

# Using Irradiated Cornea in Penetrating Keratoplasty, in a Patient with Bilateral Corneal Injury

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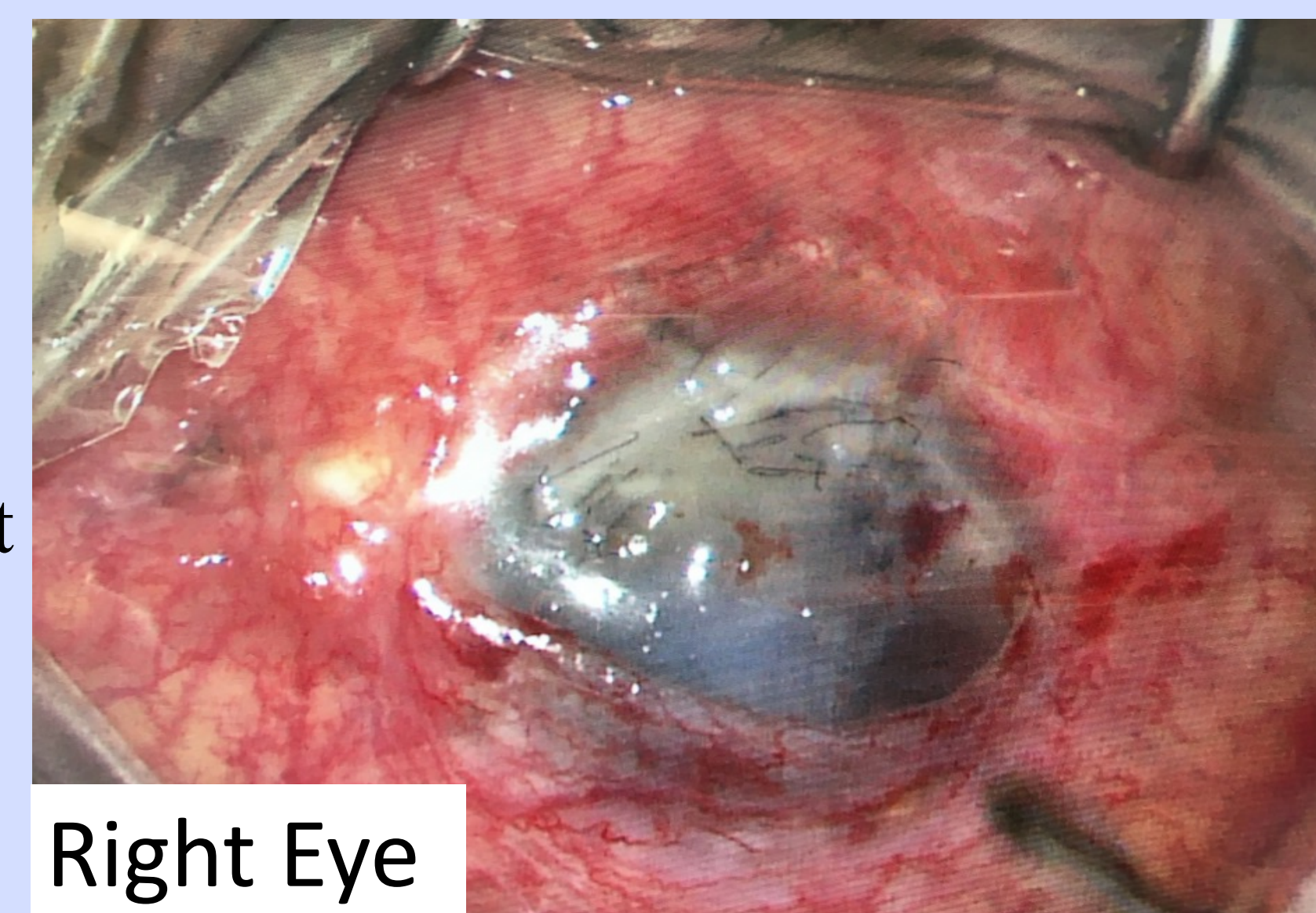
## INTRODUCTION

- Penetrating keratoplasty (PK) - full thickness corneal transplant replacing a patient's damaged or diseased cornea with a donor cornea.
- PK is performed to restore vision or reinforced integrity of the globe.
- Ideal to have any ongoing disease process treated, to minimize post-operative inflammation.
- In the setting of ongoing inflammation, rate of transplant rejection is high.
- In ocular trauma, goal of surgery is to restore the globe integrity.
- If there is not enough host tissue, at times other material is used, i.e. graft cornea.
- Failure rate of PK in a trauma setting is 36%.
- Using an irradiated corneal graft, may minimized the rejection rate.

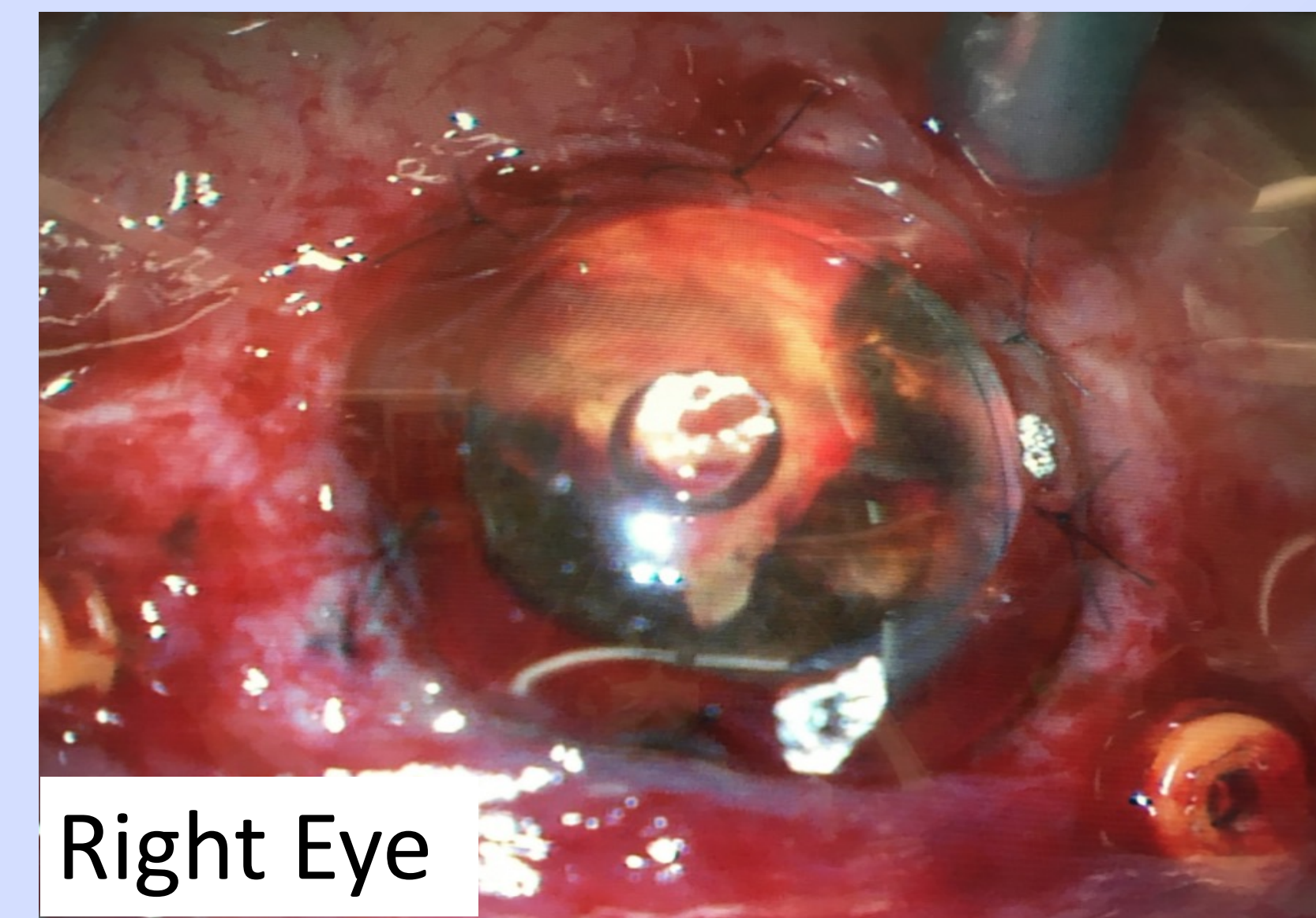
## CASE REPORT

- 36-year-old active duty male, bilateral "open-globe" injuries.
- Initial repair - Landstuhl Army Medical Center.
- At WRNMMC, needed multiple retinal and corneal surgeries.
- Visual acuity initially was light perception in both eyes.
- Due to severe inflammation of both eyes, staged surgeries were planned.
- Right eye underwent PK using irradiated cornea.
- Once Right eye was stable at 1 month after surgery, Left eye underwent similar surgery.
- At 1-month post PK in the Right eye, visual acuity was 20/150
- At 1-month post PK in the Left eye, visual acuity was 20/150
- After inflammation in the right eye was decreased, Right eye underwent regular PK, 2 months after initial presentation to WRNMMC.
- At 1-month post regular PK in the Right eye, visual acuity was 20/100.
- At 2-months post irradiated PK in the Left eye, visual acuity was 20/70.
- At that point (3-4 months after presentation to WRNMMC), stable vision, no evidence of graft failure or rejection in either eye.
- A month later (5 months post initial presentation, 3 month post regular PK), Right eye started showing evidence of rejection.
- Right eye was aggressively treated and is now improving.

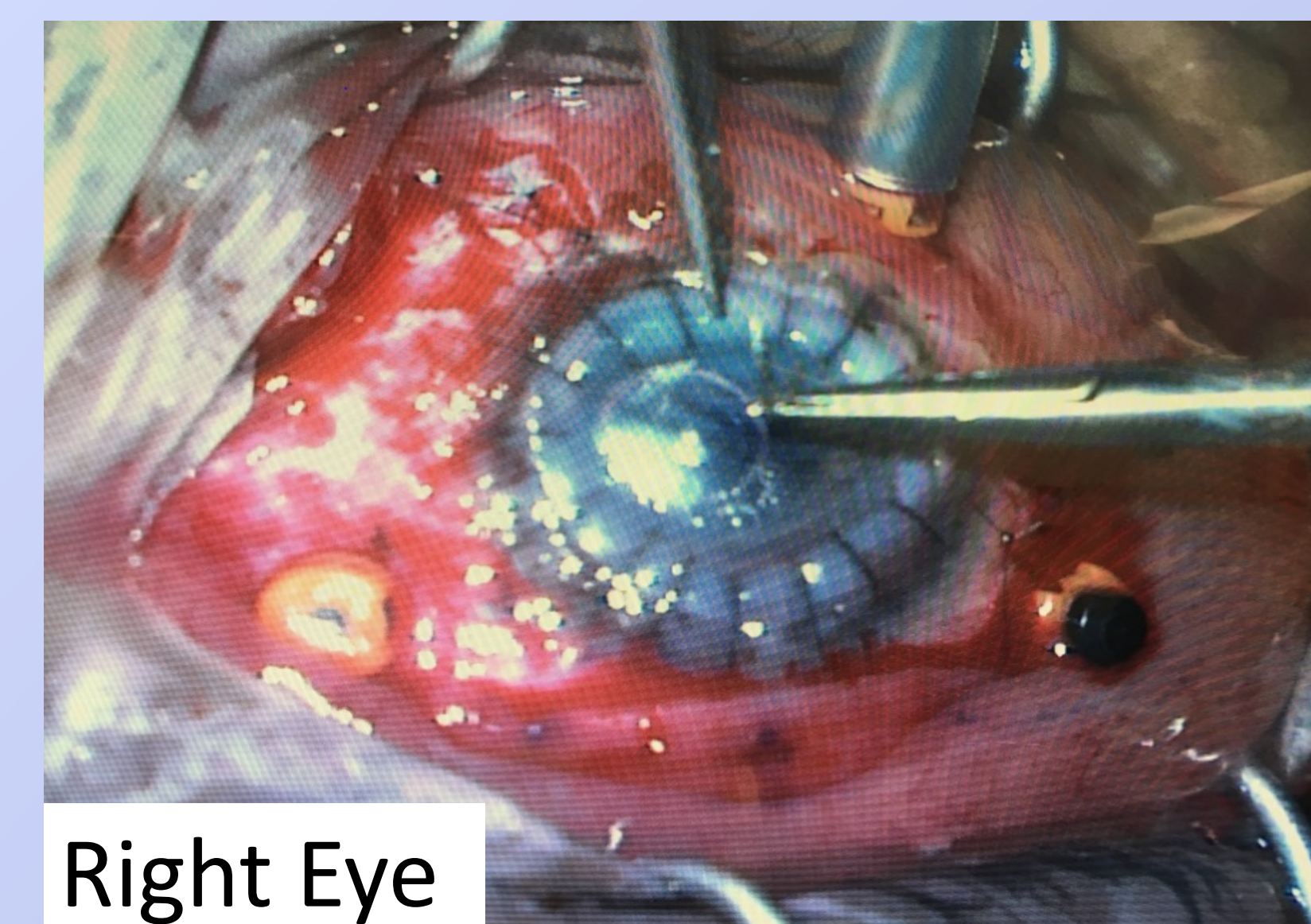
Initial Repair, Start of Surgery



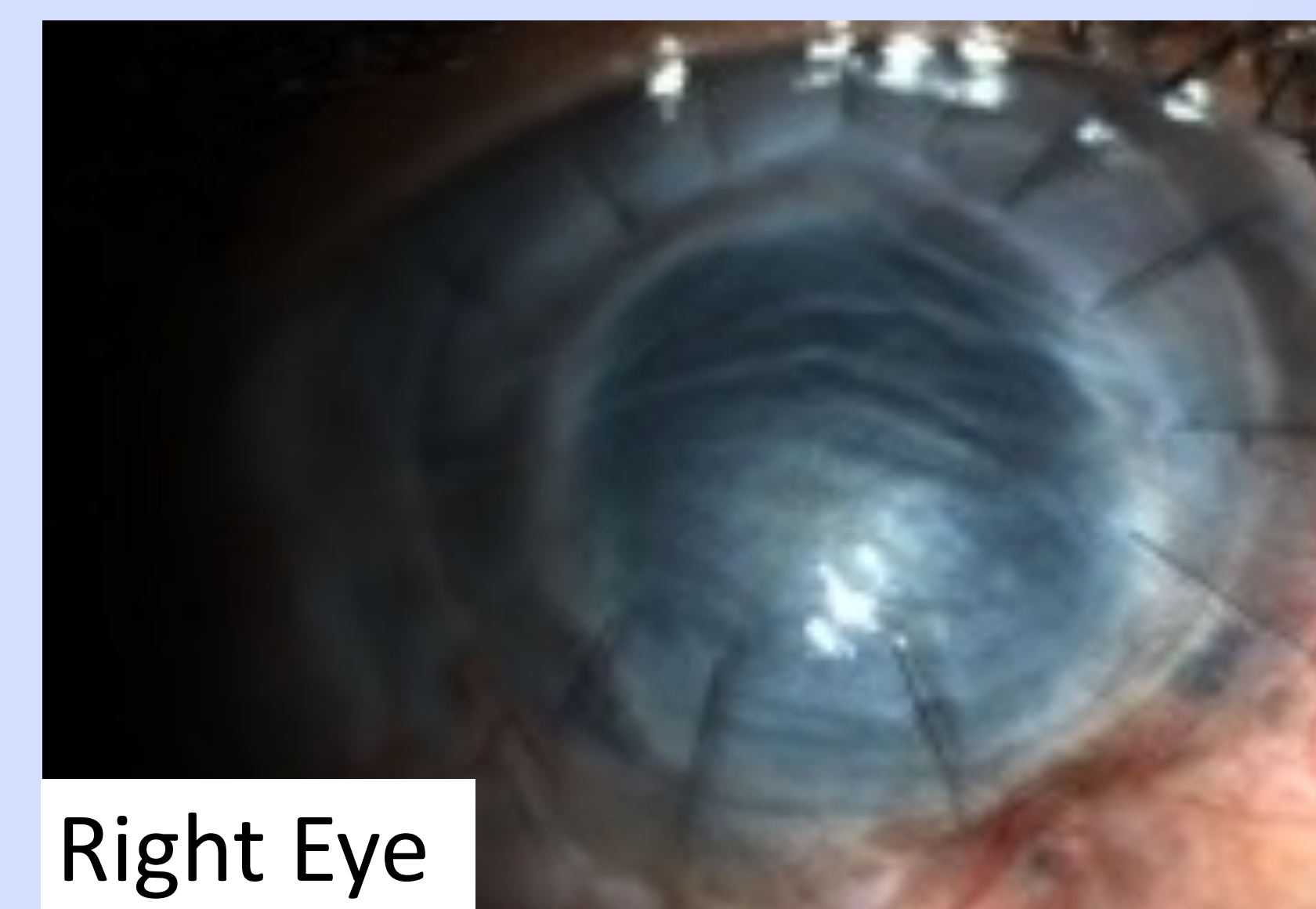
Initial Repair, Keratoprosthesis Attached



Initial Repair, End of Surgery, irradiated cornea attached



1 month post irradiated cornea transplant



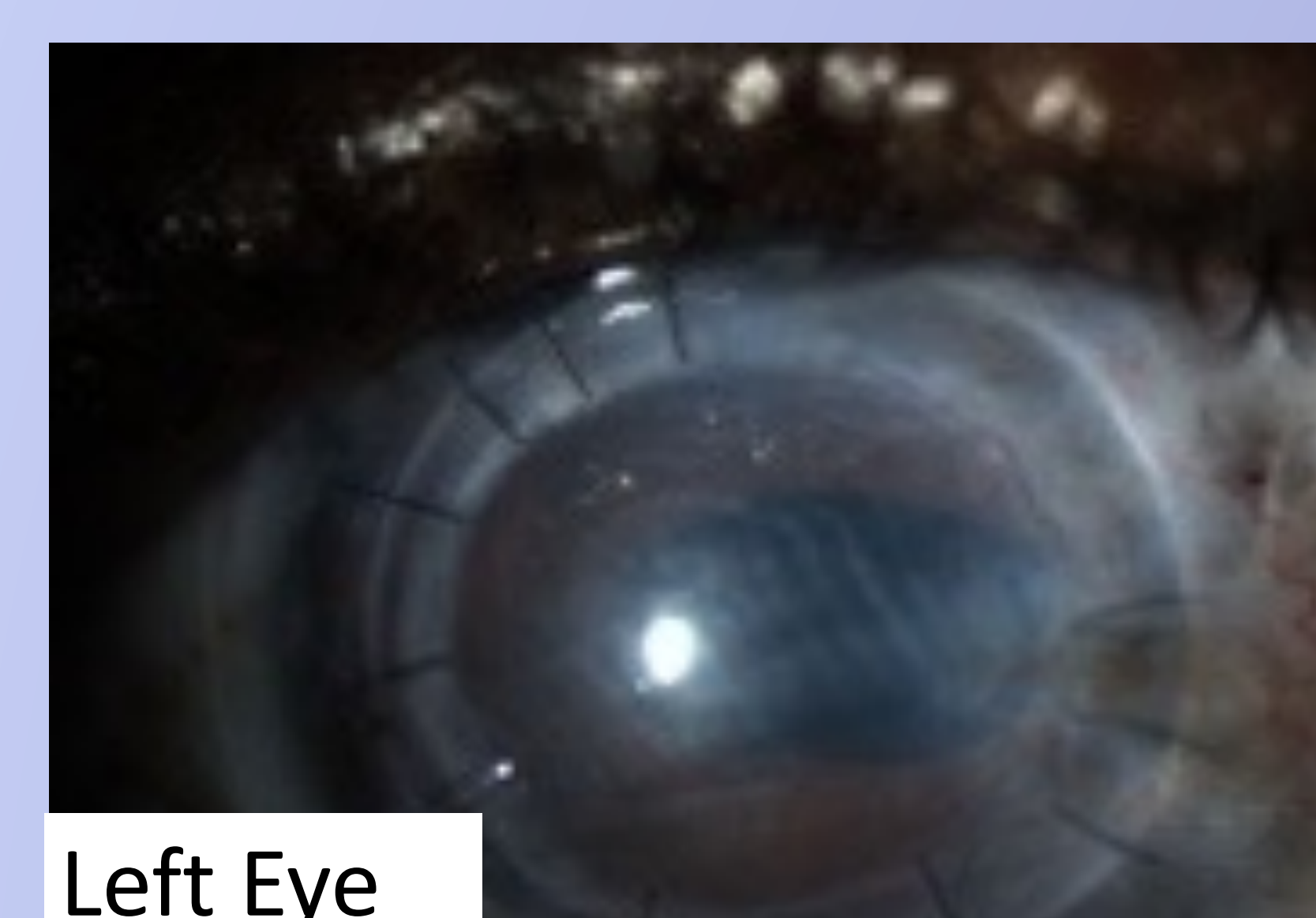
1 month post irradiated cornea transplant



1 month post regular cornea transplant



2 months post irradiated cornea transplant



## CONCLUSION

- Corneal graft rejection – complex immune response.
- Hosts' immune system recognizes the transplanted corneal antigens as foreign, beginning an aggressive immune response.
- Rejection rate is higher in the setting of trauma.
- By using an irradiated cornea to wait until the inflammation subsides, subsequent PK using a regular donor graft reduces the rate of graft rejection.
- Irradiated cornea can serve as a stand along PK.
- Irradiated cornea can be used as an immediate tissues source, without having to order donor tissues, in the setting of a globe trauma or infection.
- Irradiated cornea has a long shelf life, does not need refrigeration, so can be taken to a CSH.

## REFERENCES

1. Vlasov A, Ryan D, Ludlow S, Weichel ED, Colyer MH: Causes of Combat Ocular Trauma Related Blindness from Operation Iraqi Freedom and Enduring Freedom. *J Trauma Acute Care Surg* 2015; 79 (4 Suppl 2): S210-5.
2. Charters L: Protective eye gear essential for modern soldier. *Ophthalmology Times* 2007; 32: 9.
3. Weichel ED, Colyer MH: Combat ocular trauma and systemic injury. *Curr Opin Ophthalmol* 2008; 19(6): 519-55.
4. Hornblass A: Eye injuries in the military. *Int Ophthalmol Clin* 1981; 21: 121-38.
5. Thach AB, Johnson AJ, Carroll RB, et al: Severe eye injuries in the war in Iraq, 2003-2005. *Ophthalmology* 2008; 115: 377-82
6. Weichel ED, Colyer MH, Ludlow SE, Bower KS, Eiseman AS: Combat ocular trauma visual outcomes during Iraqi and Enduring Freedom. *Ophthalmology* 2008; 115: 2235-45.
7. Mader TH, Carroll RD, Slade CS, George RK, Ritchey JP, Neville SP: Ocular war injuries of the Iraqi Insurgency. January-September 2004. *Ophthalmology* 2006; 113: 97-104.