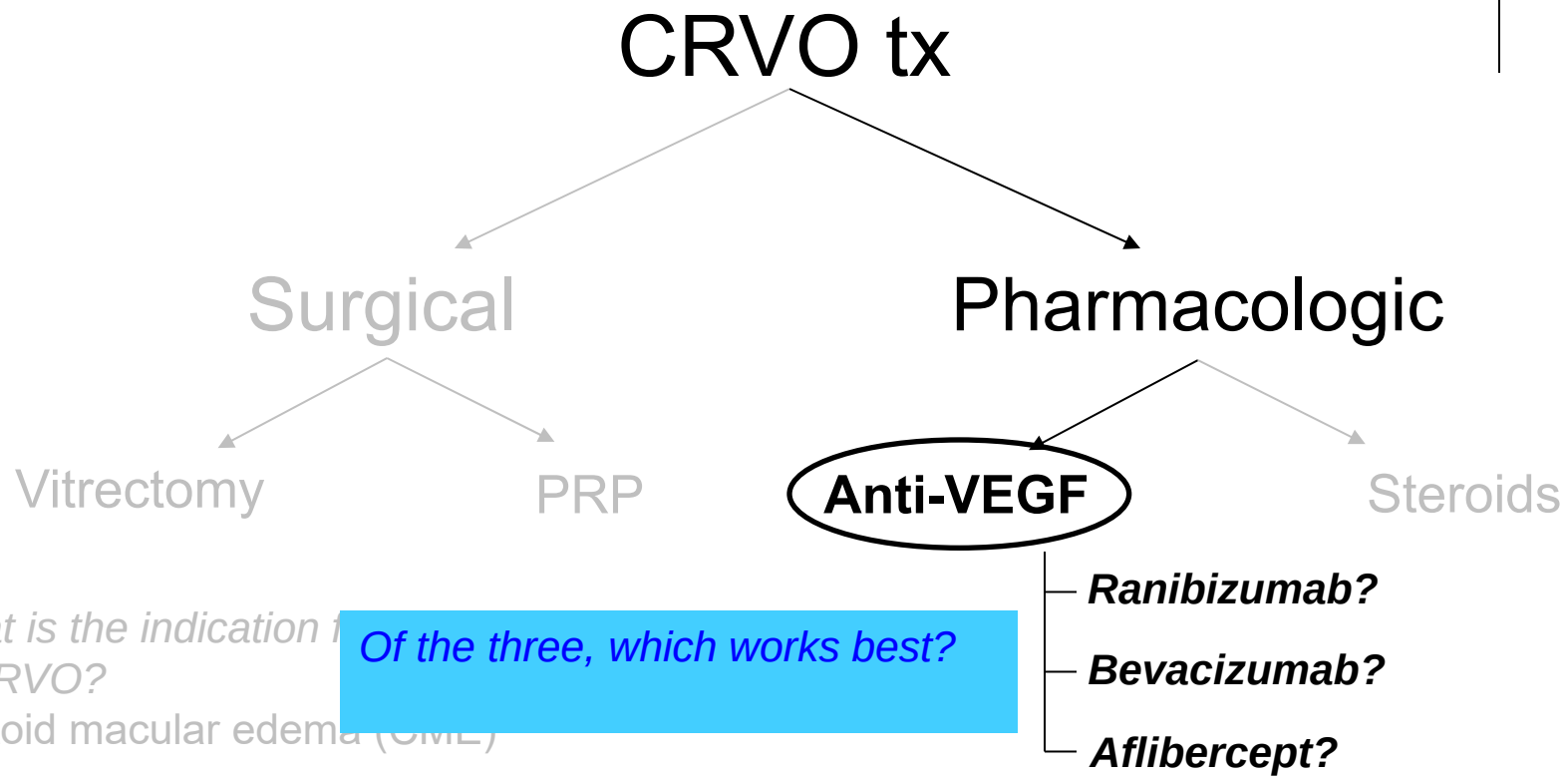
Does that mean CRVO pts receiving anti-VEGF therapy must be tx'd monthly?
No. In common clinical practice, monthly, tx-and-extend, and as-needed schedules are all employed successfully. As of this writing, no schedule has been proven superior to the others.

Are IVit anti-VEGF meds effective?
Indeed they are—**at 6 months post-event, about 50% of CRVO pts will gain 15 or more ETDRS letters above baseline**

What complications/side effects were revealed in the anti-VEGF clinical trials?
None to speak of

Q

CRVO



Of the three, which works best?

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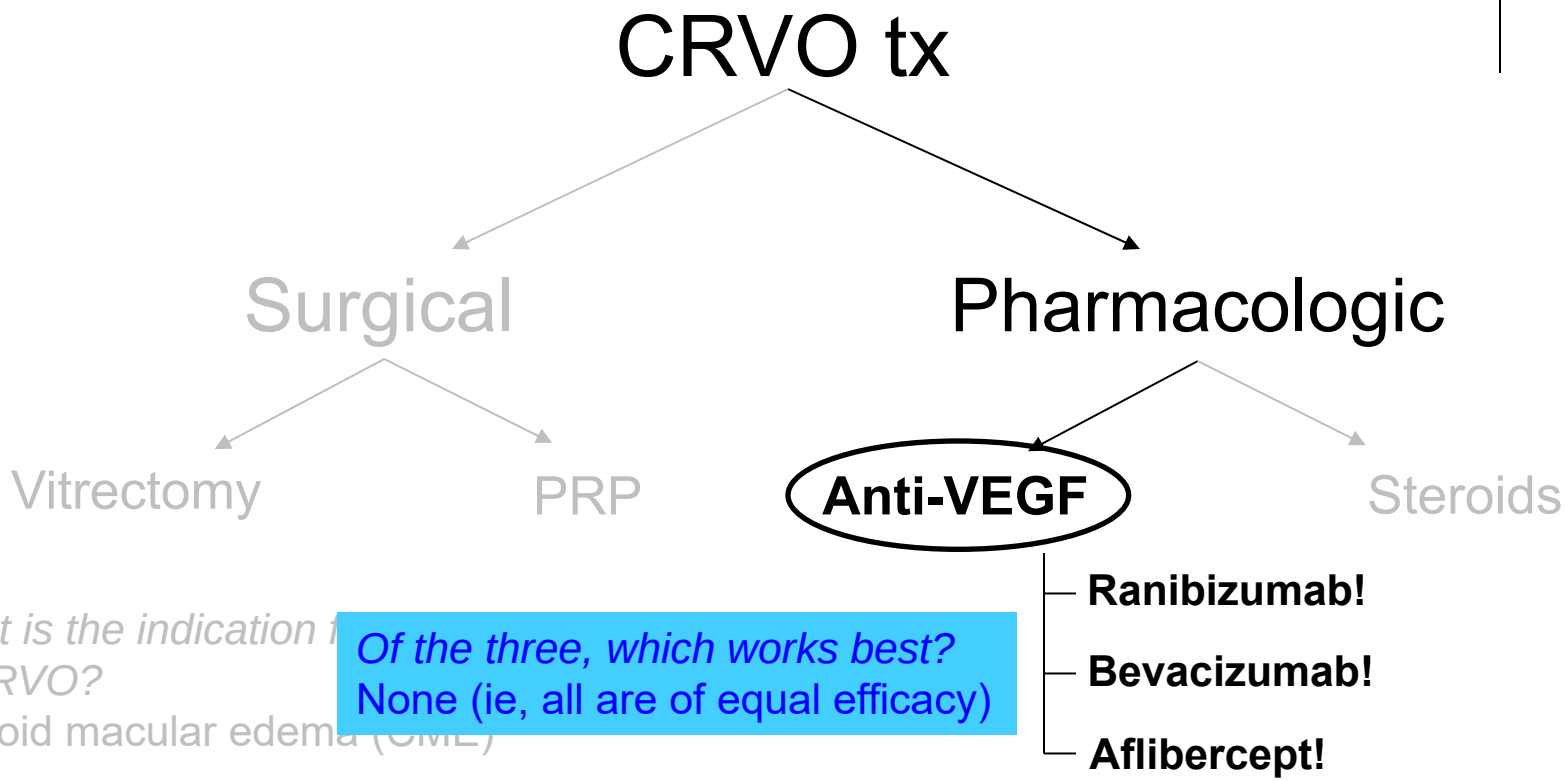
None to speak of

A

CRVO



What is the indication f
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Cystoid macular edema (CME)

Of the three, which works best?
None (ie, all are of equal efficacy)

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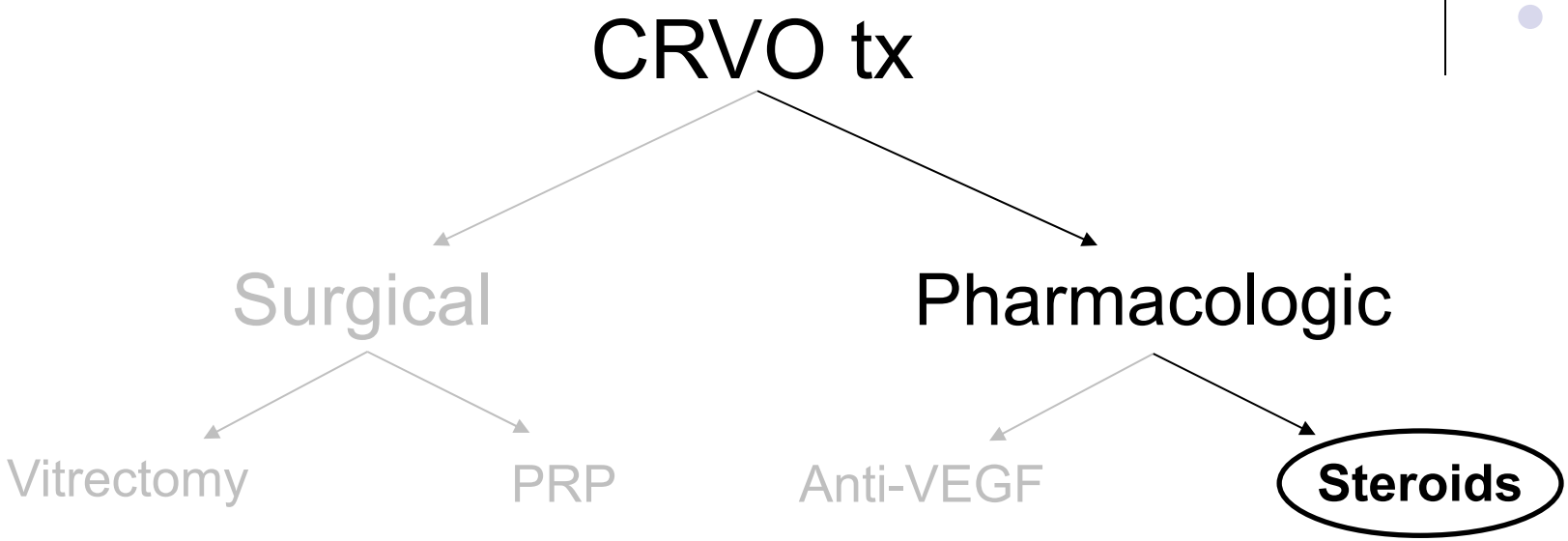

What is the indication for intravitreal steroids in CRVO?

A

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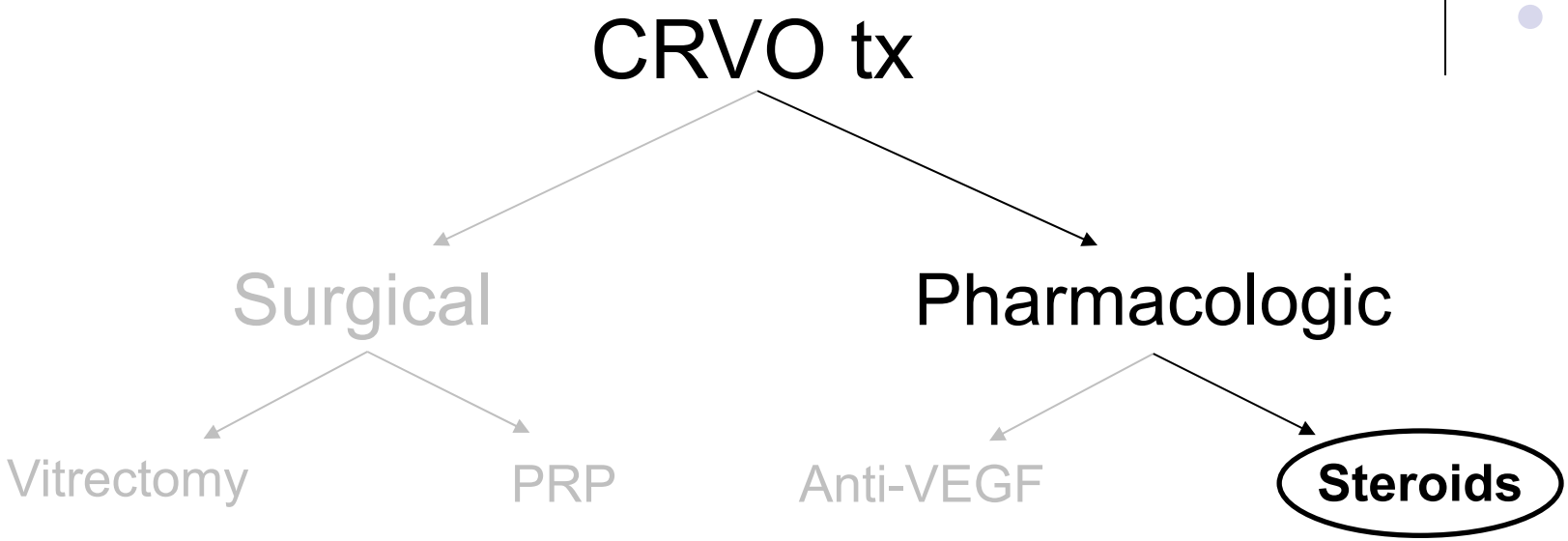

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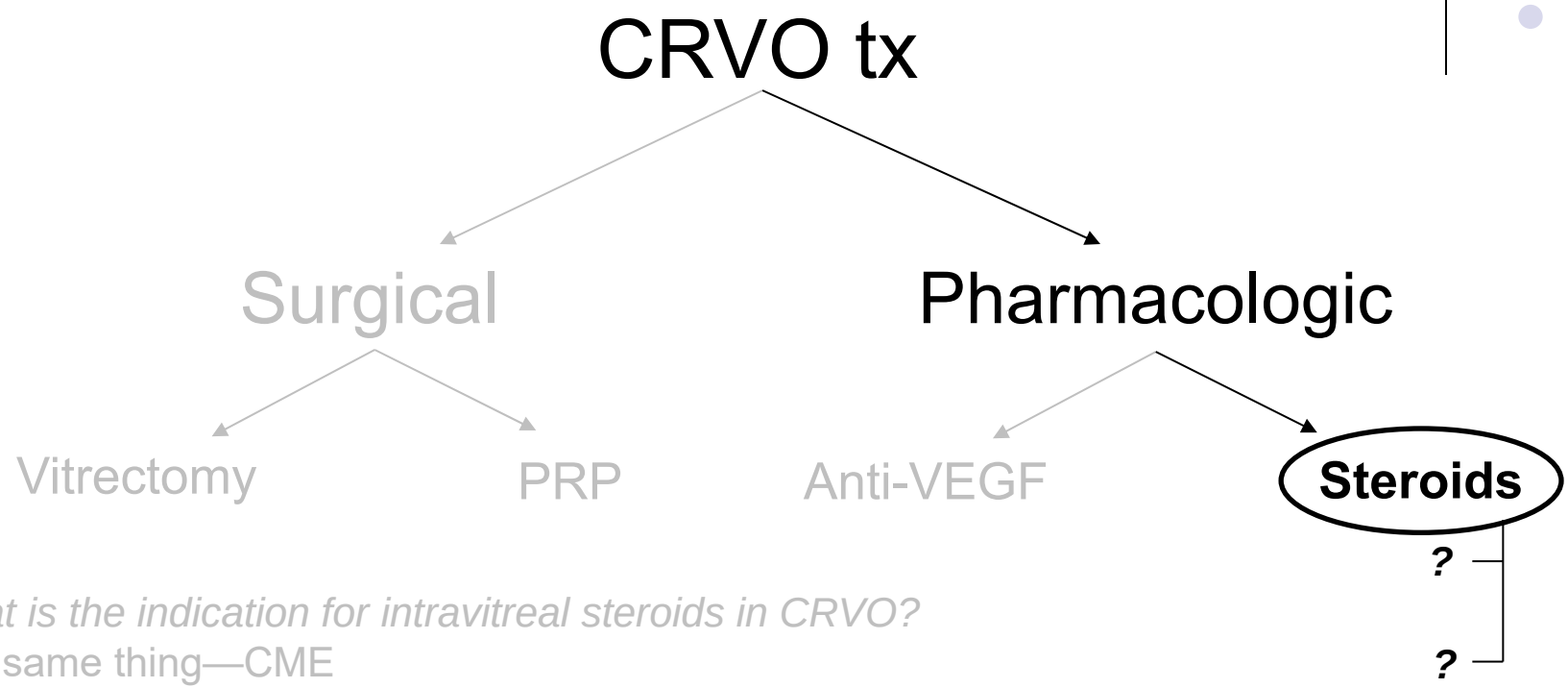
The same thing—CME

Q

CRVO



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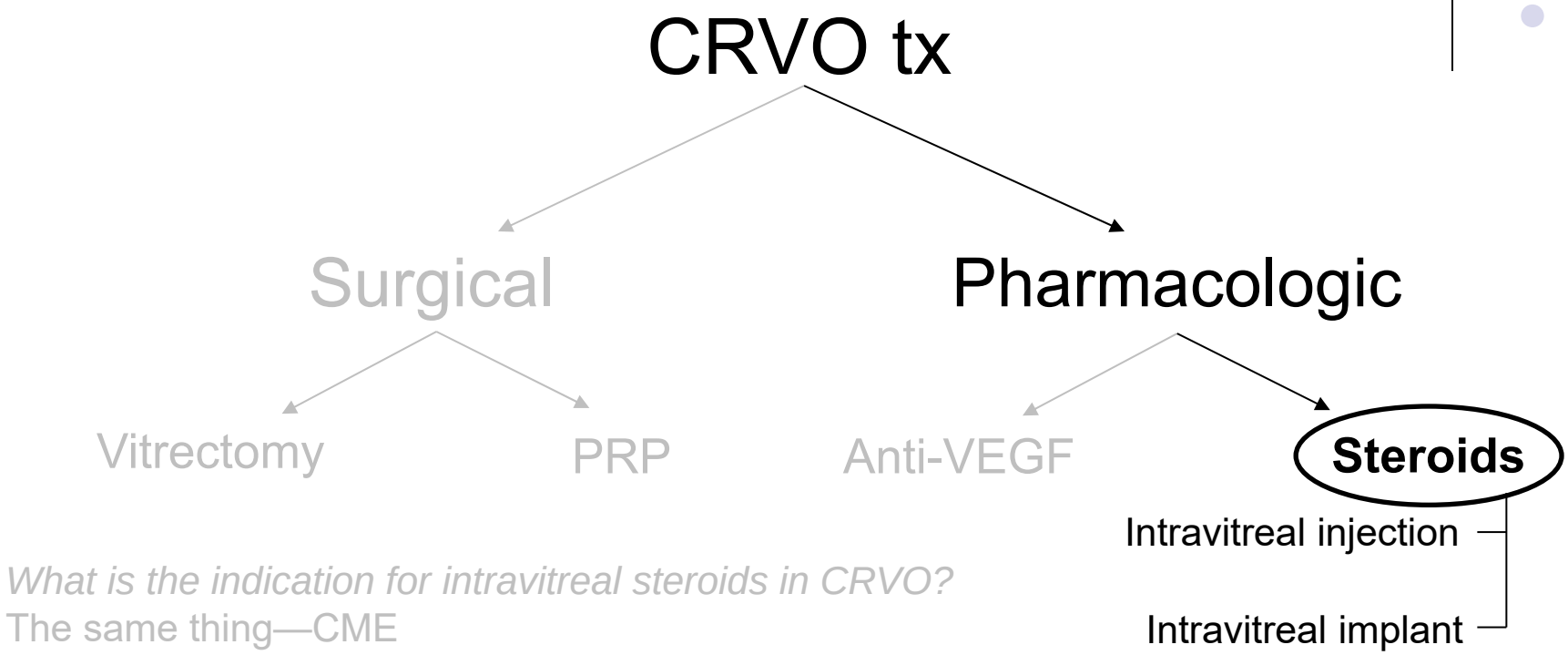
The same thing—CME

What are the two means of IVit steroid delivery?

A

CRVO



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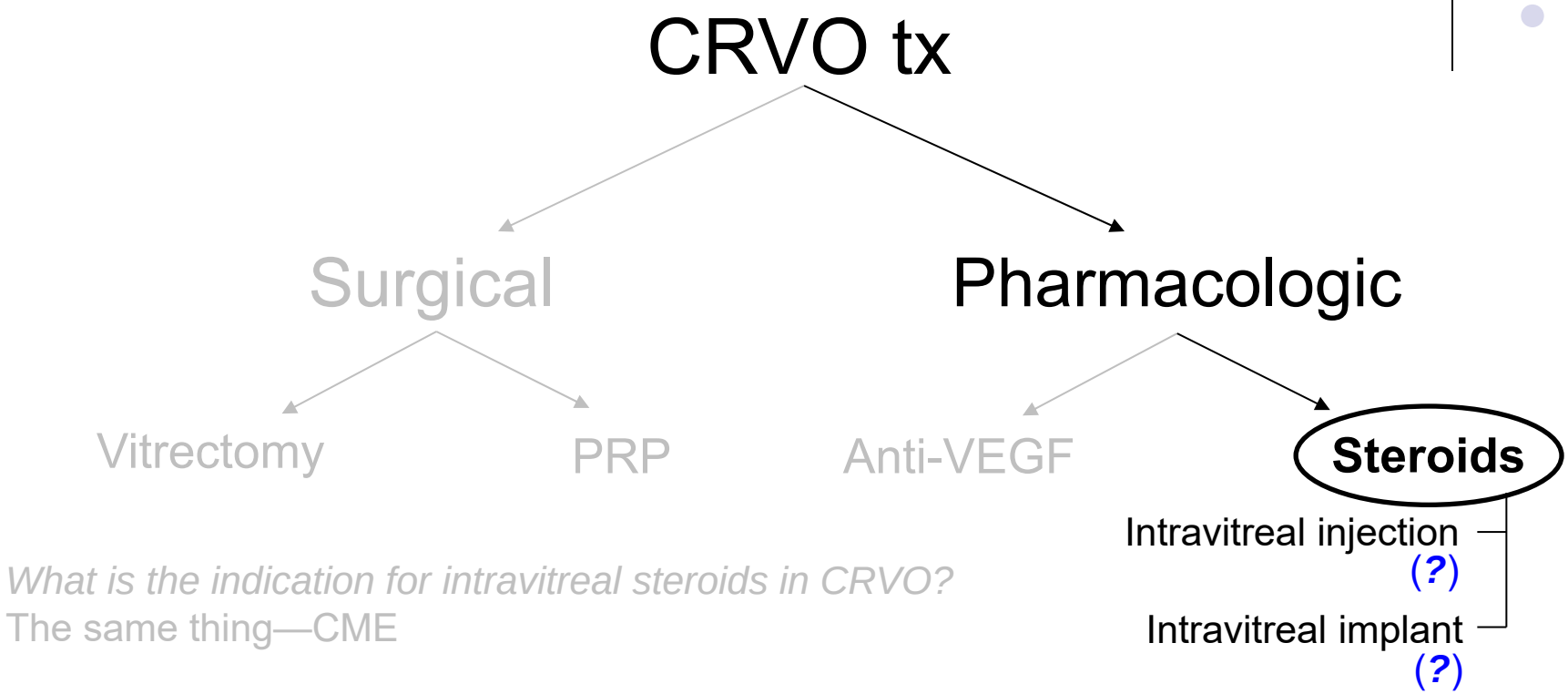

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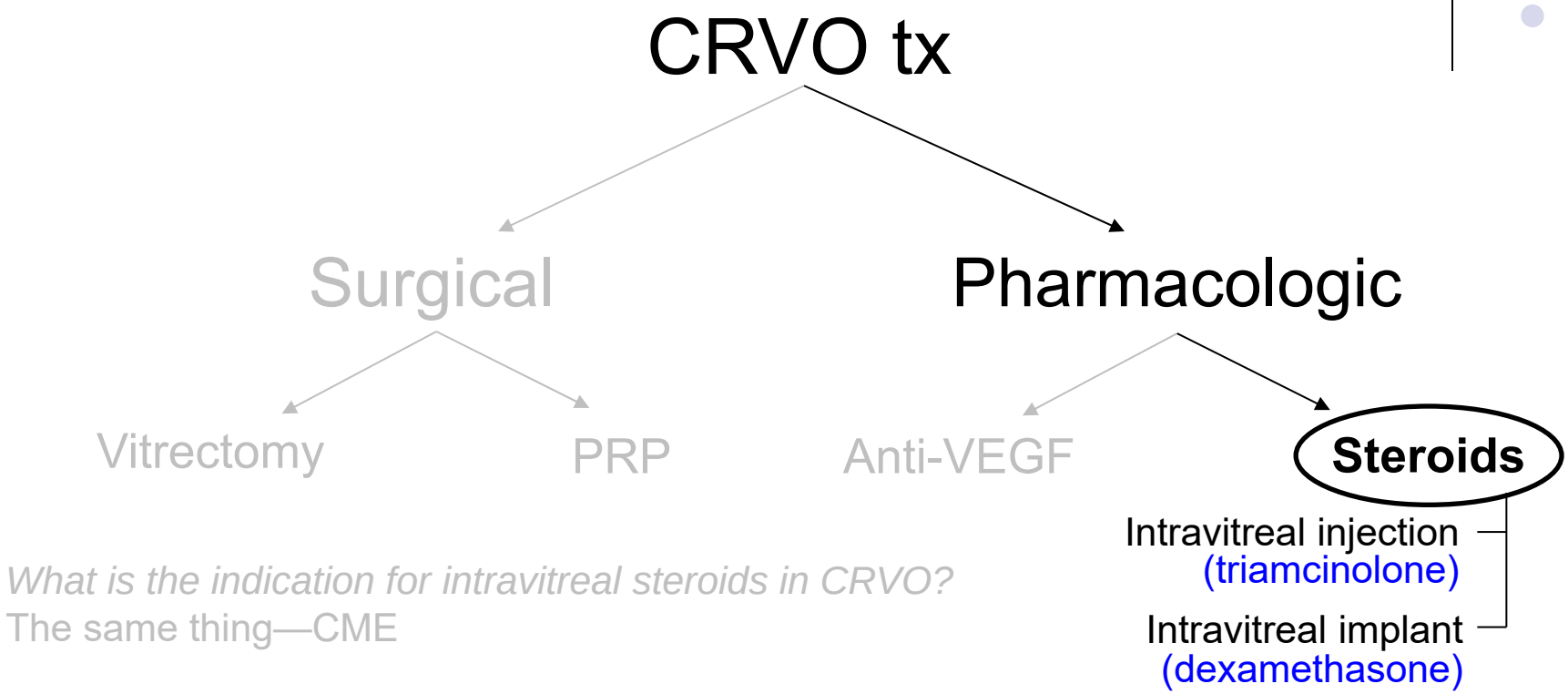
A

CRVO



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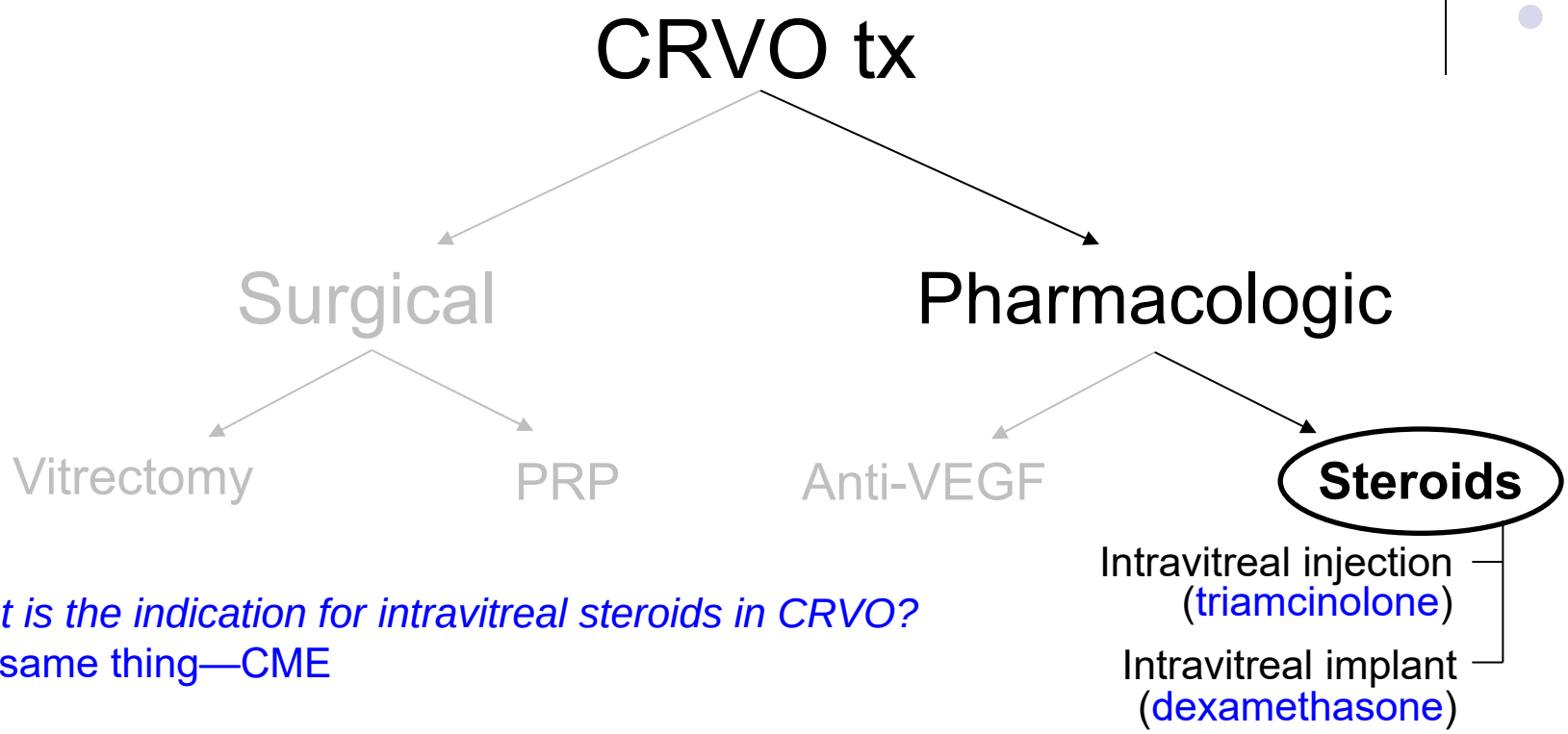

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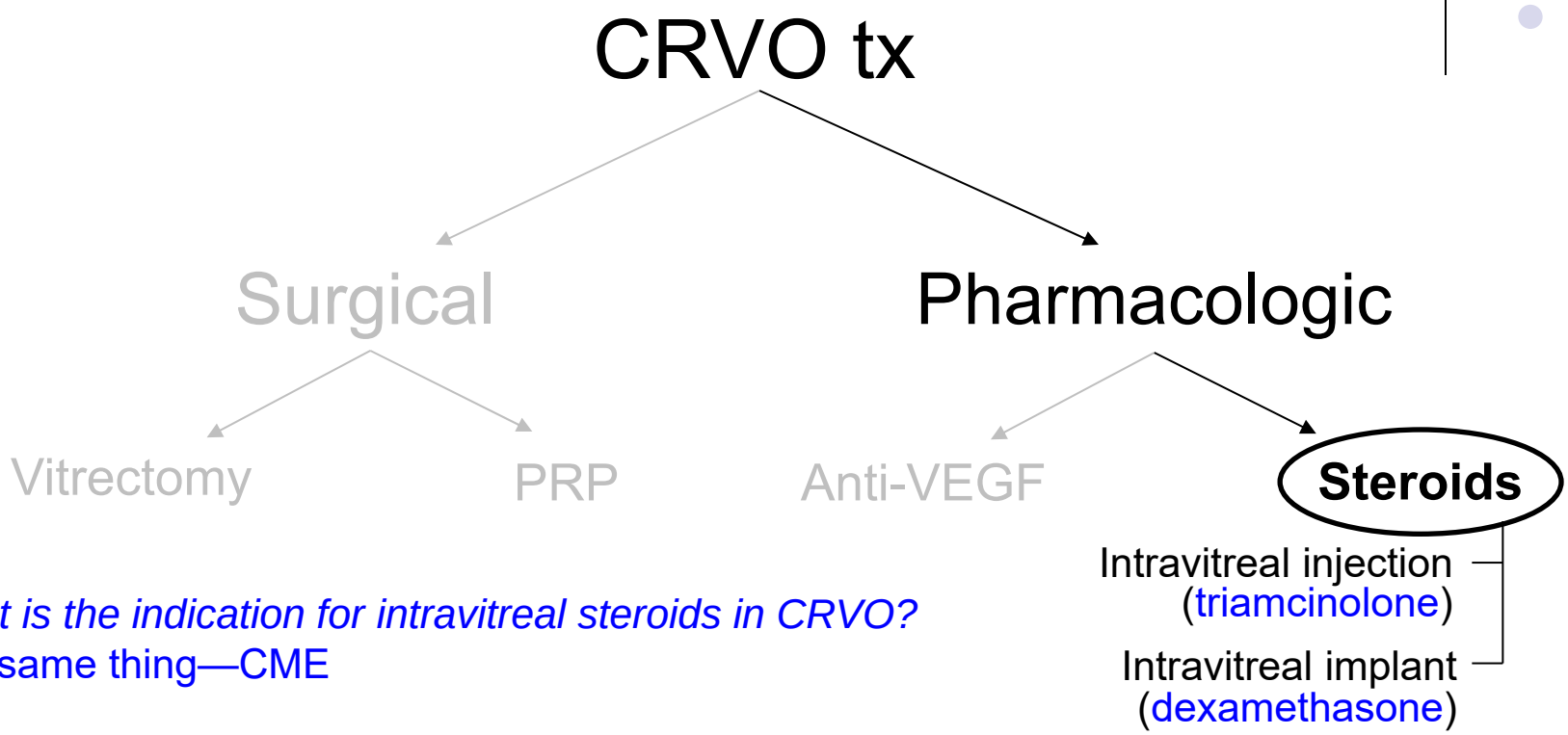
Are IVit steroids effective?

Q/A

CRVO



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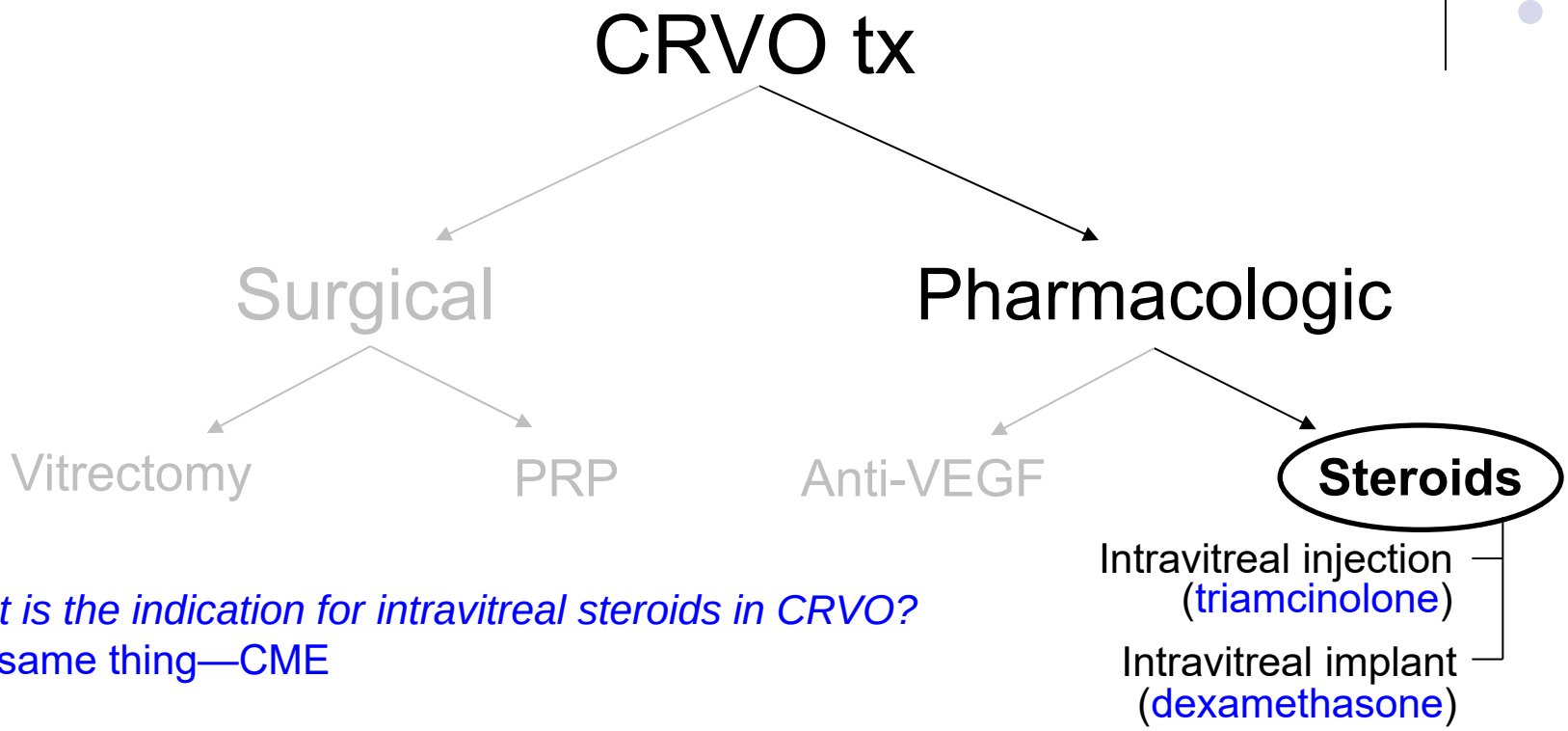
A

CRVO



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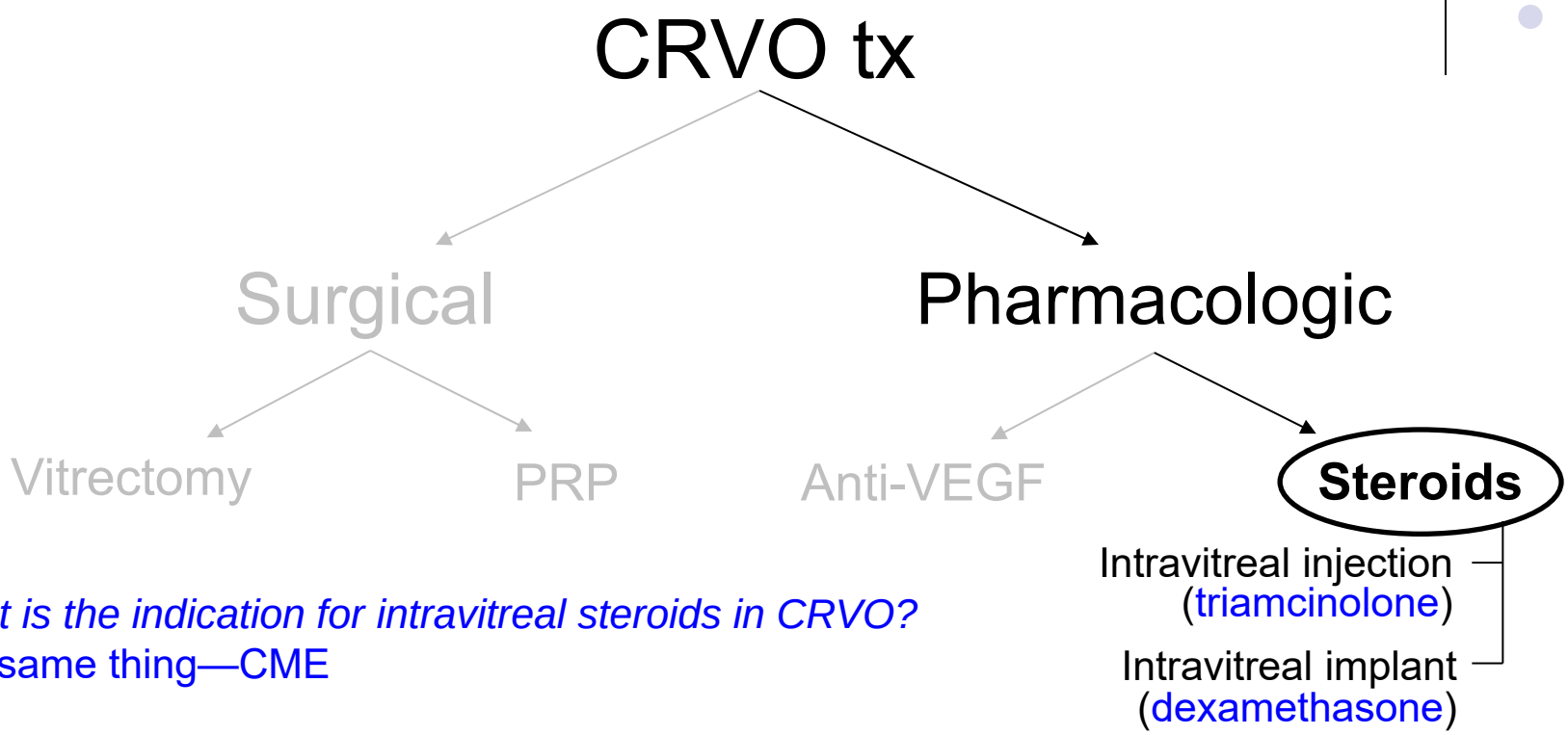

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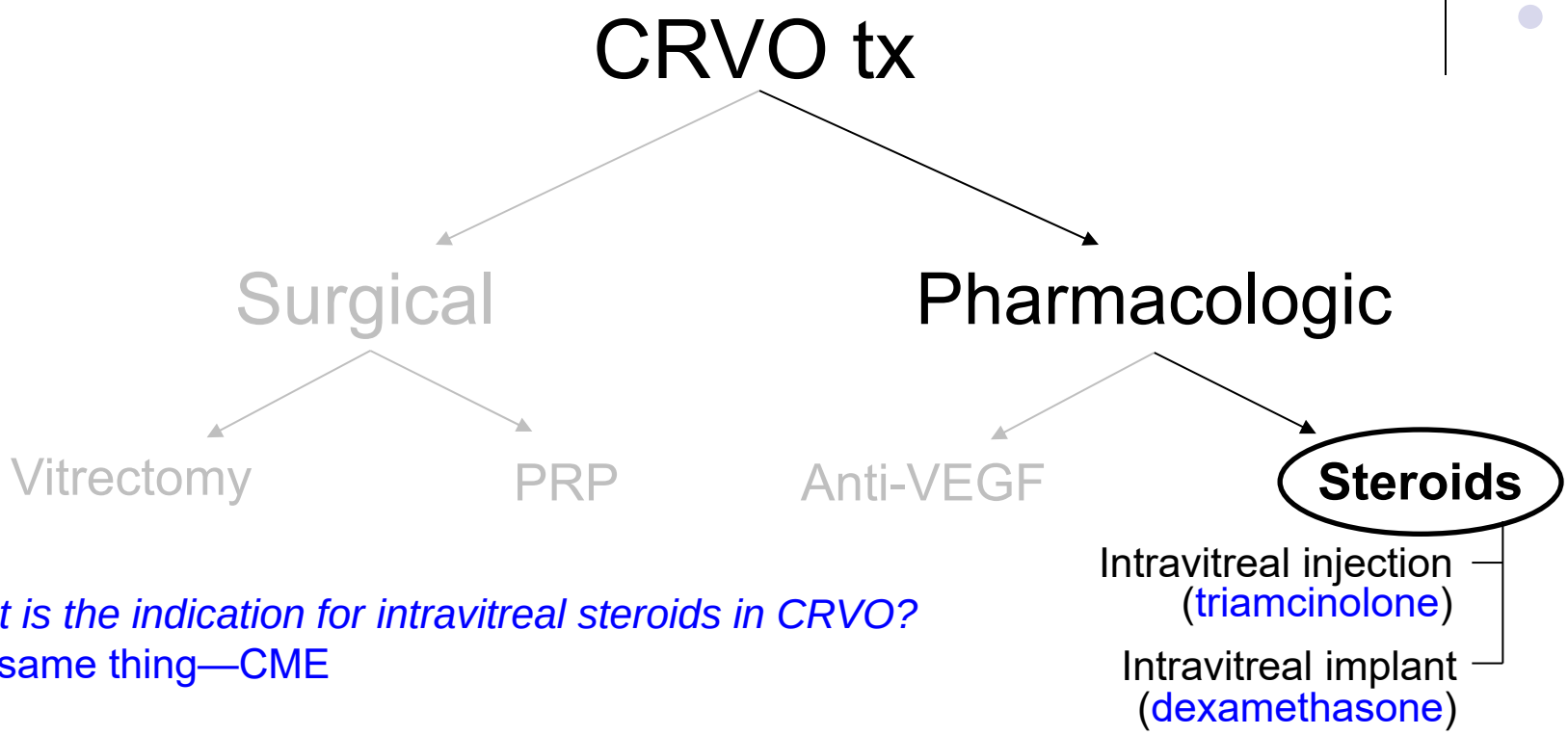
Q

CRVO



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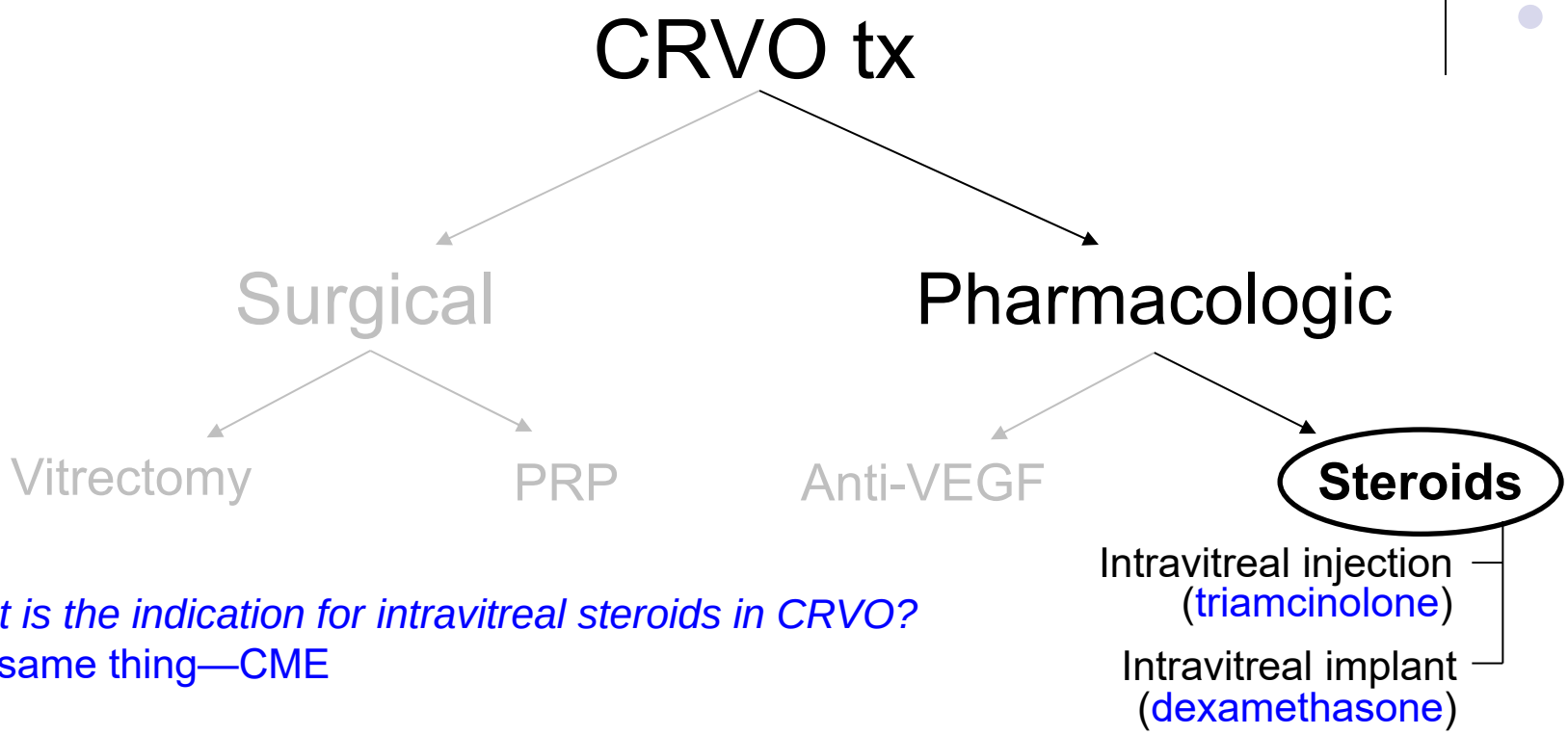

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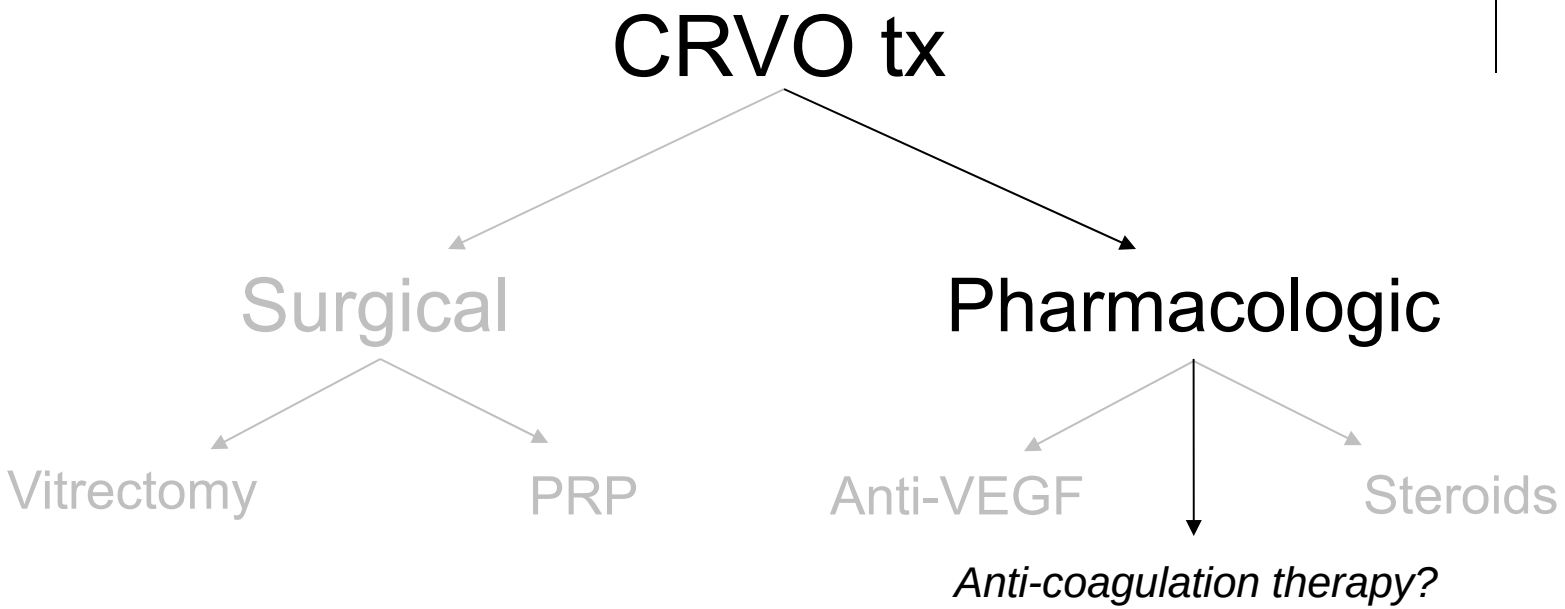
The same thing—CME

Are IVit steroids effective?
Meh. IVit triamcinolone is about half as good as IVit anti-VEGF tx, with about 25% of pts picking up 15+ ETDRS letters. The IVit implant fared even worse—while pts picked up ETDRS letters initially, after 3 months or so they lost most of their gainz, brah.

What complications/side effects were revealed in IVit steroid clinical trials?
The same two that dog all chronic ocular steroid use—cataract formation and IOP elevation

Q

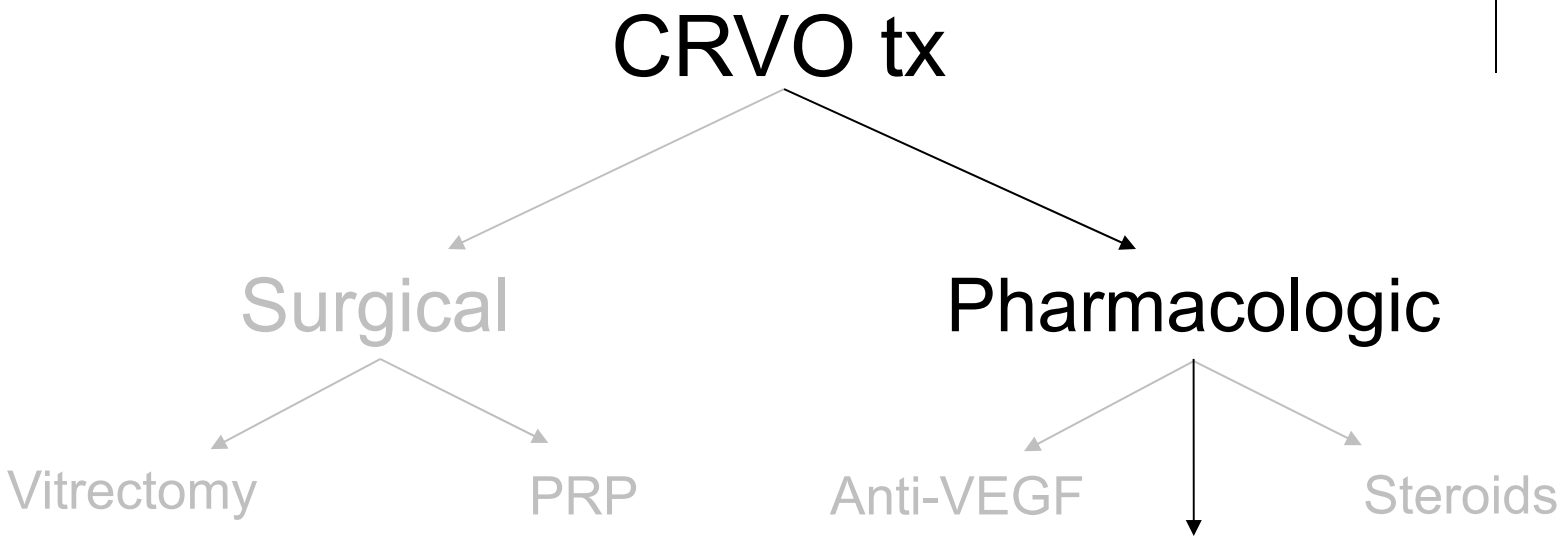
CRVO



Finally: Is anti-coagulation therapy indicated in the management of CRVO?

A

CRVO



Anti-coagulation therapy? **No!**

Finally: Is anti-coagulation therapy indicated in the management of CRVO? **No**. Not only has it failed to demonstrate efficacy, it has been shown to *worsen* the intraretinal hemorrhages.