

# The Challenges of Cataract Surgery

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# Financial Disclosures

I have no financial disclosures with  
any products or technologies  
presented today

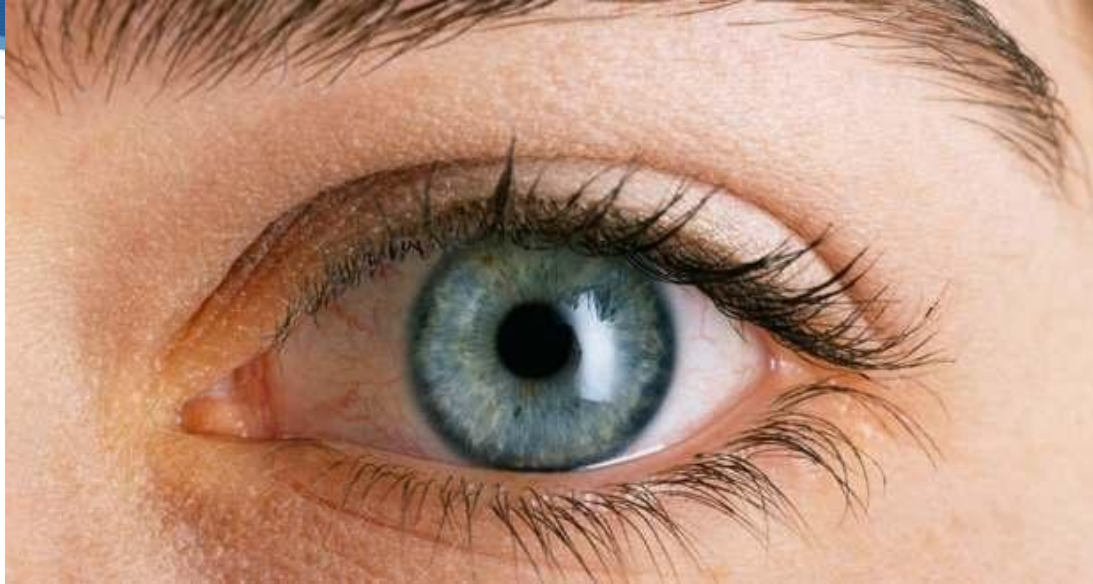


# Learning Points

- ◆ Understand how Cataracts affects our Sight
- ◆ Understand the Goals of Cataract Surgery
- ◆ Understand the Challenges and Limitations of Cataract Surgery



# How do we see?



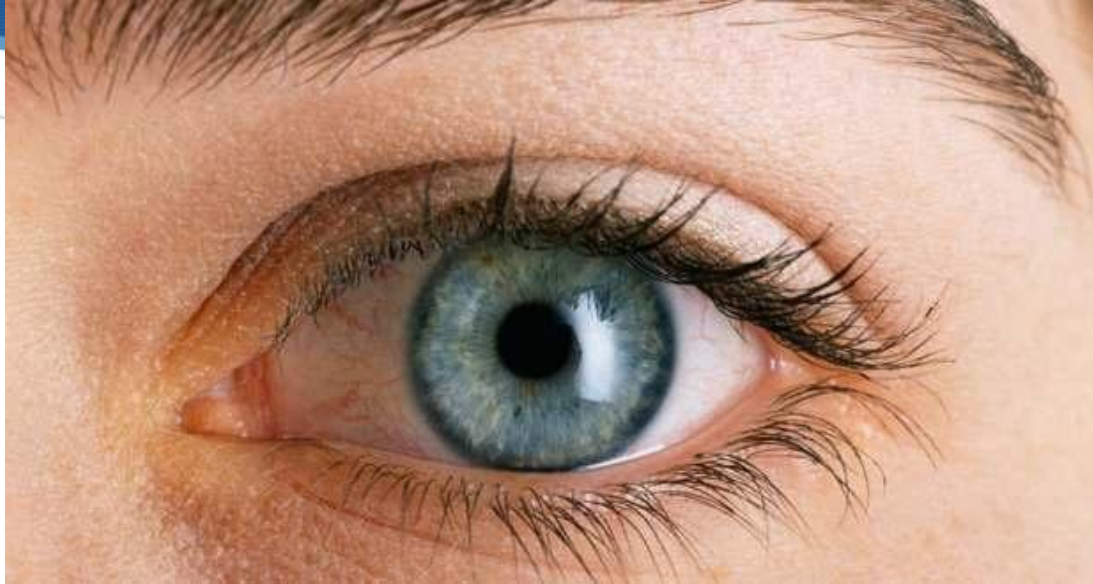
# How do we see?



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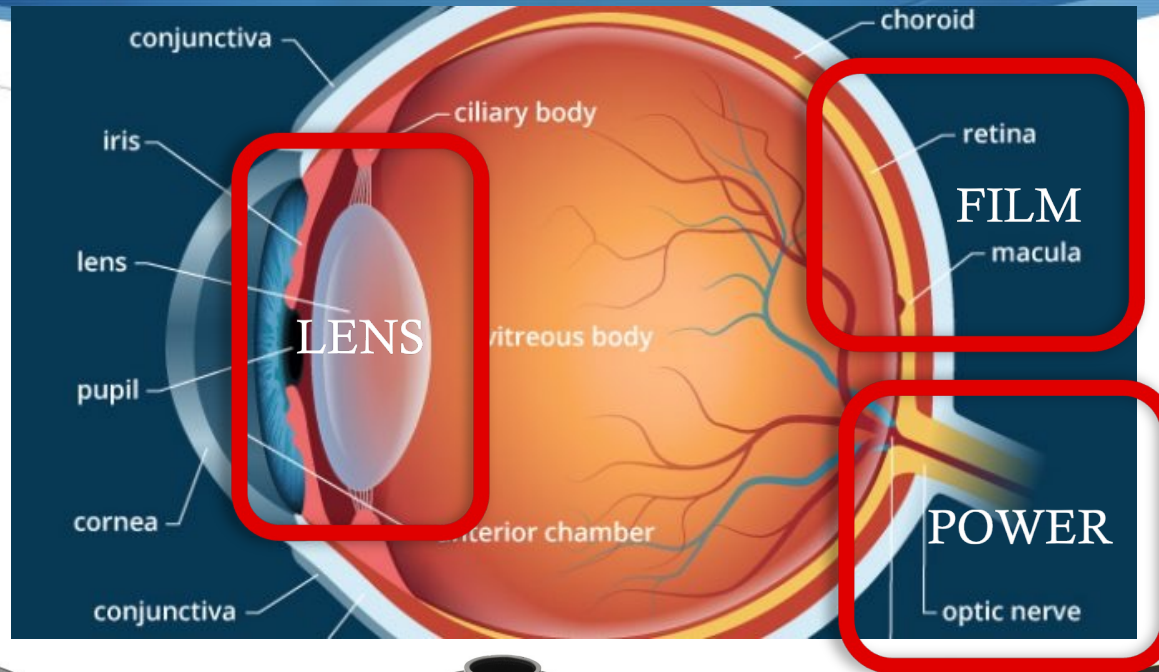


# How do we see?





# How do we see?





# Cataract

*Cataracta (Latin) or Katarráktēs (Greek): “water fall” or white water*



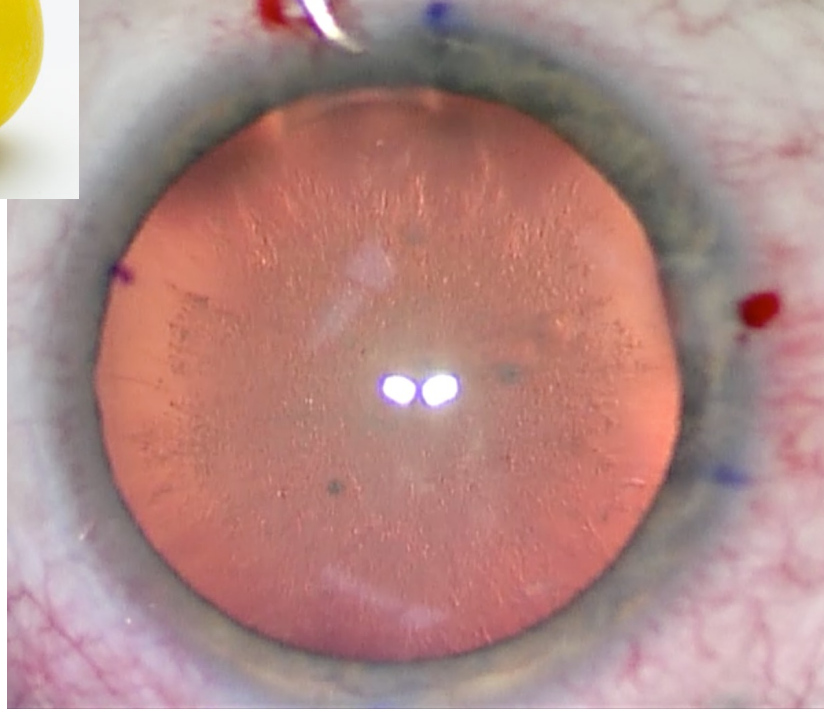
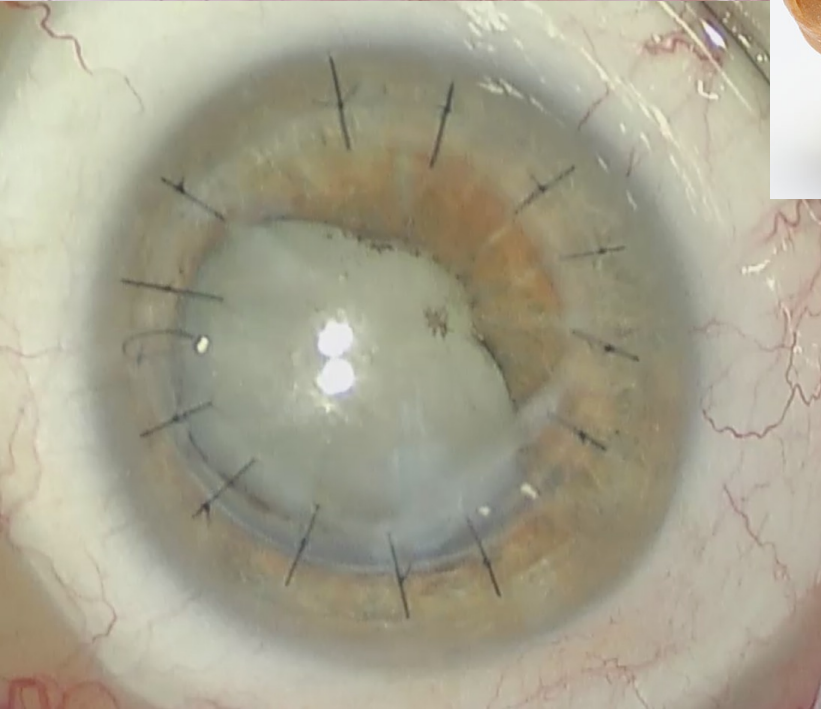
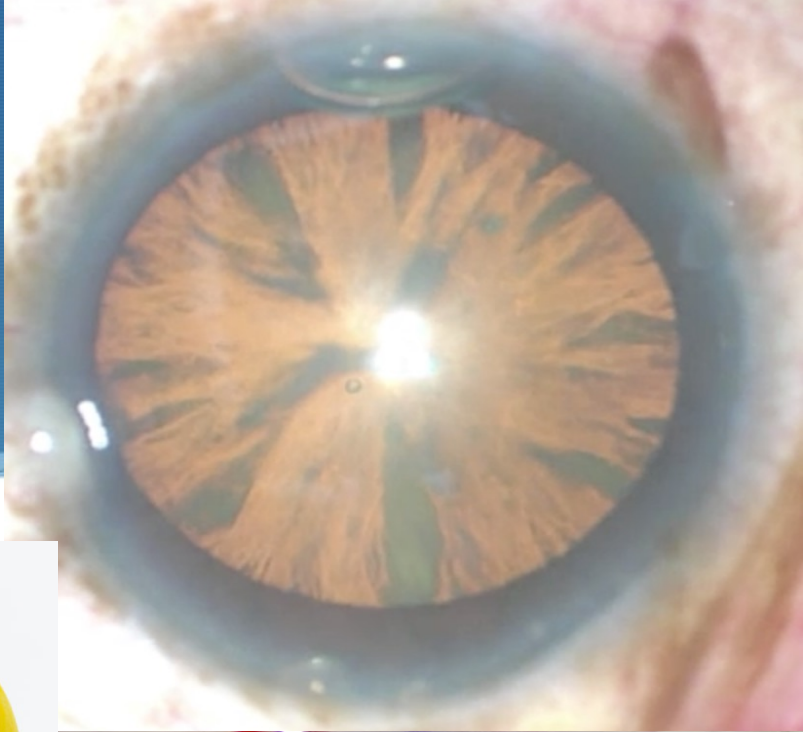
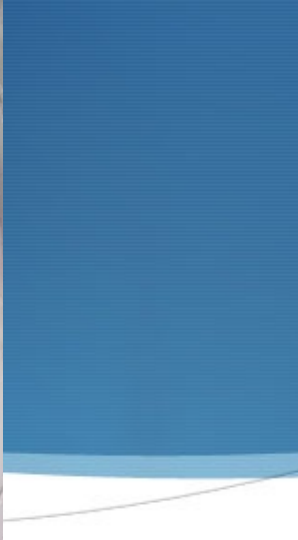
# 65 Million





**CATARACT PROGRESSION**







# White Chocolate Peanut M&M!



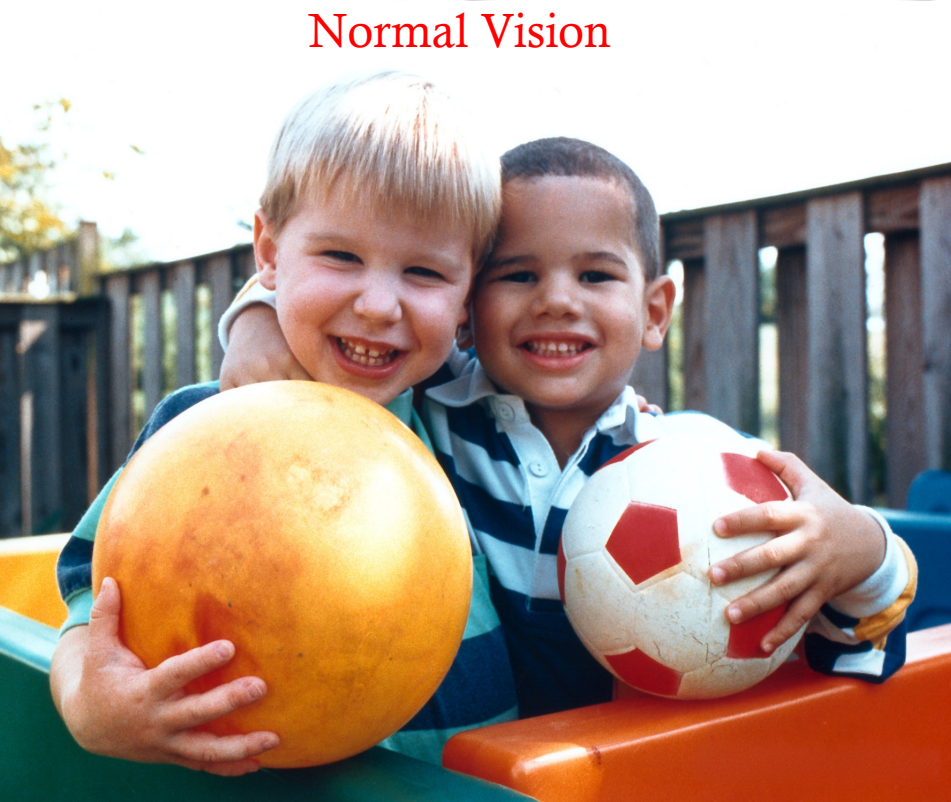
# The Typical Cataract Patient



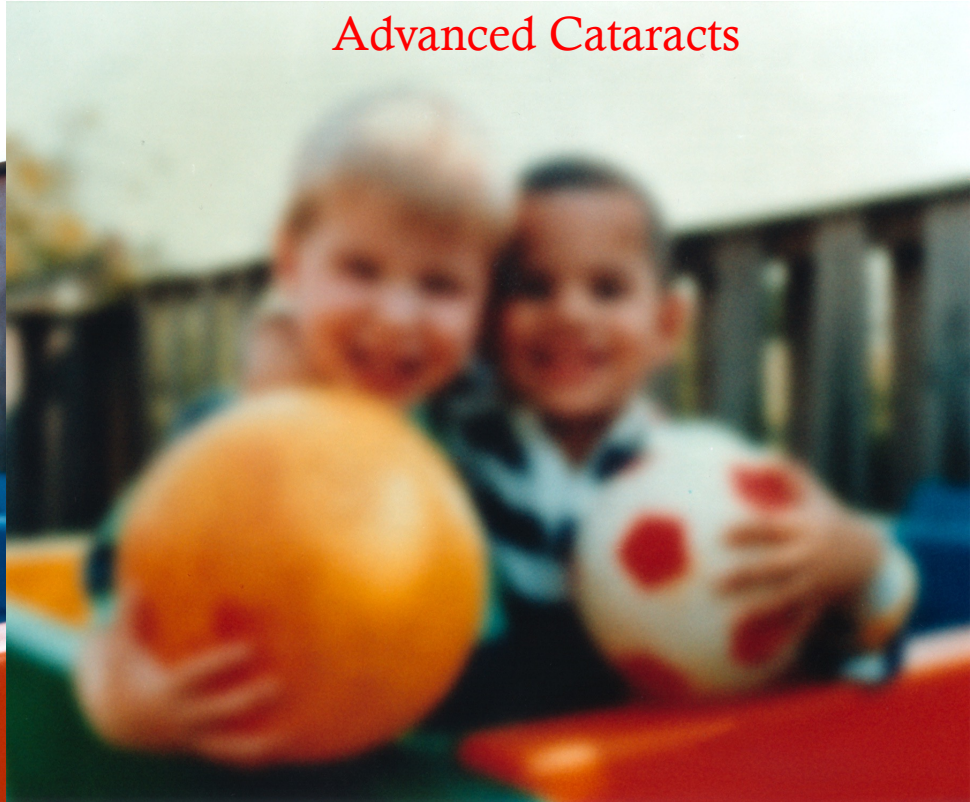


# How Cataract Affect Sight

Normal Vision

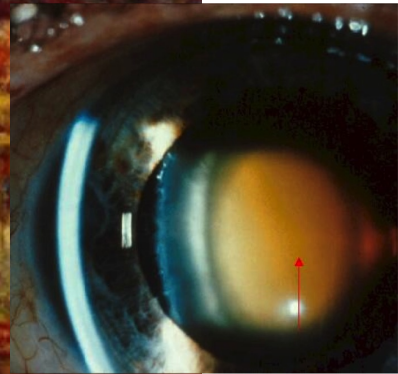
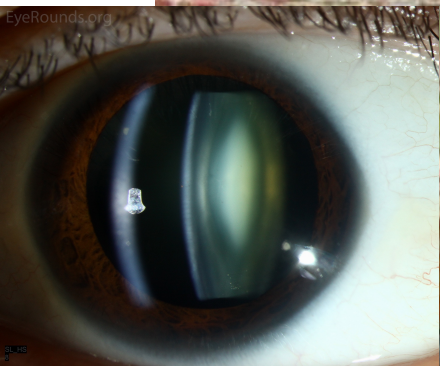


Advanced Cataracts



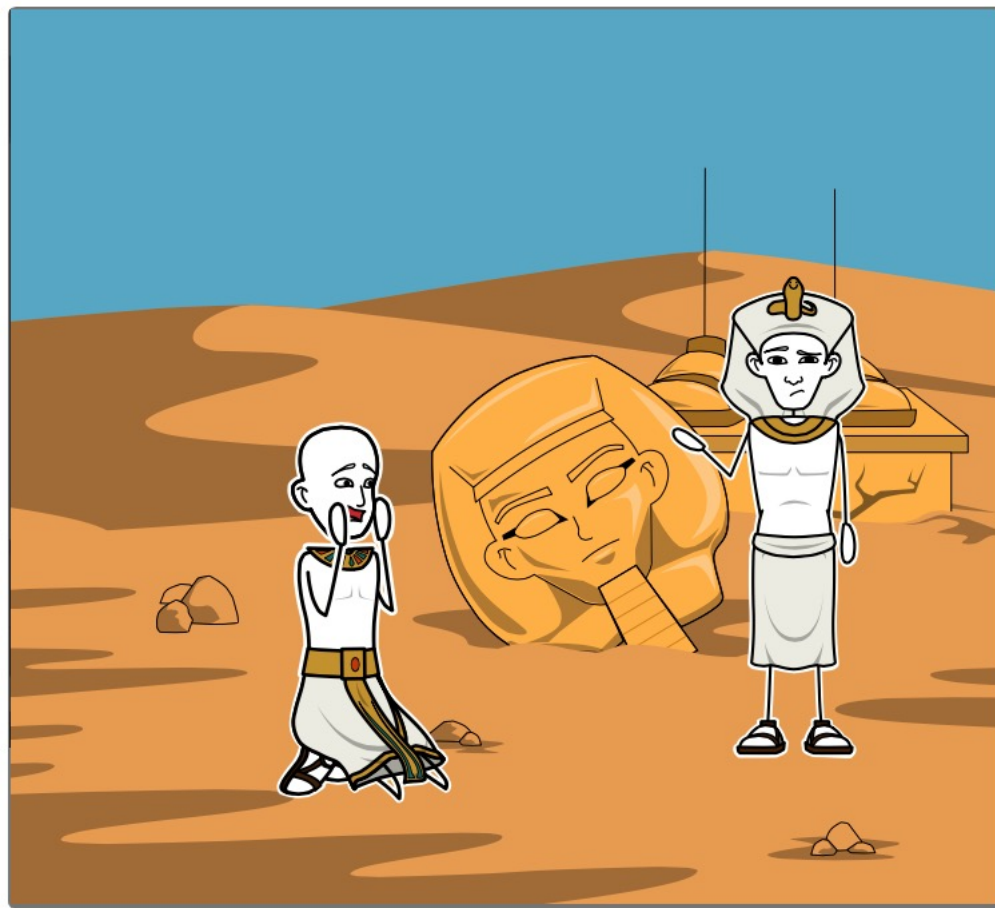


# How Cataracts Affect Sight

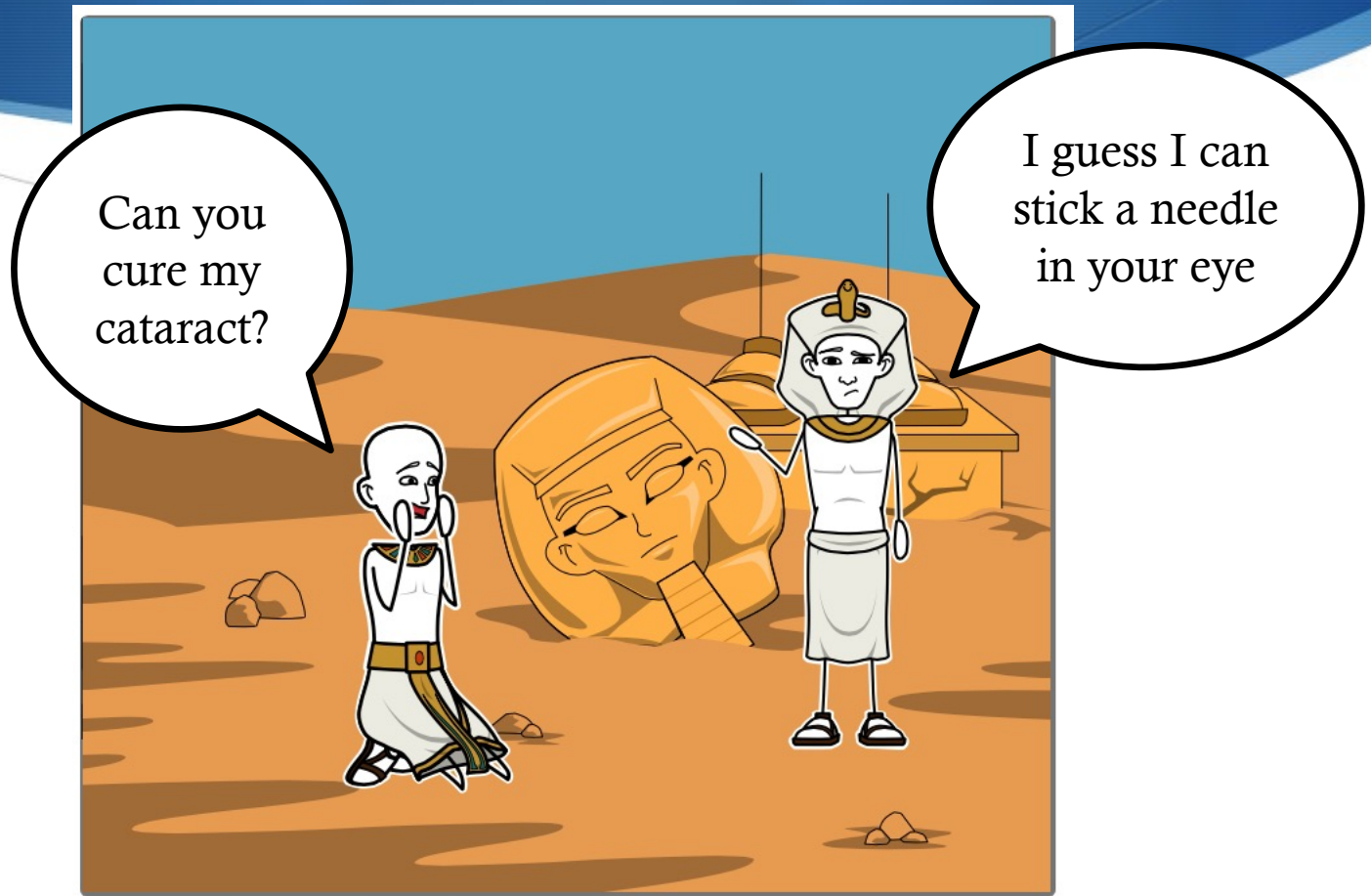




# Treatment of Cataracts through Civilizations



# 3000 years ago

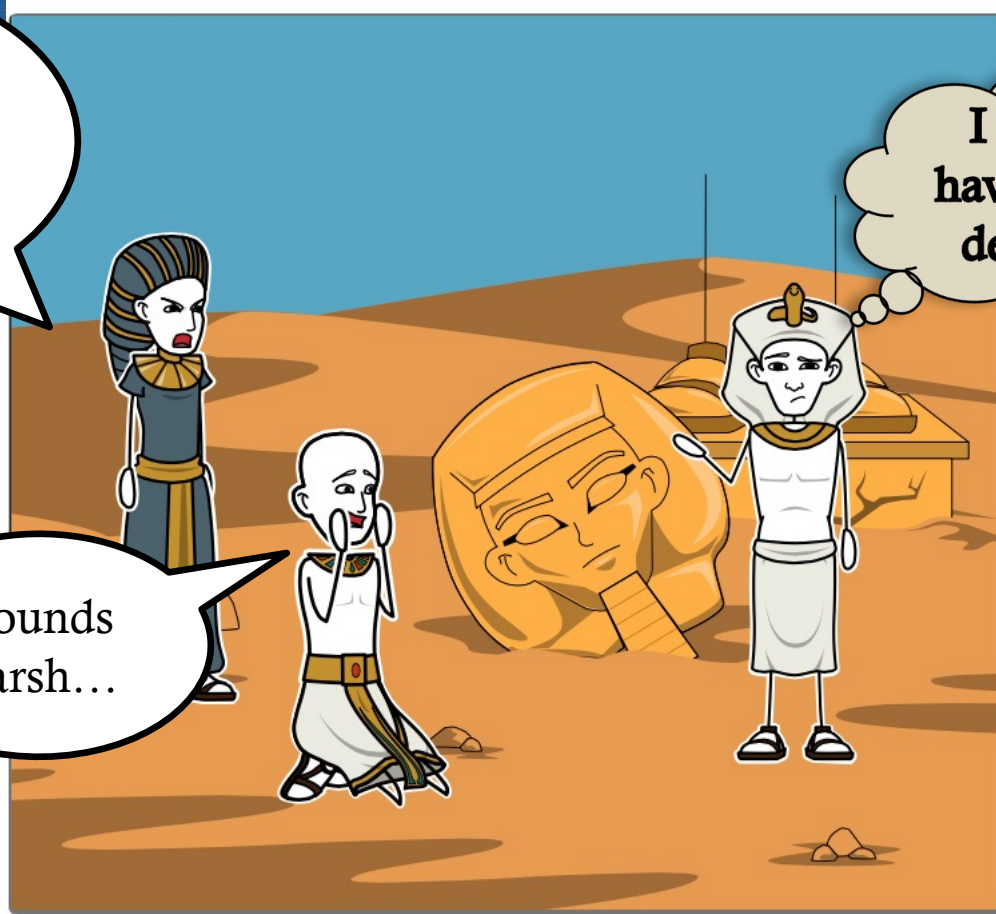


# 3000 years ago

Also, he's my  
slave. If you  
blind him, I get  
to cut off your  
hands

Sounds  
harsh...

I should  
have been a  
dentist...



# 2000 years ago

Can you  
cure my  
cataract?

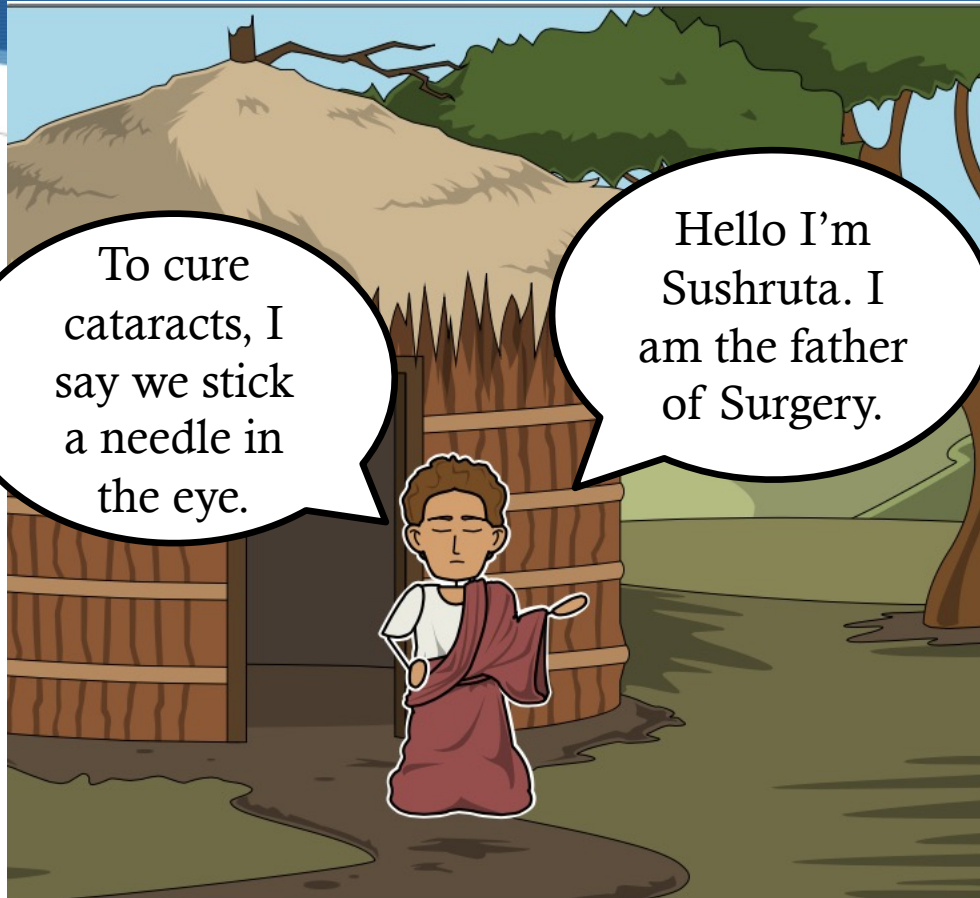


I guess I can  
stick a needle  
in your eye



# 1000 years ago





To cure  
cataracts, I  
say we stick  
a needle in  
the eye.

Hello I'm  
Sushruta. I  
am the father  
of Surgery.

# Day

Hello, I would like to have cataract surgery

I hear it's super simple...

Sure, friend!

Sort of...

...and you see immediately, I'd like both eyes done together so I can drive home





# Present Day

I want to see  
20/20, or  
better.

Also, I'm a  
lawyer...I just  
thought you  
should know.

Right, about  
that...

Also, I don't  
want to pay  
anything my  
insurance  
won't cover

Okay...



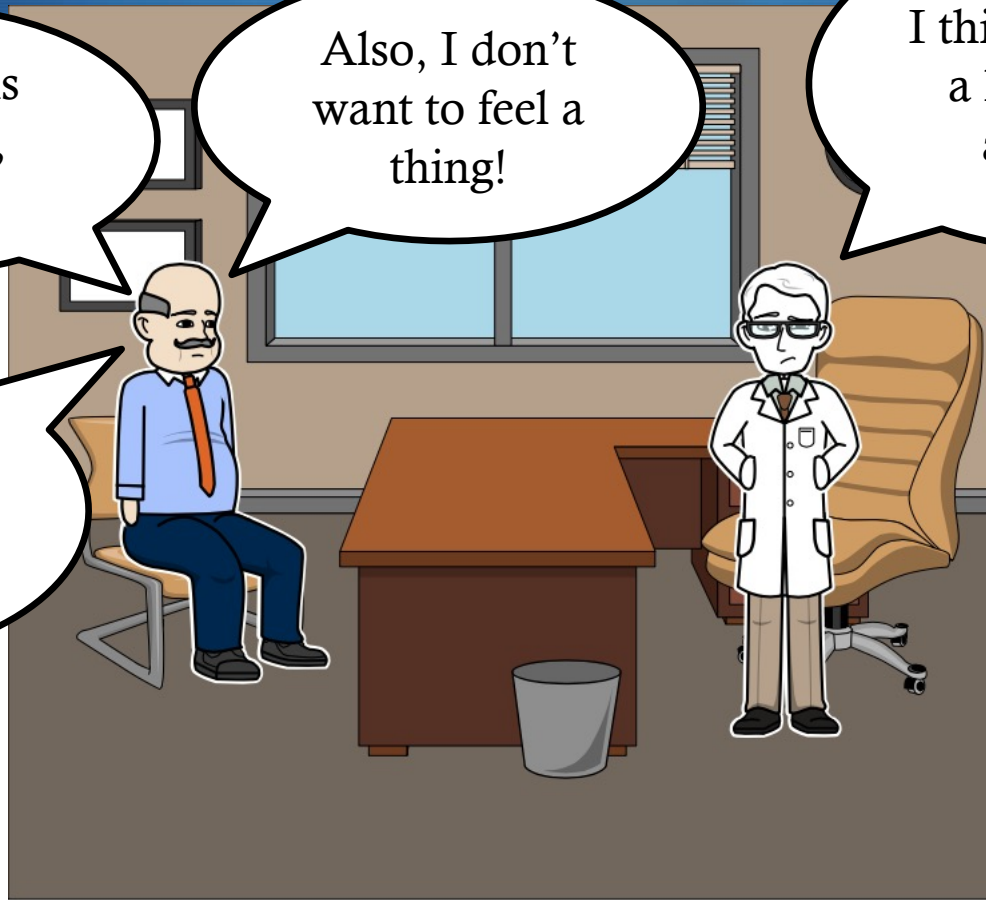
# Present Day

You do this  
with laser,  
right?

Also, I don't  
want to feel a  
thing!

I think we have  
a lot to talk  
about...

I don't want  
"standard"  
surgery. I want  
the BEST



# Present Day

My friends don't wear glasses after surgery.

Give me one of them fancy lenses, not the cheap ones

Also, can I have this done today?

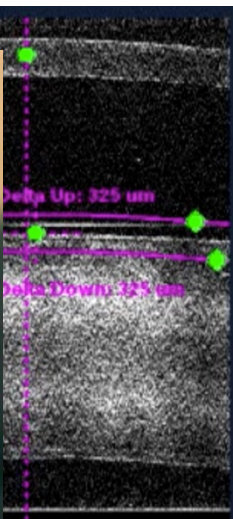
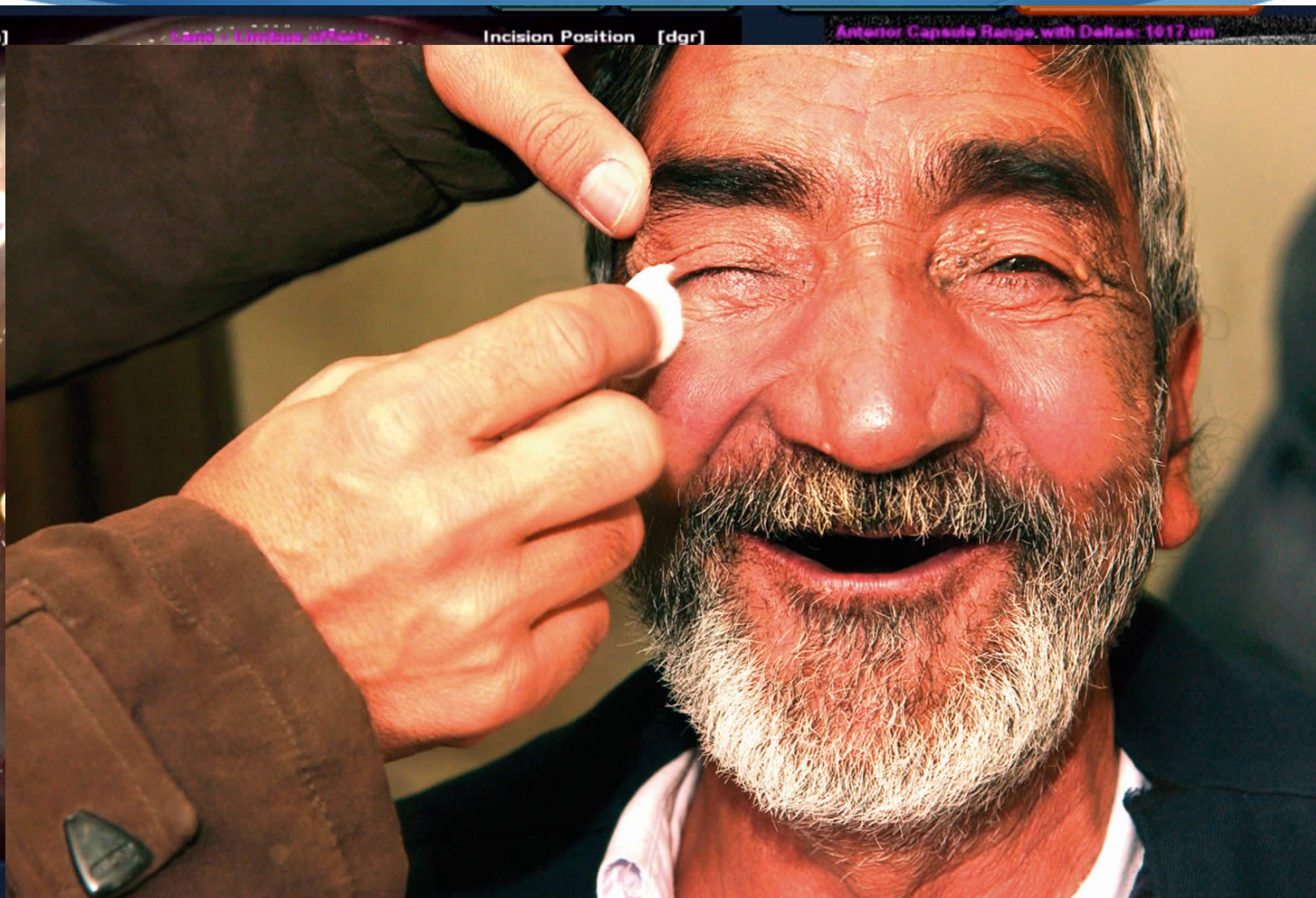
**I should have been a dentist...**





# Present Day Cataract Surgery

Diameter	[mm]
Capsulotomy	5.0
Lens Champ	4.8
Lens Cylinder	2.2
Lens Error	N/A
Frag & Spokes	N/A
Arcuate Cut	3.0



Toric®  
Aspheric IOL



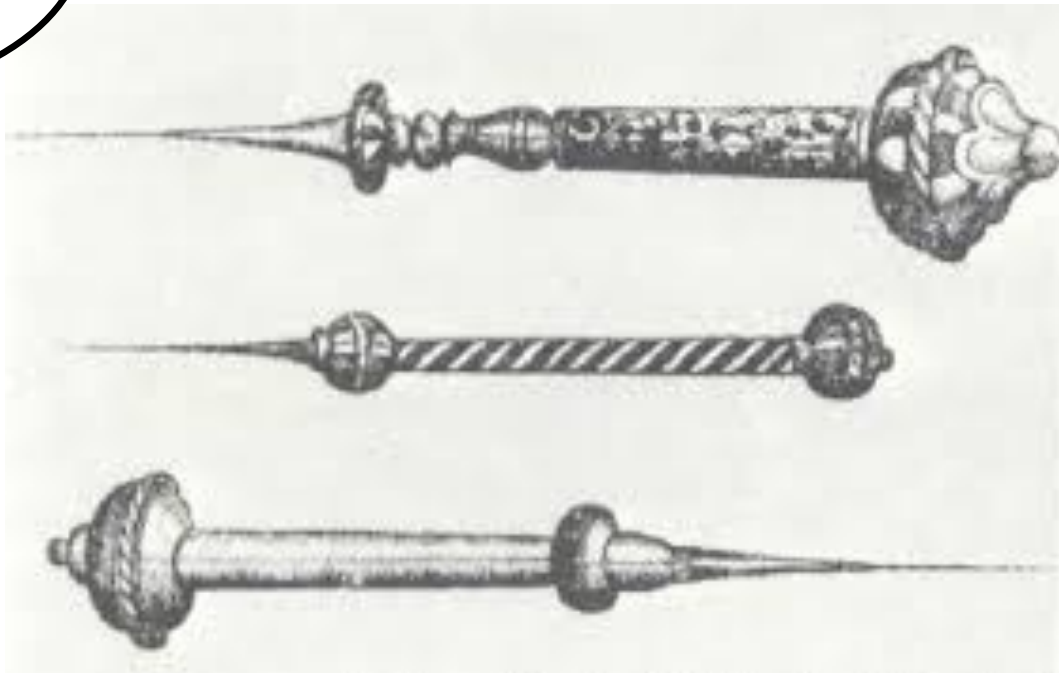
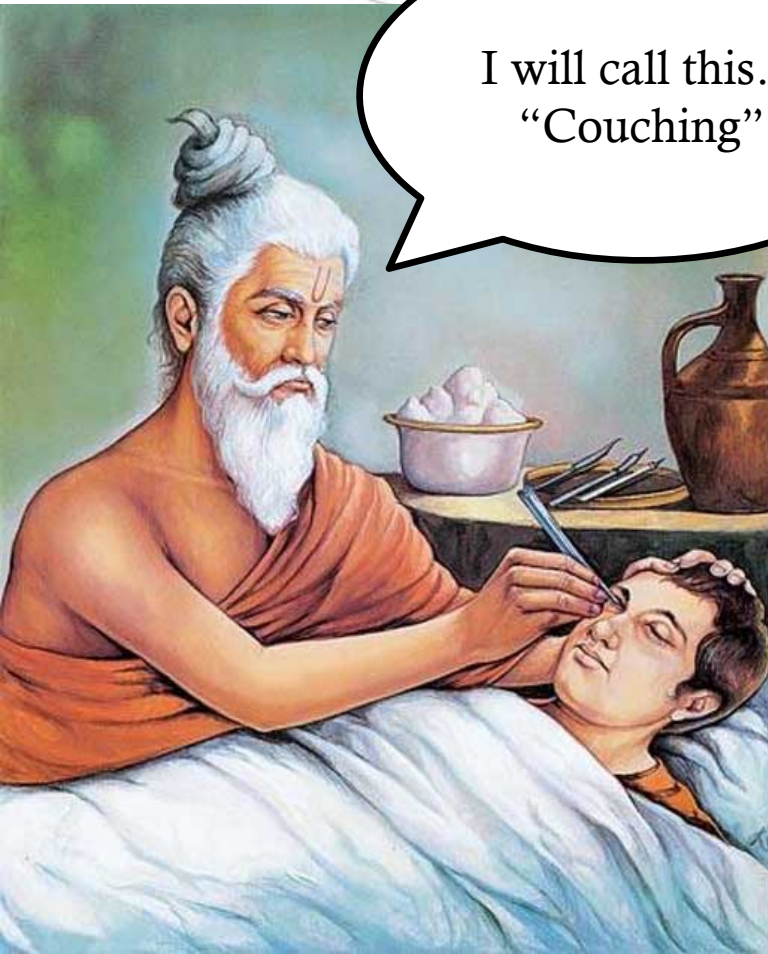
# Back to that Needle...





# Back to that Needle...

I will call this...  
“Couching”





# Dictionary

Search for a word



**couch**<sup>1</sup>

/kouCH/

*verb*

gerund or present participle: **couching**; noun: **couching**

1. express (something) in language of a specified style.  
"many false claims are couched in scientific jargon"

Similar:

express

phrase

word

frame

put

formulate

style



2. **LITERARY**

lie down.

"two creatures couched side by side in the deep grass"

3. **ARCHAIC**

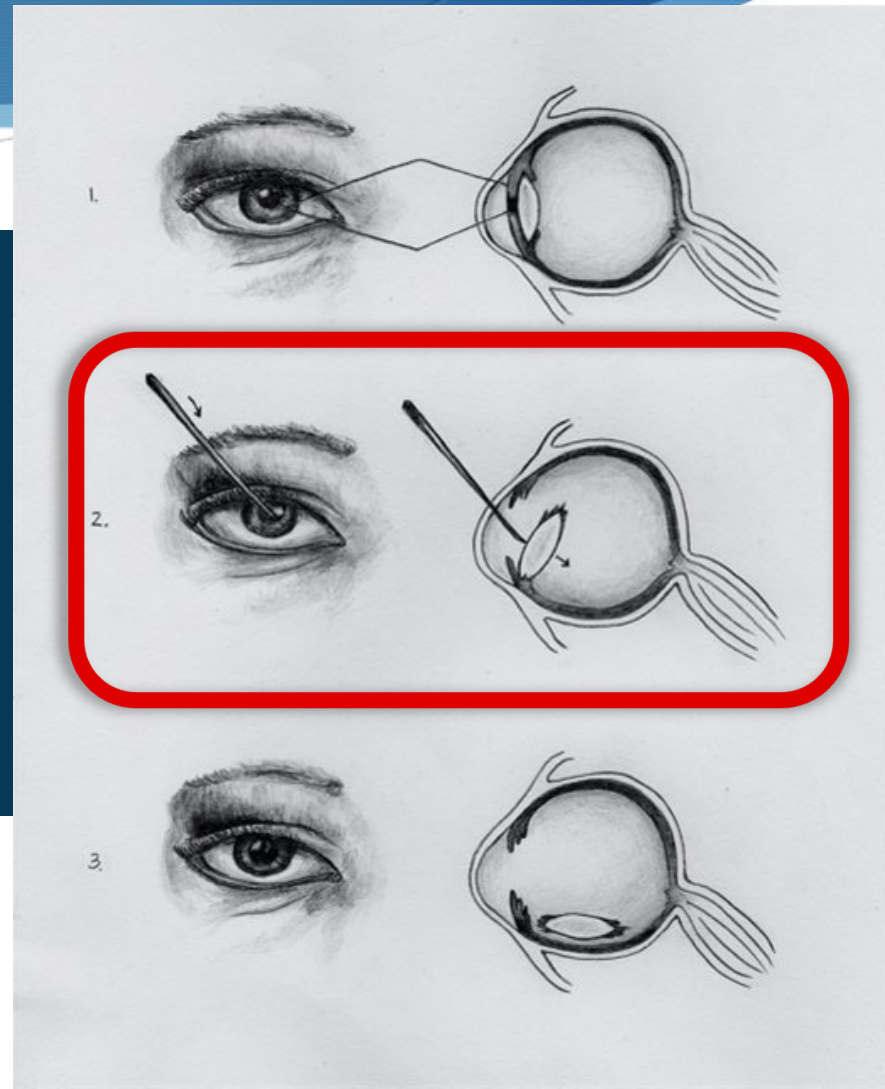
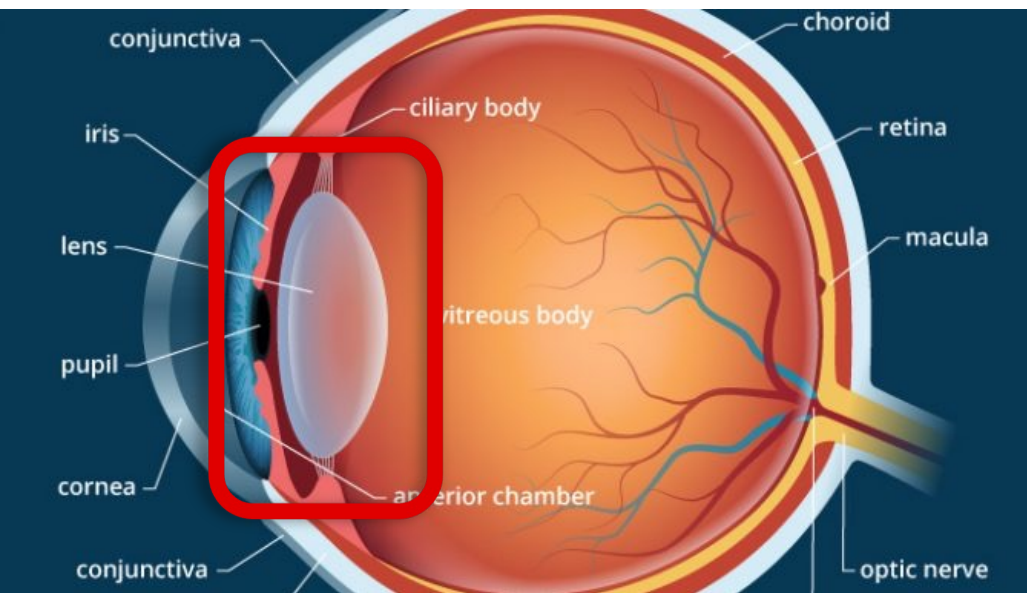
lower (a spear) to the position for attack.

4. **HISTORICAL**

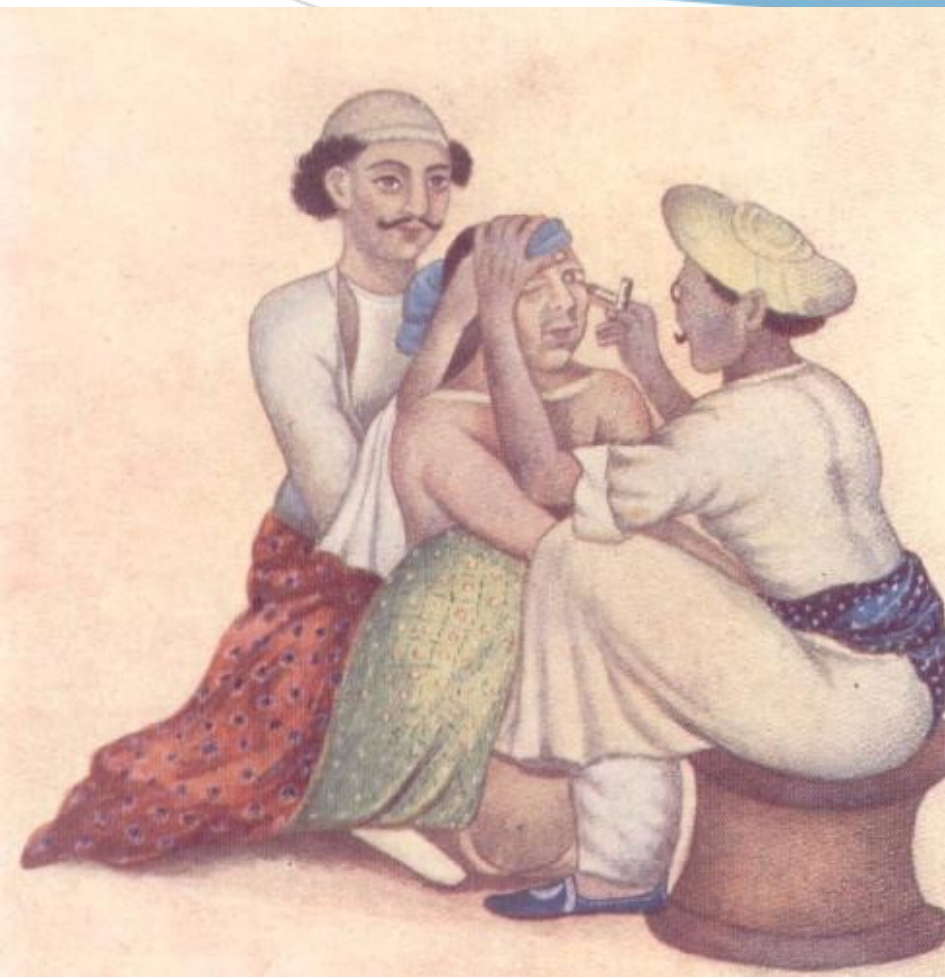
treat (a cataract) by pushing the lens of the eye downward and backward, out of line with the pupil.

5. (in embroidery) fix (a thread) to a fabric by stitching it down flat with another thread.  
"gold and silver threads couched by hand"

# Couching



# Couching



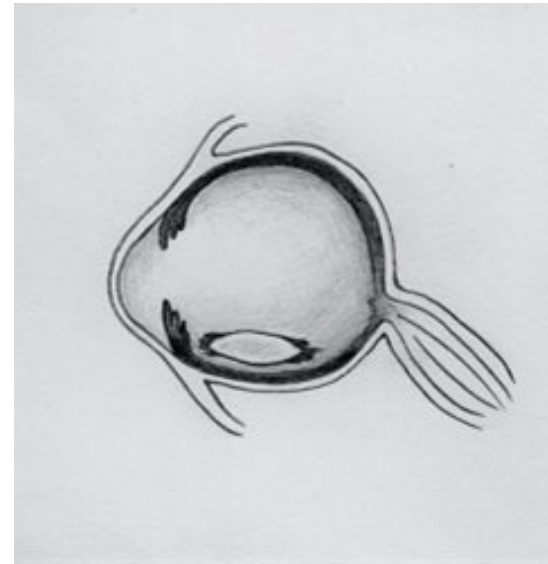


# Couching



# Couching

- ◆ Primary surgical technique for cataracts, **first documented around 1000 BC up until the mid-1700s**
- ◆ Not to EXTRACT (rather dislodge) the cataract
- ◆ Dislodged Cataract is out of visual axis, so defocused images/light can enter the eye again
- ◆ High risks and complications
- ◆ Done at a time without modern antibiotics or medicines
- ◆ Abysmal outcomes (most aphakic patients are still blind)



# What else happened in 1000 BC

- World's population was 50 million
- Phoenician alphabet was invented
- Rice cultivated in Japan
- The only other early surgery involved cutting a hole in the head to relieve headaches... (it didn't)





Dedicated to my  
Friend & Teacher

Morris S. Osher, M.D.  
1912 - 1998

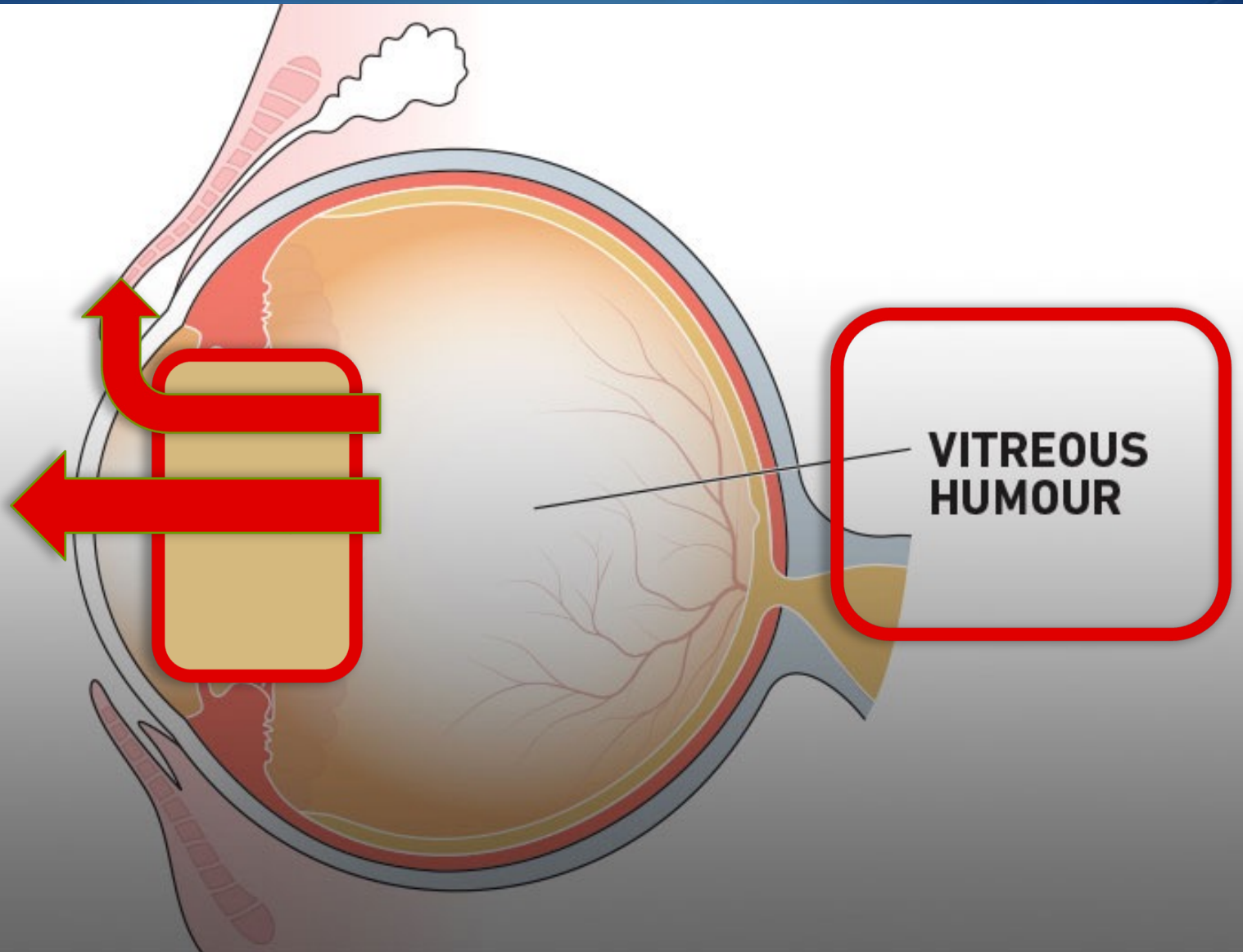
**COUCHING** has stood the test of time!

# 1750s – Surgery Evolves (finally)

**Samuel Sharp** performs the first  
Cataract Extraction (Intracapsular)  
around 1750

Sharp was a member of the “United  
Barber and Surgeons’ Company” –  
who fulfilled both duties of surgeon  
and barber

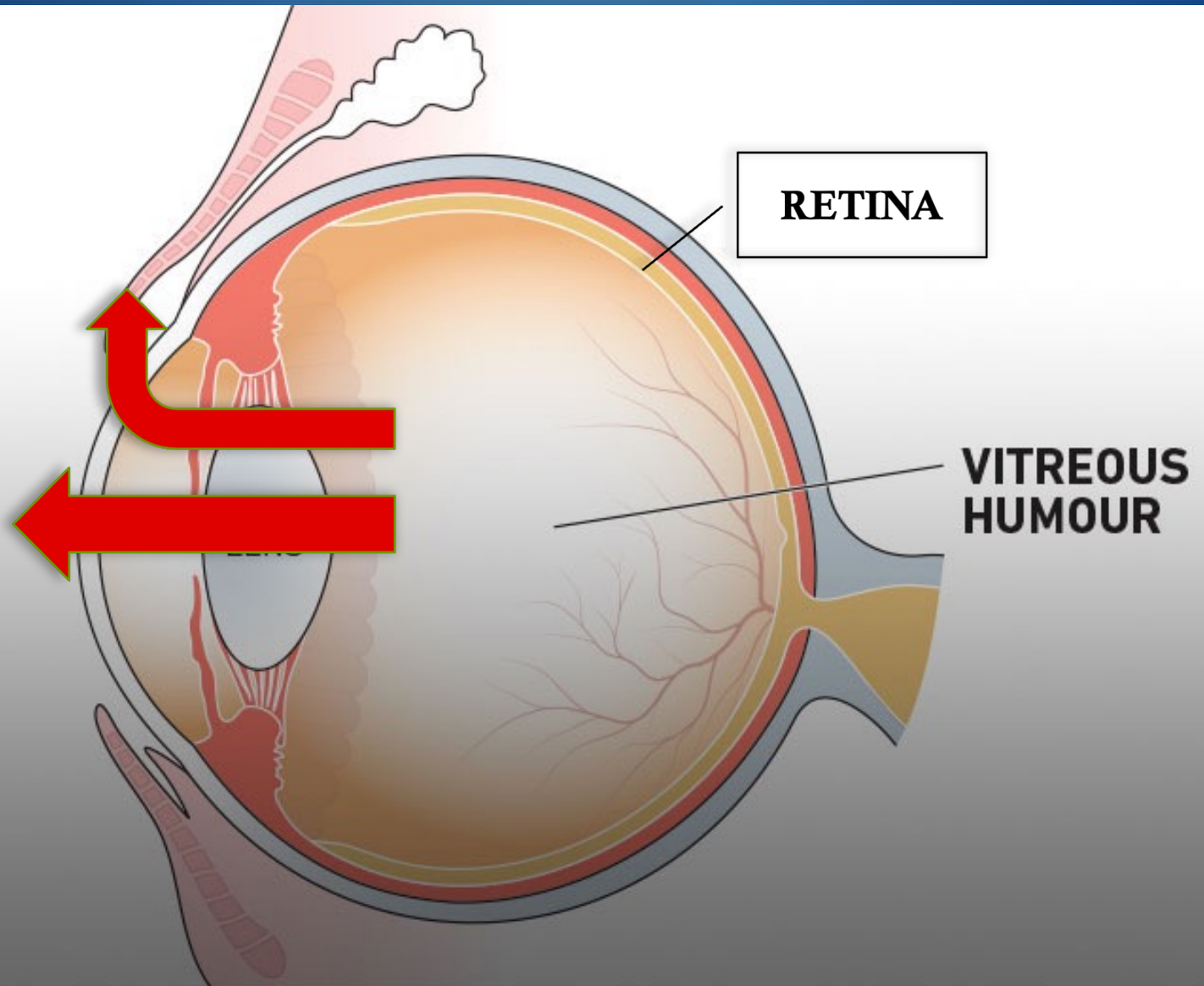




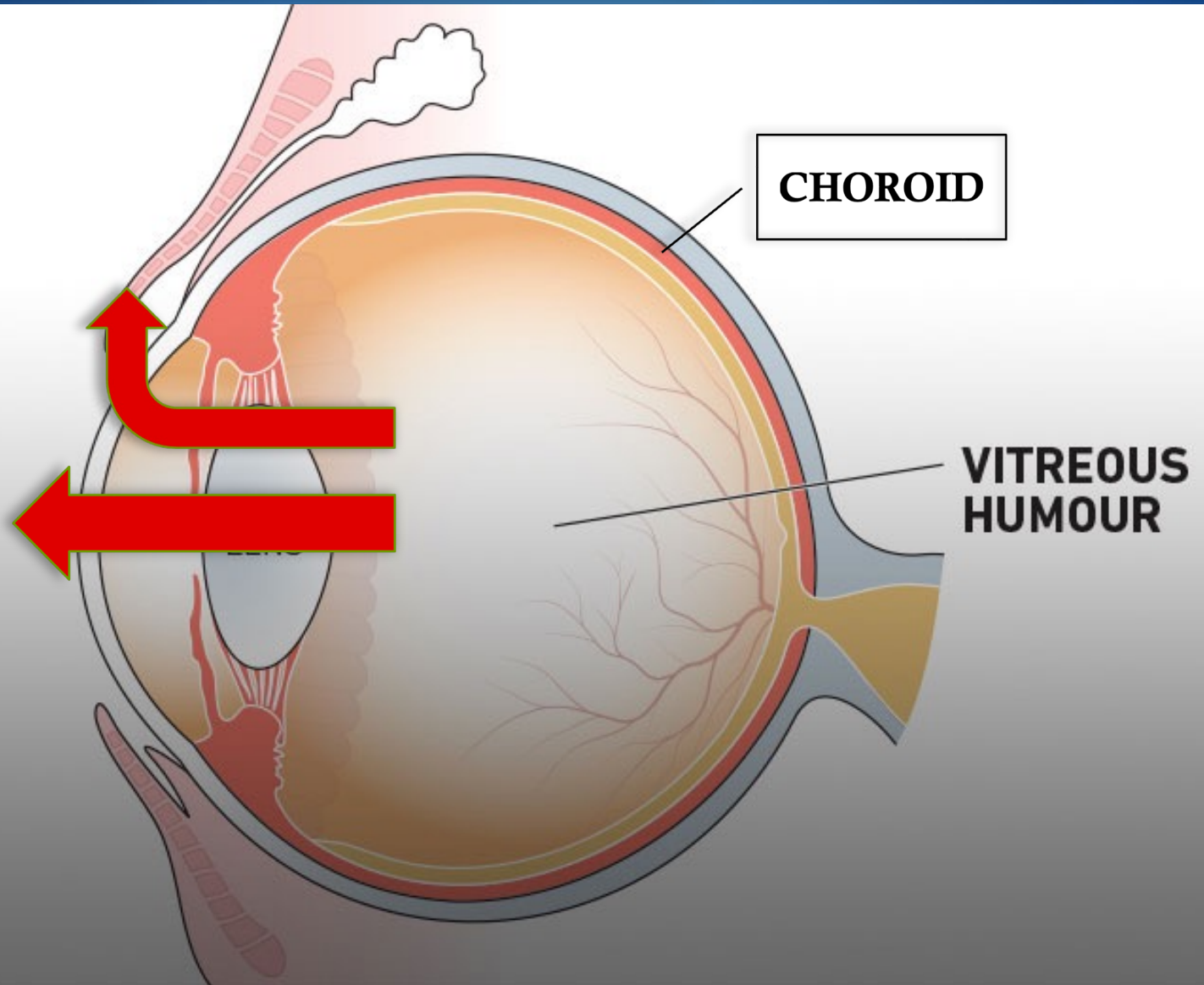


# VITREOUS HUMOR





**RETINAL DETACHMENT = BAD**



**CHOROIDAL HEMORRHAGE = BAD**



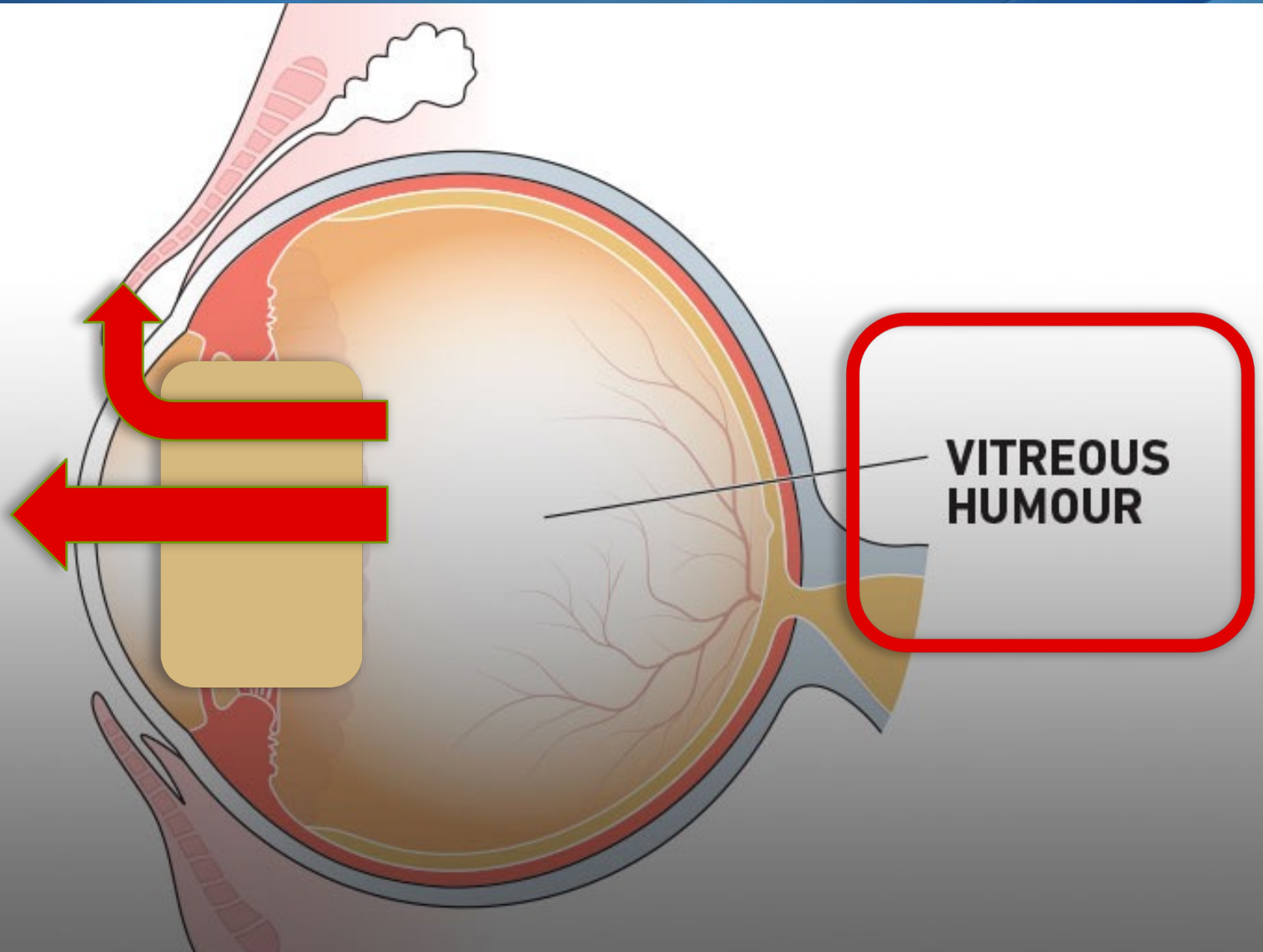
# Extracapsular Cataract Extraction

Jacques Daviel performs the first Extracapsular cataract extraction (leaving the Capsule behind) also around 1750

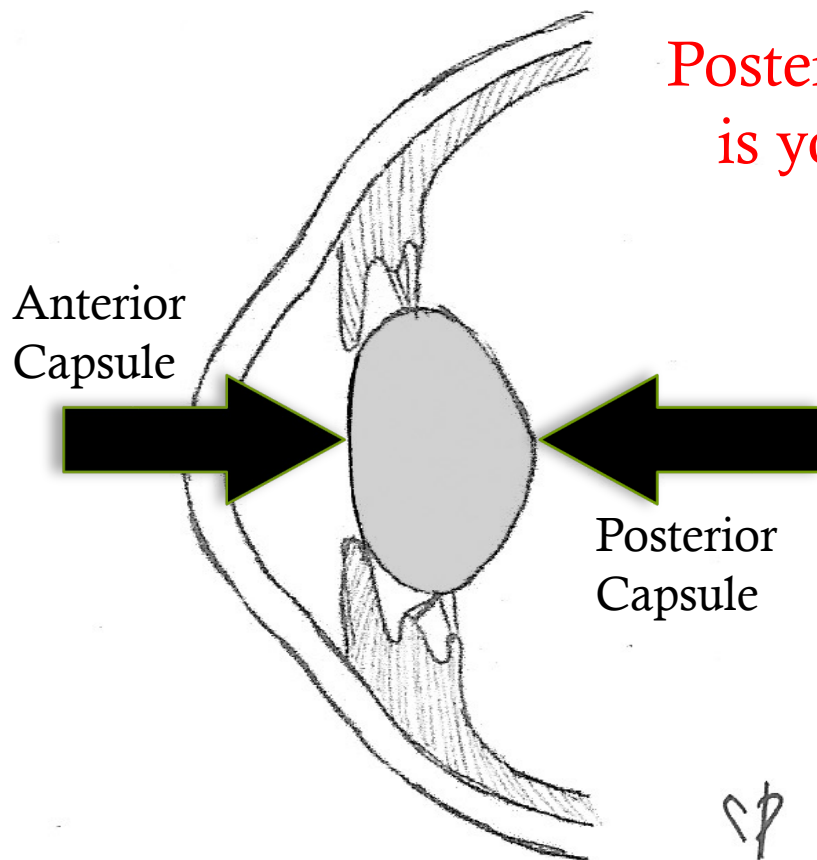
This begins the era of “modern” cataract surgery! (sort of...)



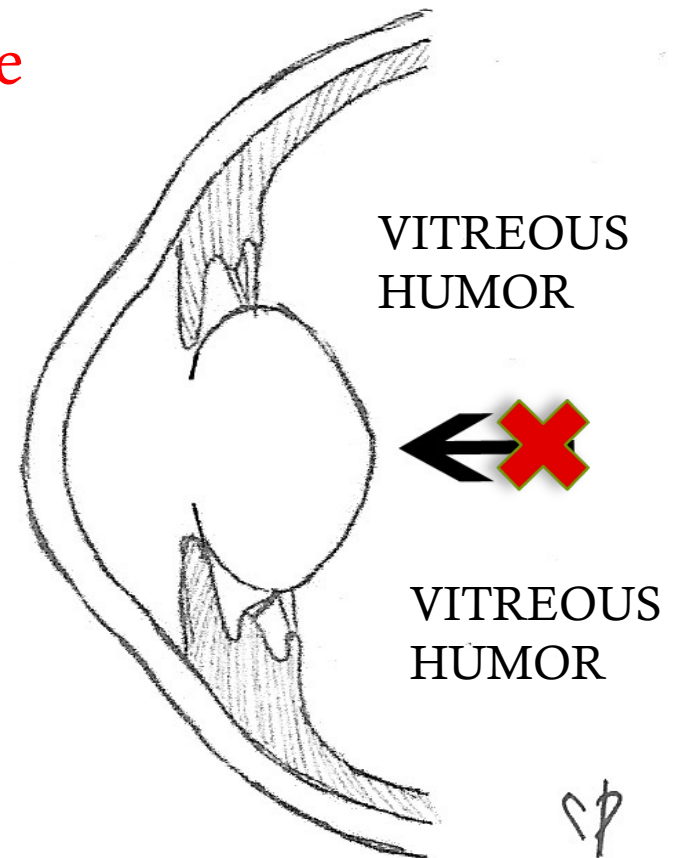
# Why does this even MATTER?



# Why does this even MATTER?



Posterior Capsule  
is your friend!



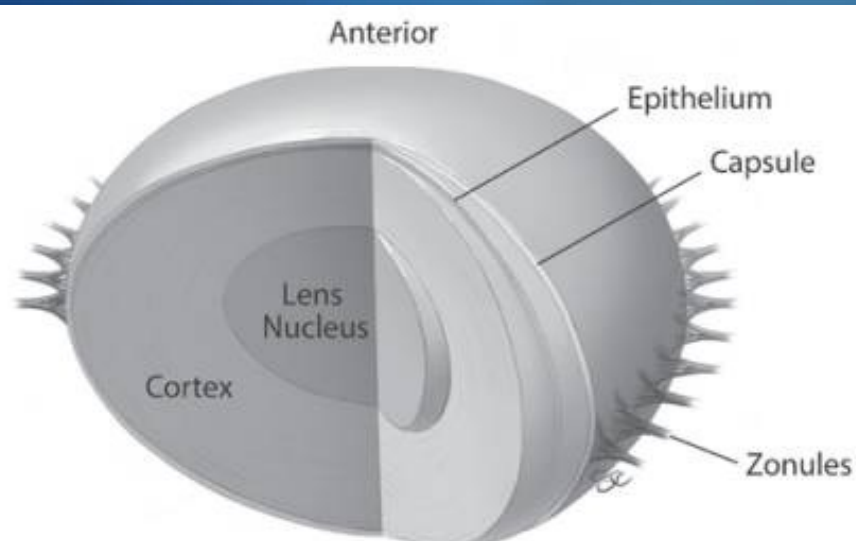


# The Capsule is Your Friend!

The capsule is your friend, don't break the capsule!  
The capsule is your friend, don't break the capsule!  
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# BTW, Did You Know?



**Leaving behind the Capsule is like eating a peanut M&M but leaving the candy shell...**

# How to perform your first Cataract Surgery

Medical Library and Historical Journal, 1904.

Plate 12.



FIG. 1.



FIG. 2.



FIG. 3.

FIG. 1.—Sharp's knife for cutting the iris. (From his: "A Treatise on the Operations of Surgery." 4. Ed. London, 1743. Plate 10, Fig. C.)

FIG. 2.—The iris knife of Cheselden. (From his: "Anatomy of the Human Body." 6. Ed. London, 1741. Tab. XXXVI.)

FIG. 3.—Sharp's cataract knife. (From his first paper in: *Phil. Tr.*, Lond., 1753, xlviii, pt. 1, page 161.)

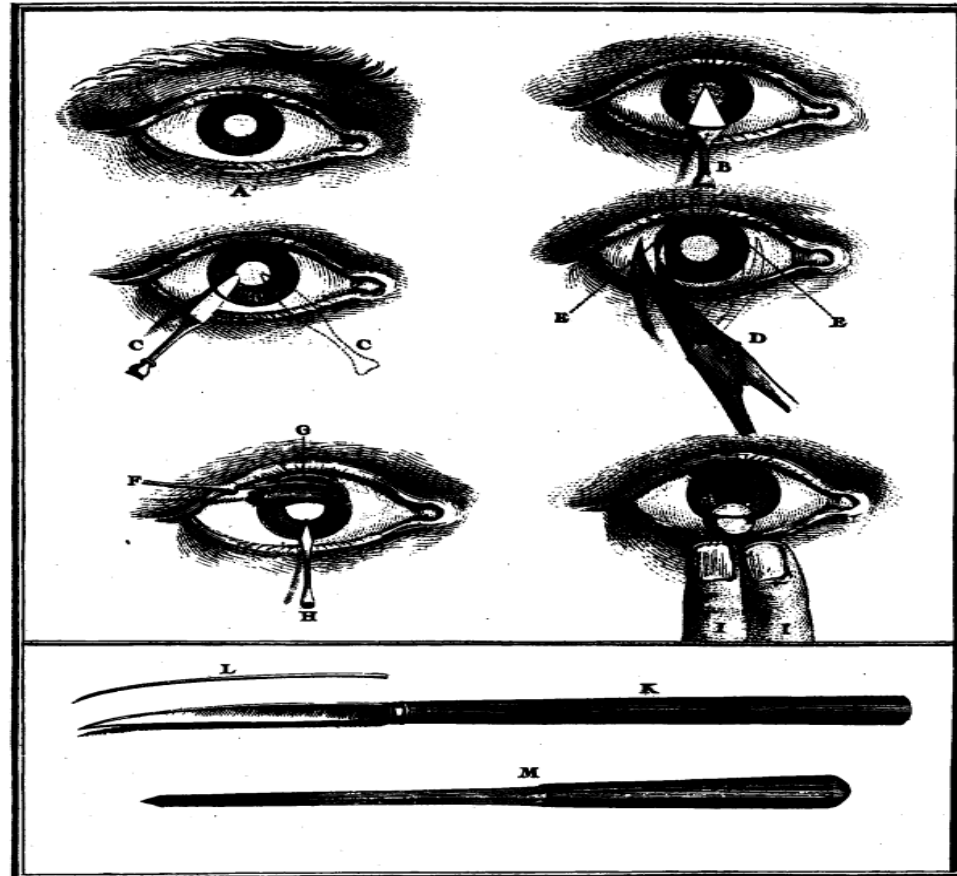
FIG. 4.—Another illustration of Sharp's cataract knife. (From: *Mem. de l'Acad. Roy. de Chir.*, Par., 1753, ii, Pl. XXII, Fig. 11.)



FIG. 4.

Medical Library and Historical Journal, 1904.

Plate 13.



Facsimile reproduction of original plate accompanying Daviel's paper.

FIGS. A-F.—Illustrate Daviel's method of operation.

FIG. G.—The knife of de la Faye. The upper line (L) shows the convexity of the blade on its flat.

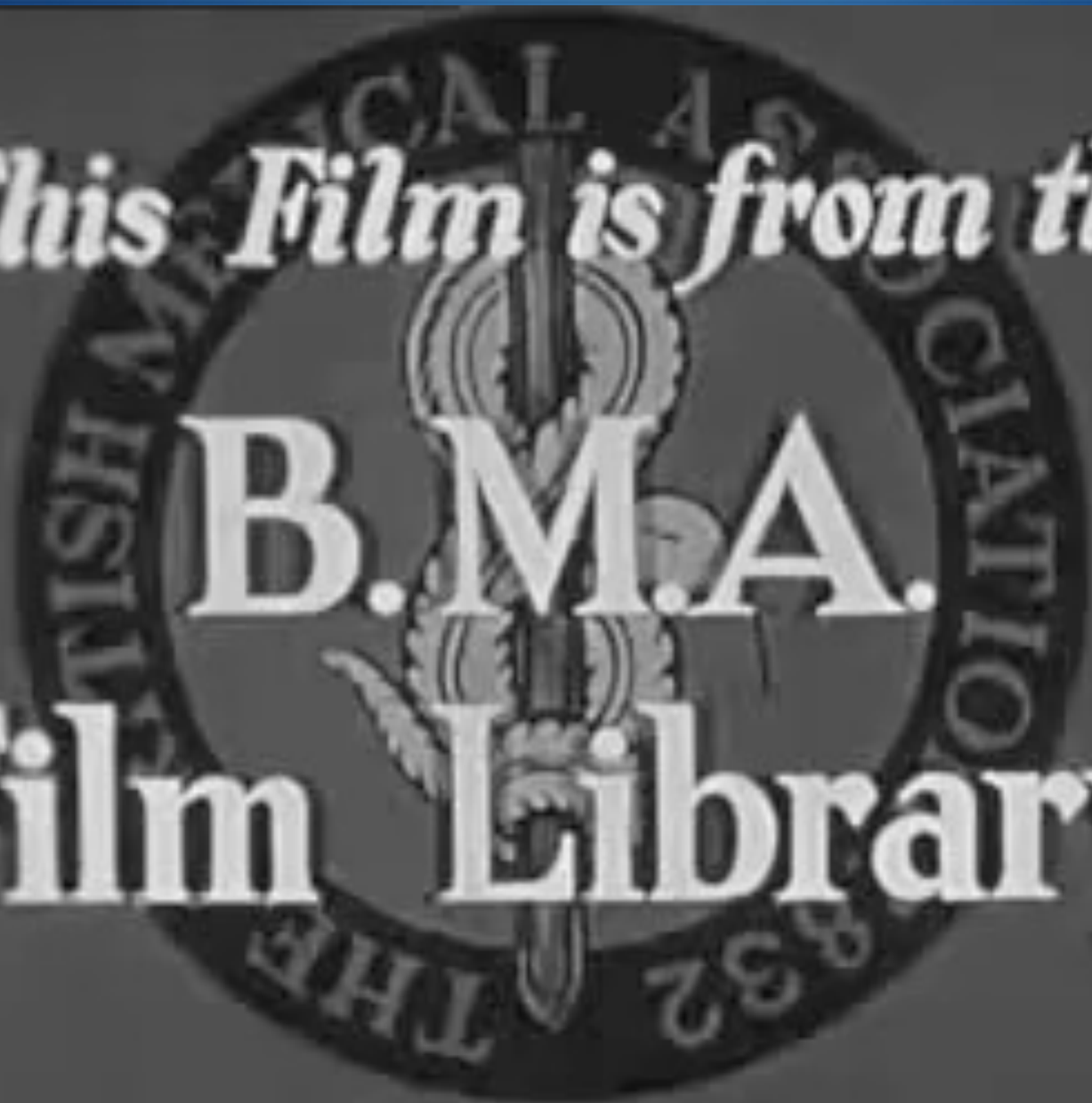
FIG. M.—The knife of Poyet.



*This Film is from the*

**B.M.A.**

**Film Library**



# BTW, Did You Know?



when was anesthesia invented?



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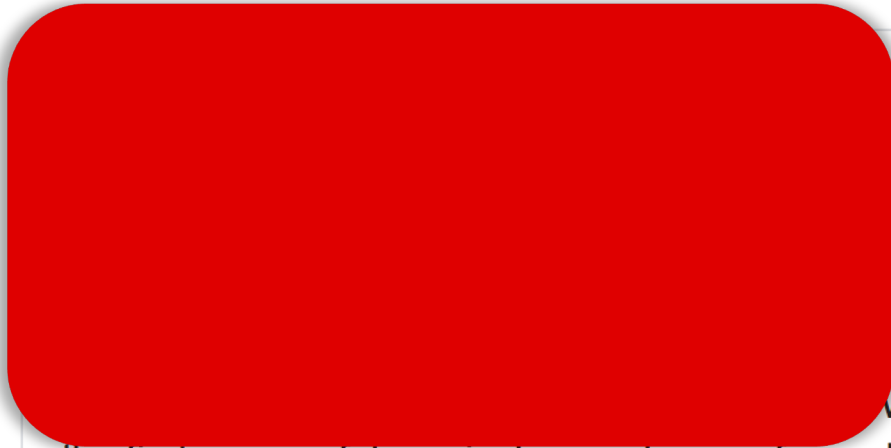
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About 610,000 results (0.70 seconds)



and  
Warren  
with  
the first successful surgical procedure performed with  
**anesthesia.**

Historical development of modern anesthesia. - NCBI

<https://www.ncbi.nlm.nih.gov/pubmed>

# BTW, Did You Know?



when was first use of suture in cataract surgery



All



Images



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About 566,000 results (0.63 seconds)

The  in the closure of a **cataract** incision was Henry W. Williston.

[Sutures Used in Cataract Surgery - American Journal of ...](#)

<https://www.ajo.com> › [article](#) › [pdf](#)



# BTW, Did You Know?



when was antibiotics discovered



All



News



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About 34,100,000 results (0.85 seconds)

But it was not until 1928 that penicillin, the first true **antibiotic**, was **discovered** by Alexander Fleming, Professor of Bacteriology at St. Mary's Hospital in London.



[Alexander Fleming Discovery and Development of Penicillin ...](#)

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# BTW, Did You Know?

when was the first surgical microscope used ophthalmology



All



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# Cataract Extraction during the 1750-1950s

- ◆ Required extremely large incisions (and NOT sutured)
- ◆ Patients were left Aphakic (no lens) so vision was poor
- ◆ Week long admission and Strict bed-rest with heads locked between Sandbags
- ◆ Complications were high: vitreous loss, retinal detachment, infection, hemorrhages were common
- ◆ Not really much better than couching at this time (maybe worse)

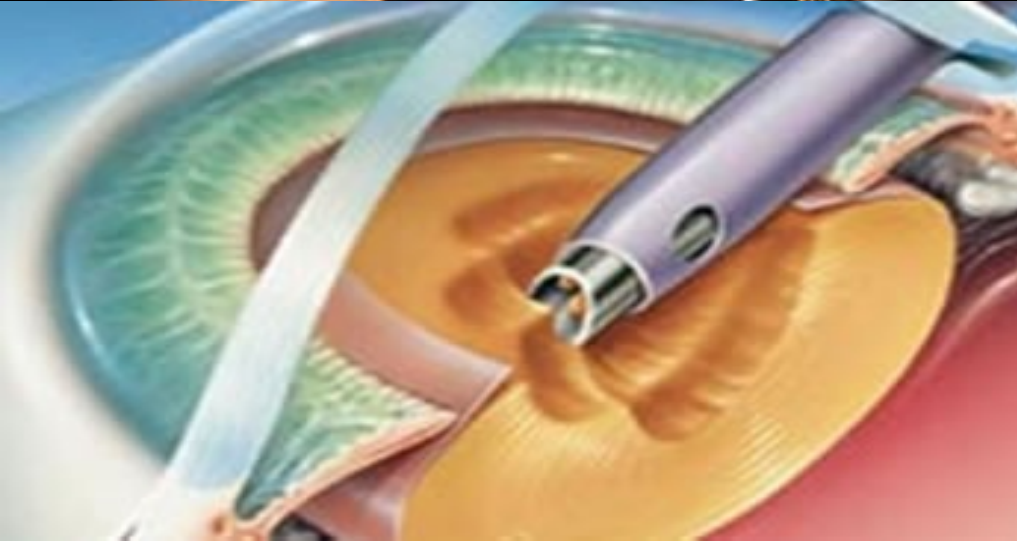


# First Intraocular Lens





# Birth of Phacoemulsification

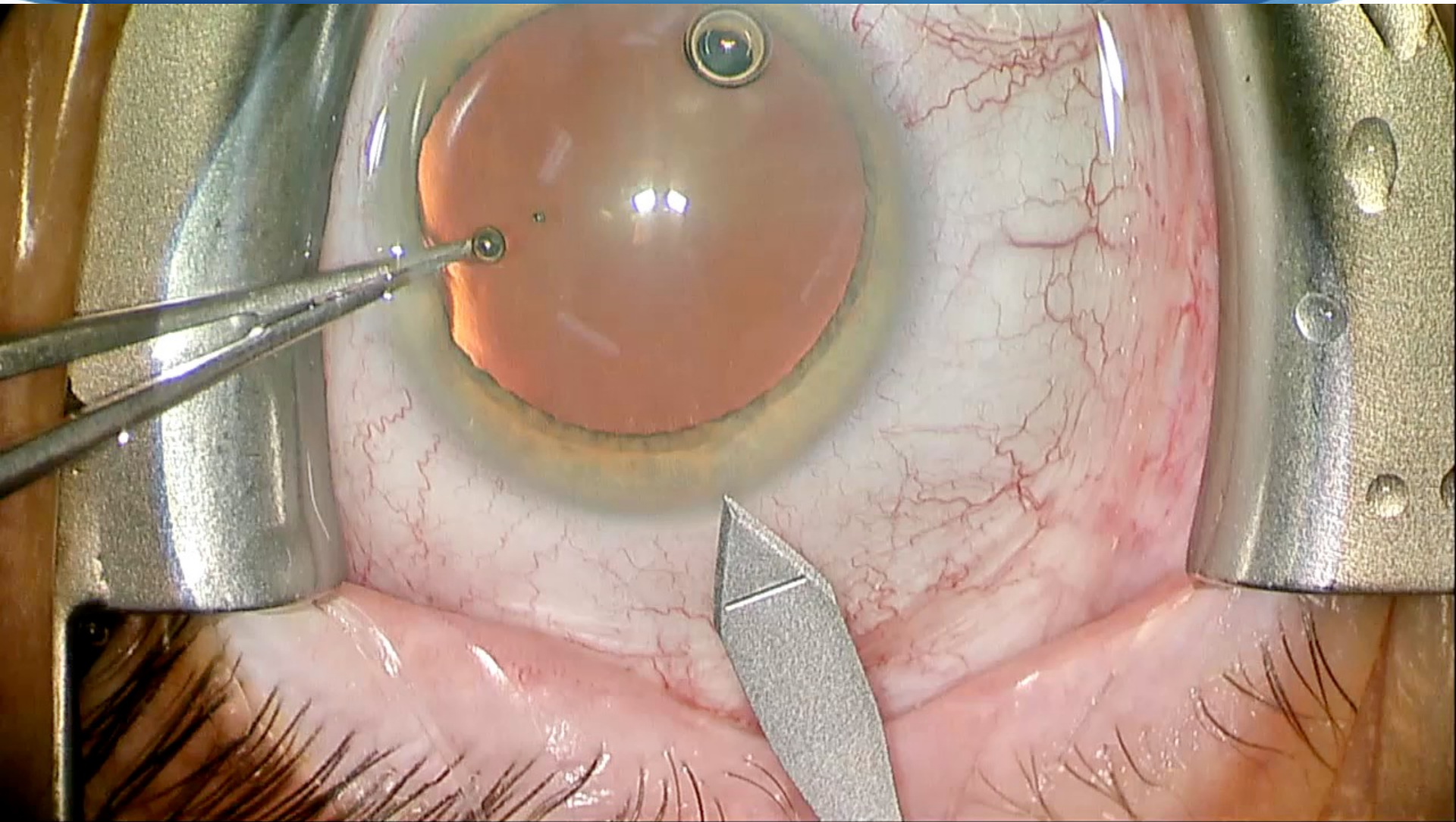




# The First Phaco Machine



# Modern Day Cataract Surgery



# Modern Day Cataract Surgery

- ◆ Exceptional Safety: less than 1 percent chance of “complications”
- ◆ Exceptional Outcomes: even “complications” typically achieve good or acceptable vision
- ◆ Exceptional Predictability and Reproducibility
- ◆ Quick surgery, Quick recover times
- ◆ Treatment of myopia, hyperopia, astigmatism, and presbyopia
- ◆ Patient Expectations are also bigger than ever

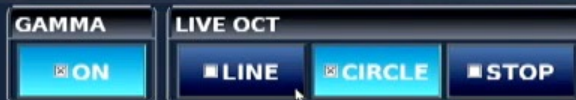
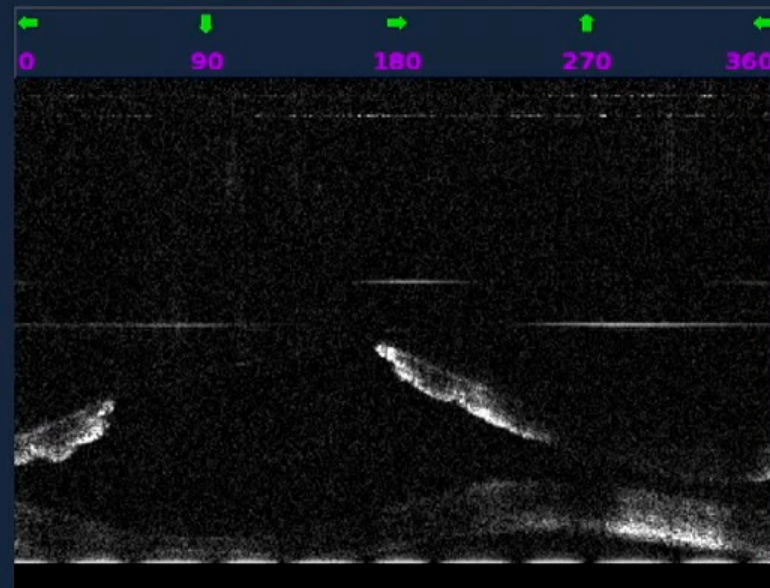
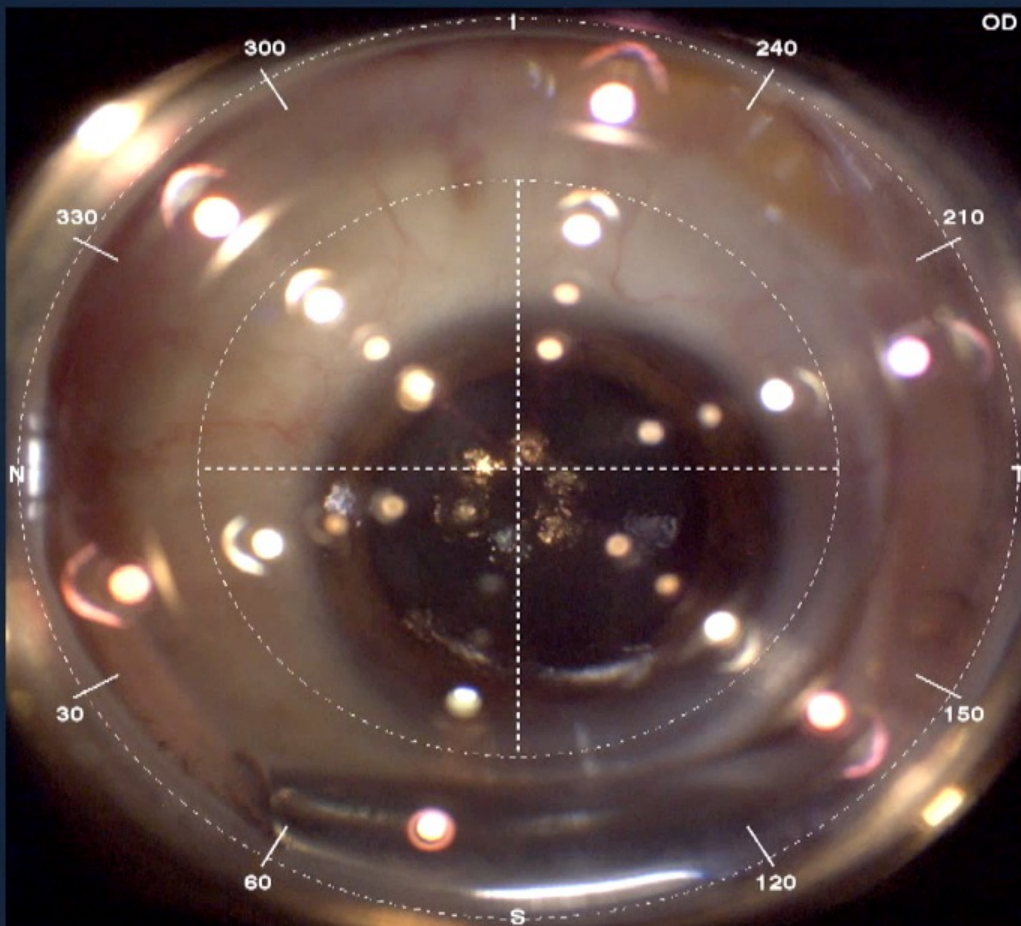


# How We Got Here

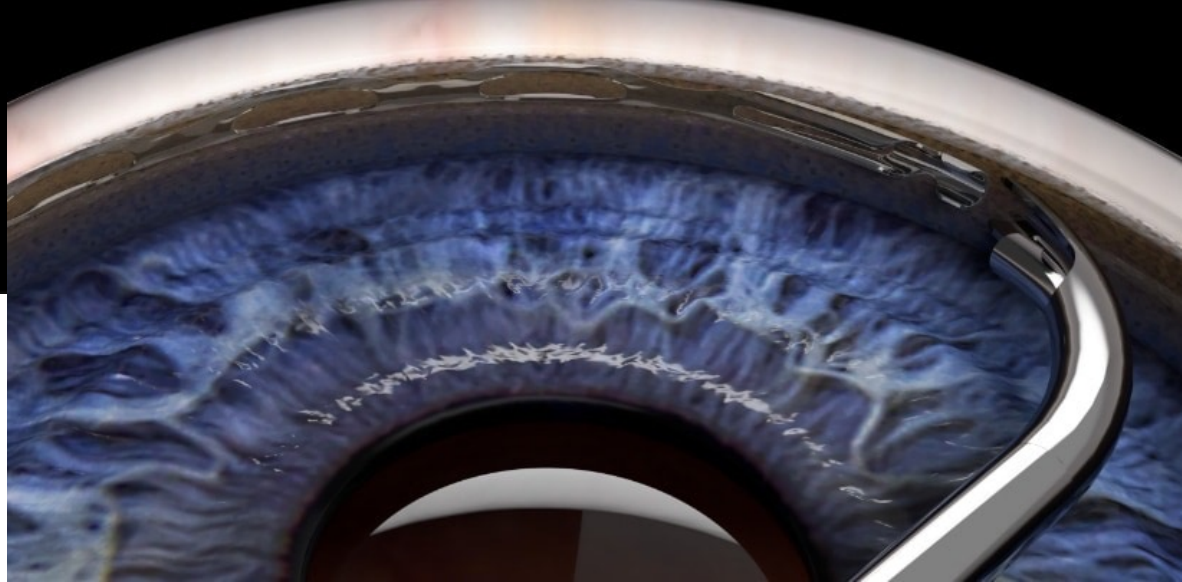
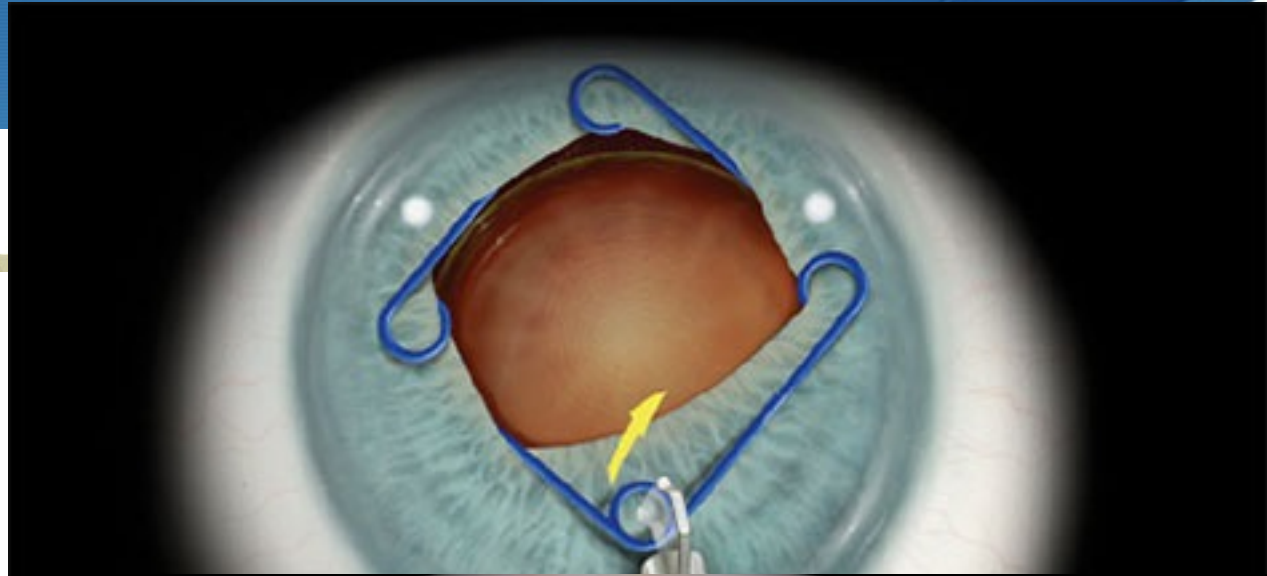
- ◆ Small incision surgery
- ◆ Phacoemulsification
- ◆ Foldable intraocular lens
- ◆ Surgical Microscopes
- ◆ Topical anesthesia
- ◆ Improved surgical techniques
- ◆ Antiseptic technique
- ◆ Advanced Biometry
- ◆ IOL Calculators
- ◆ Antibiotics
- ◆ Corneal sutures
- ◆ Dilating agents
- ◆ Viscoelastic Agents
- ◆ Improved Fluidics
- ◆ Improved Instrumentation



# What's Next?



# What's Next?





Charles Kelman – Father of  
phacoemulsification



Sir Ridley Scott – inventor of  
the intraocular lens





# What is the Hardest part of Cataract Surgery?



*UNDER-PROMISE  
OVER-DELIVER*



# Questions and Comments

# Thank You!

