

# Prevention of Microstriae and Microfolds

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# Prevention of Microstriae and Microfolds

## ■ Purpose

- To examine the incidence of and the risk factors related to microstriae and microfolds
- To study the incidence after adopting a technique that minimizes corneal hydration and emphasizes alignment adjacent to the hinge

# Prevention of microstriae

## ■ Phase I: Standard technique

- Balanced Salt Solution (BSS) in squeeze bottle
- 1280 eyes

## ■ Phase I: Standard technique

- **3.05%** microstriae or microfolds drawn on the record

# Risk factors

- Thinner flap

- 160 Hansatome keratome head had a 3.12 risk ratio compared to the 180 head

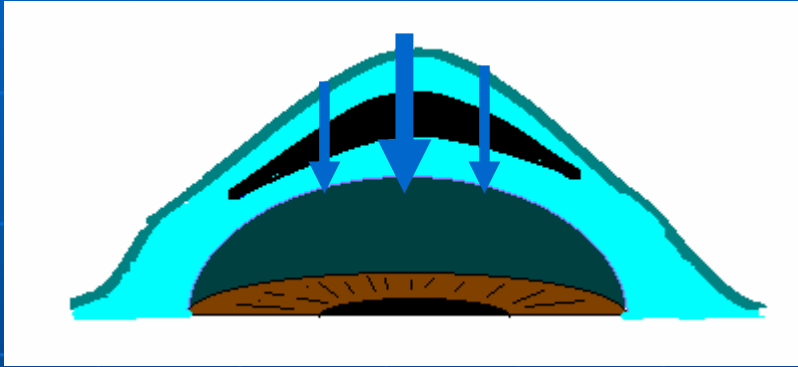
- Dry eye

- Above average correction

- AV SE: -5.94 +/- 2.7D

# Microstriae

## Related to Excess Tissue

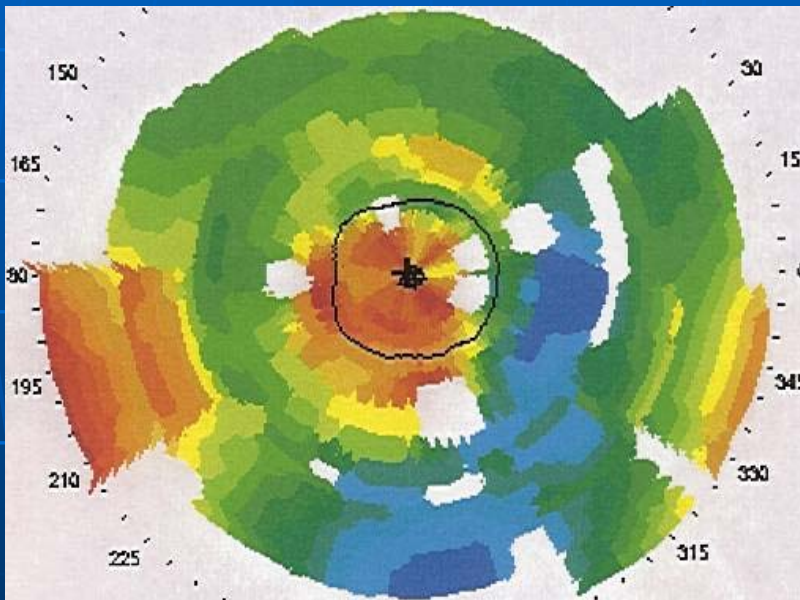


- **Standard teaching:**
- **Excess tissue folds in on itself. Theory consistent with microstriae being more common after high corrections**
- Does not explain the distribution in our patients (AV SE: -5.94 +/- 2.7D)

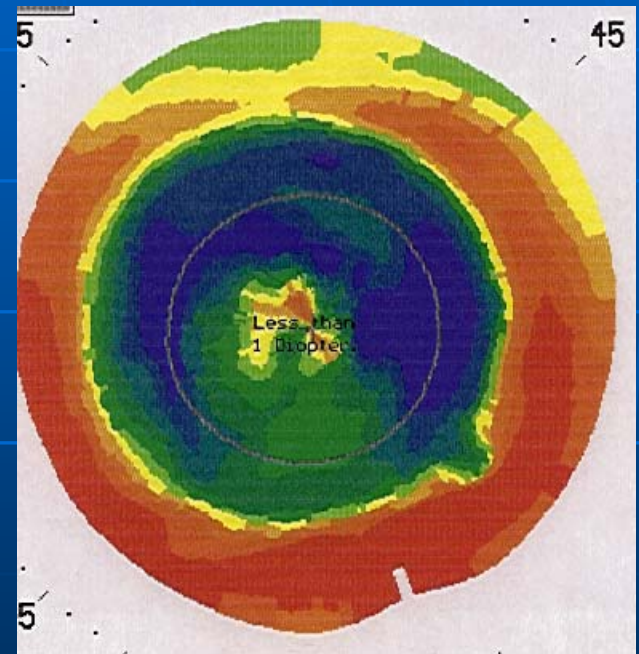
# Microstriae

## Related to over-hydration

Mark Johnston MD, ASCRS 1999



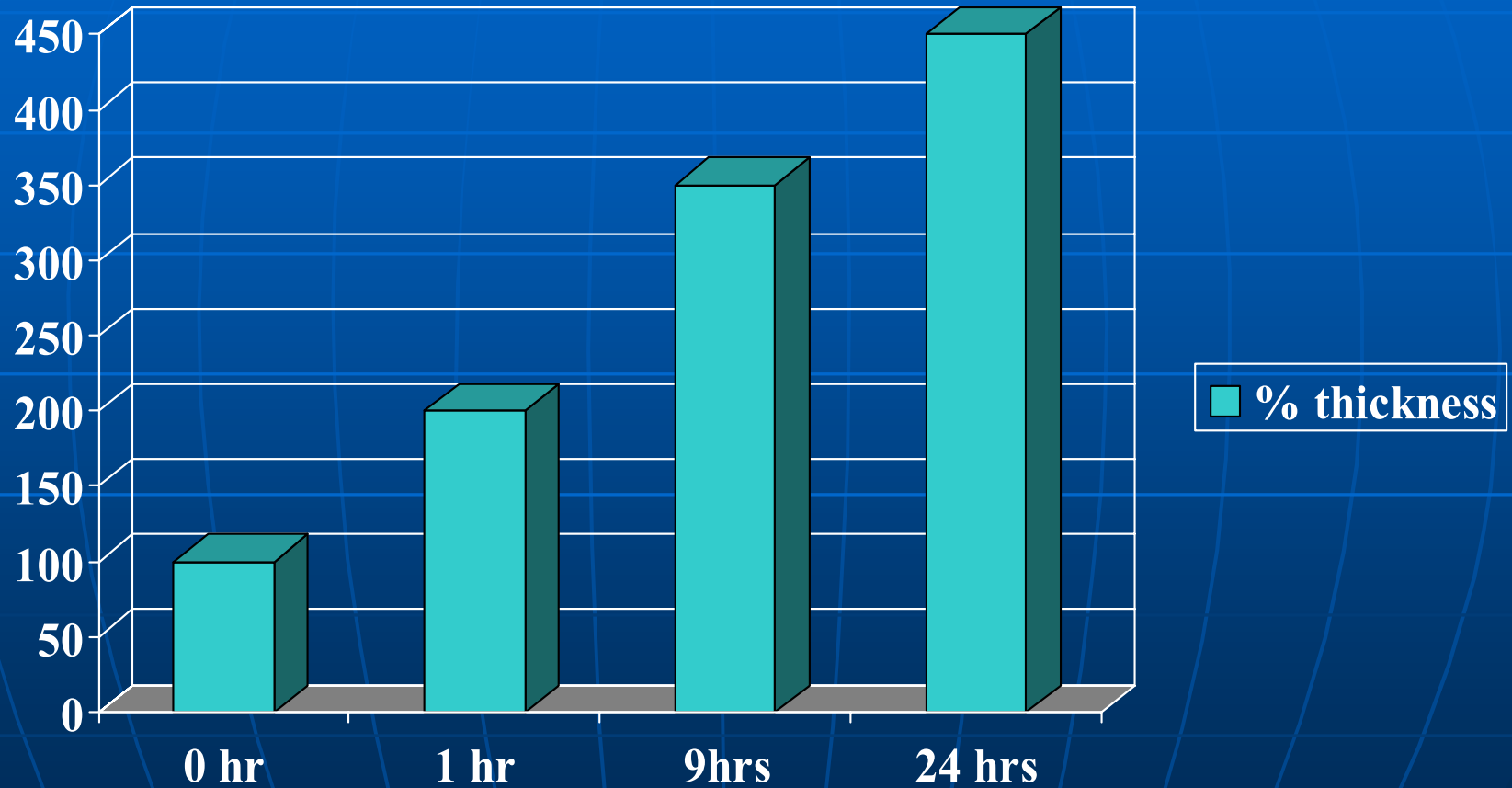
Thirty minutes after surgery a central island with moderate flap and deep stromal edema



Six weeks after surgery microstriae and a central island persist.

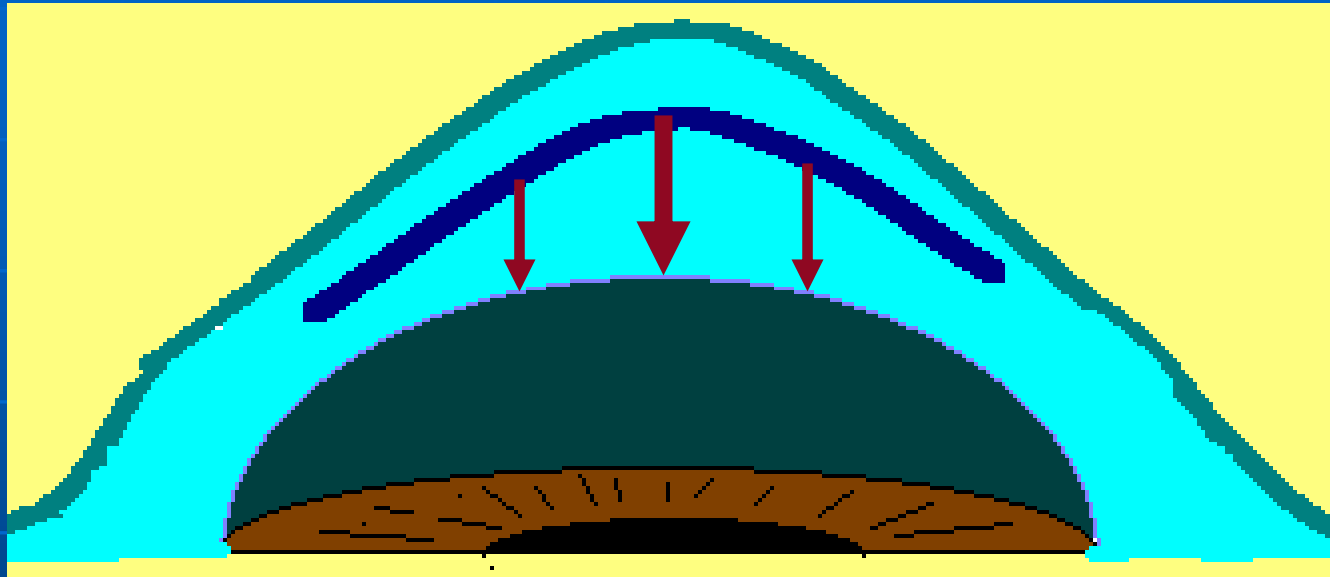
# Stromal swelling in isotonic solution: Time dependent

Doughty MJ. Biochim Biophys Acta 1999 Oct 18;1472(1-2):99-106



# Microstriae: Related to over-hydration

Mark Johnston MD, ASCRS 1999



The looser posterior cornea and central cornea swell more than the tighter anterior and peripheral cornea

When the epithelium heals, the cornea dehydrates and the excess flap tissue infolds with secondary microstriae of the cornea.

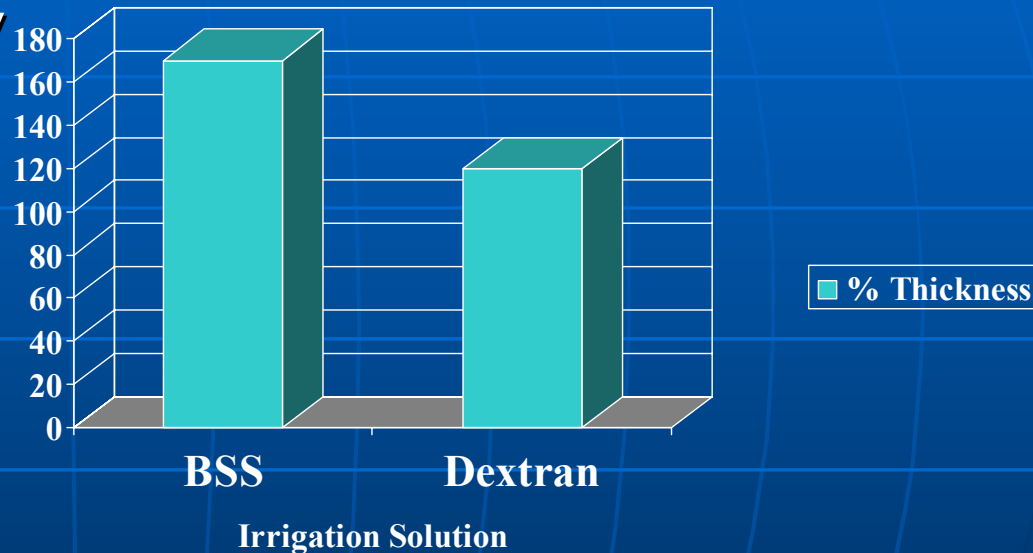


# Corneal Gel Pressure

Stromal swelling at 3 hour less with non-penetrating solute

Kohlhaas M. Ophthalmology 1995 Aug; 92(4): 410-3

- Macromolecules may slowly unwind and bind to available water
- This swelling can be prevented by adding macromolecules such as dextran to the solution.

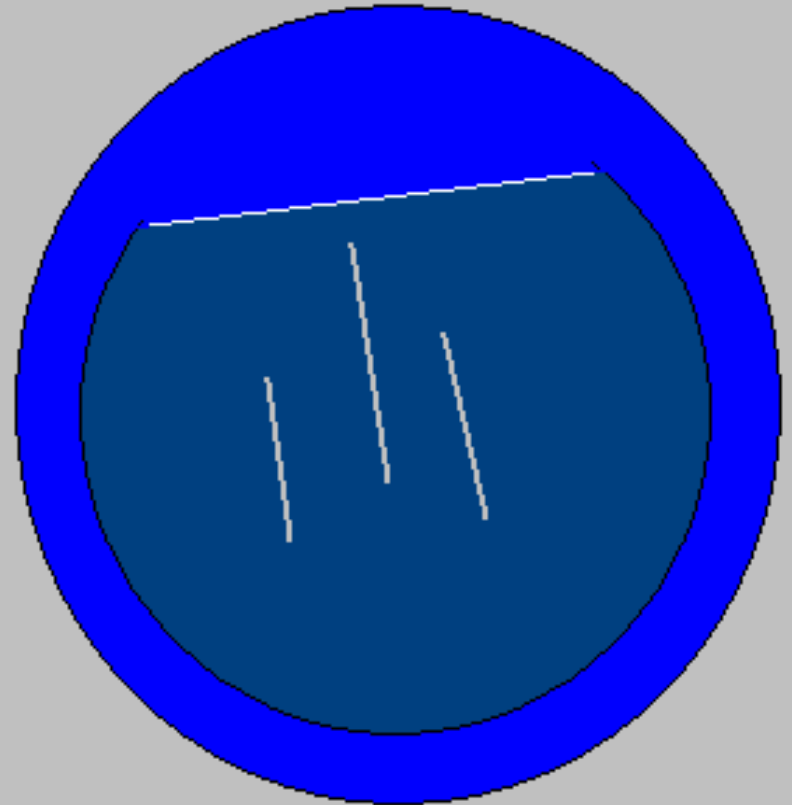
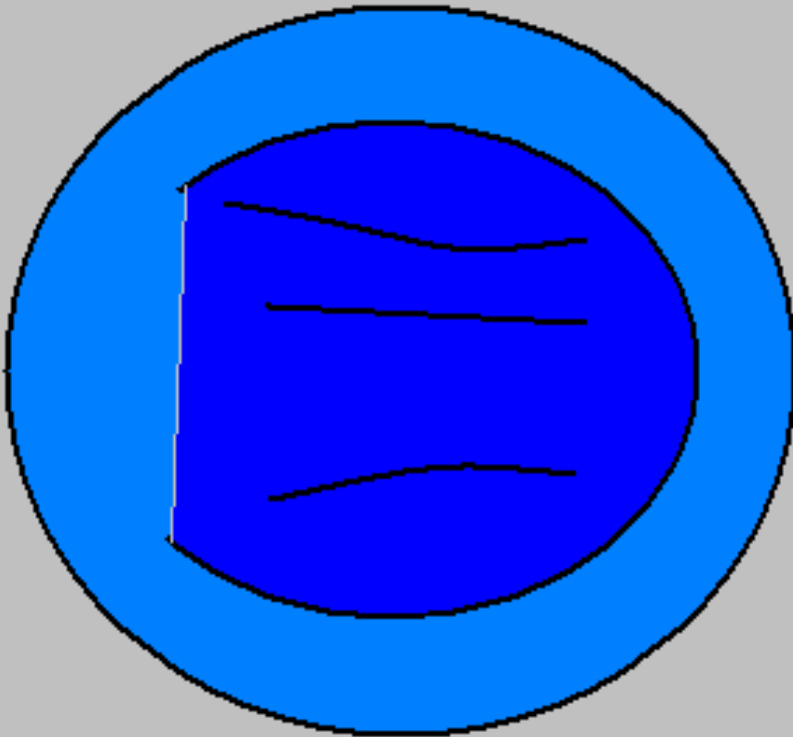


# Optisol in Routine and Complicated Lasik Surgery

Mark Johnston MD, ISRS, Oct 21,2000

- Optisol helpful in complicated cases with
  - Epithelial disruption
  - Repeated irrigation under the flap
- No significant difference in routine surgery
- No significant difference in microstriae

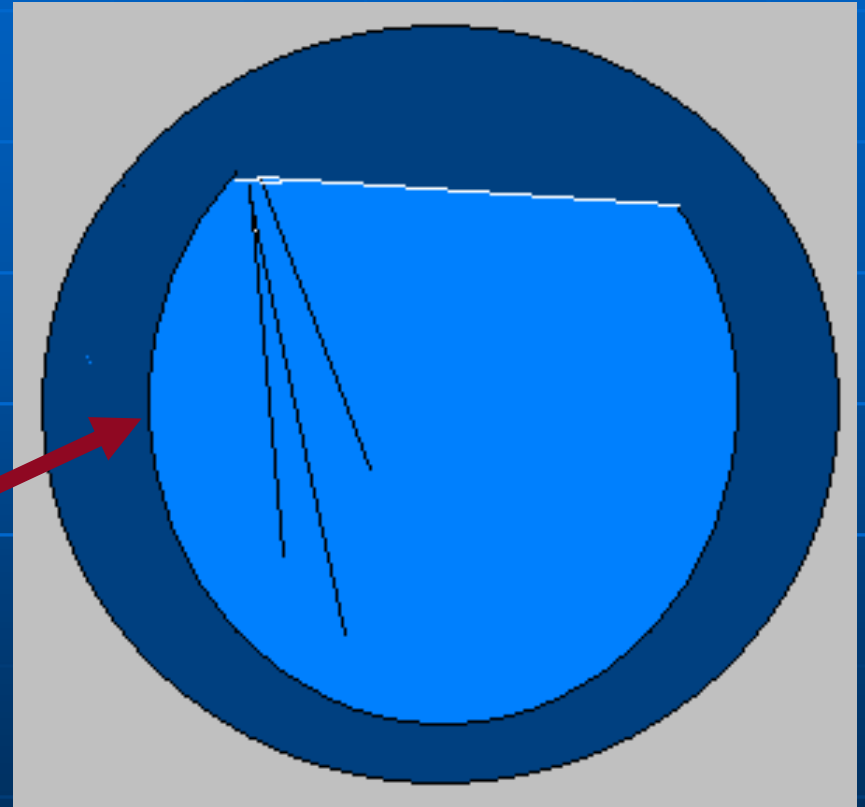
# Role of mechanics in Microstriae



Direction varies with location of the flap

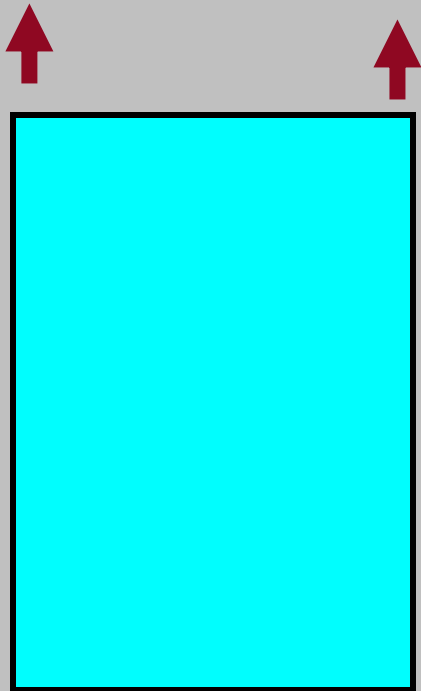
- Microfolds often seen to originate near the edge of the hinge

Gutter may be widened in that quadrant

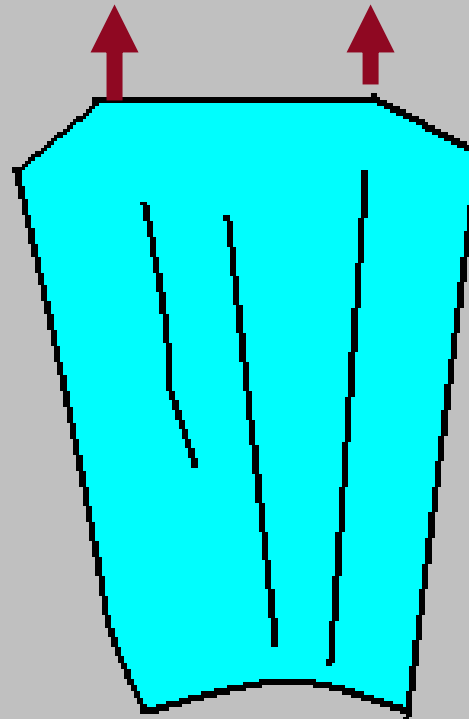


# Flap like a “wet towel”

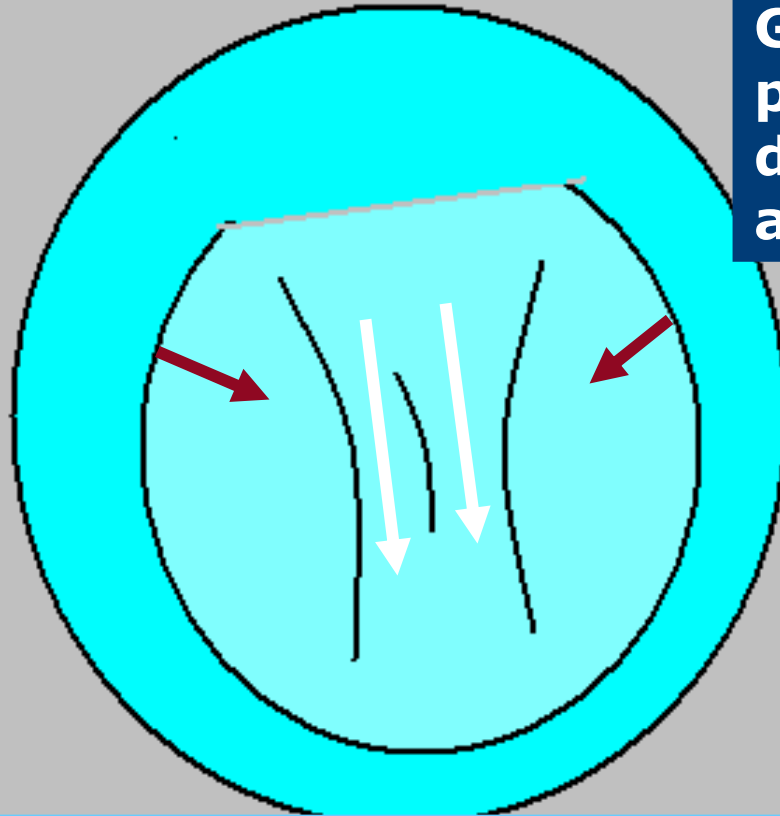
Hold up corners



Hold up “hinge”



# Etiology microstriae ?

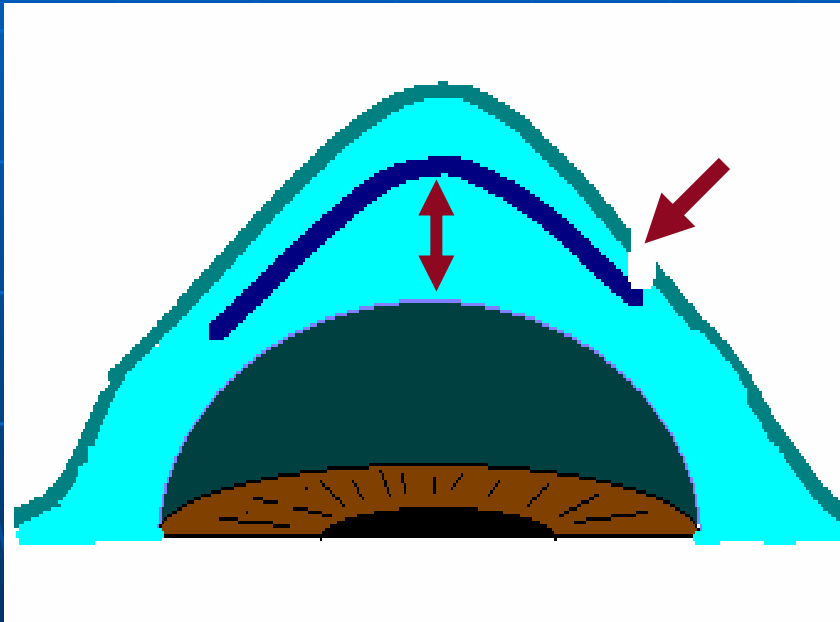


**Gutters  
pulled  
down  
and in**

**Mechanical sweep over flap**

# Widening of the Gutter

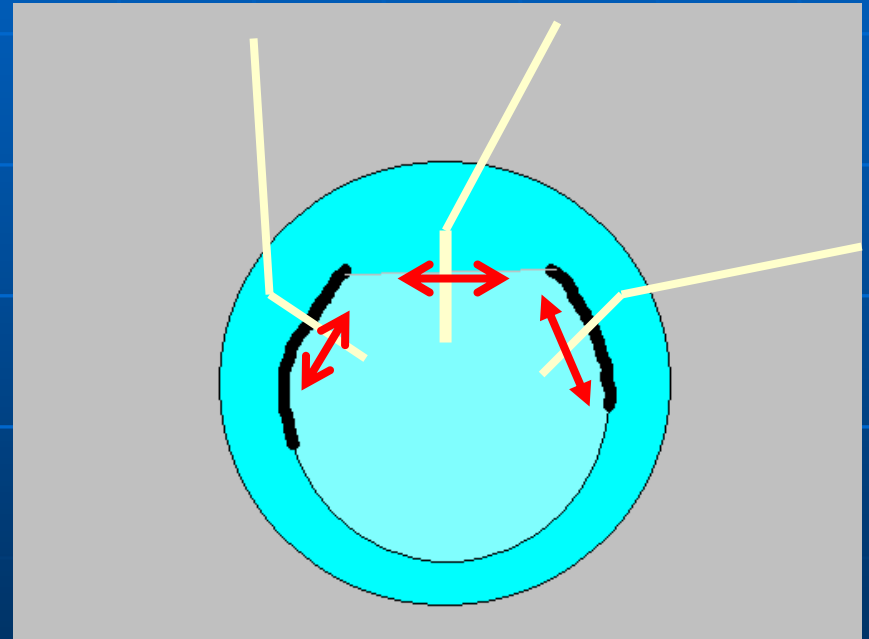
M E Johnston, ASCRS 1999



- Related to excessive corneal swelling
- Significant swelling allows the flap to "lift away"
- Does fluid adsorption near the hinge worsen microstria ?

# Prevention of microstriae

1. Minimize hydration
2. Use the cannula to smooth the hinge and the adjacent cornea before applying any pressure over the central cornea

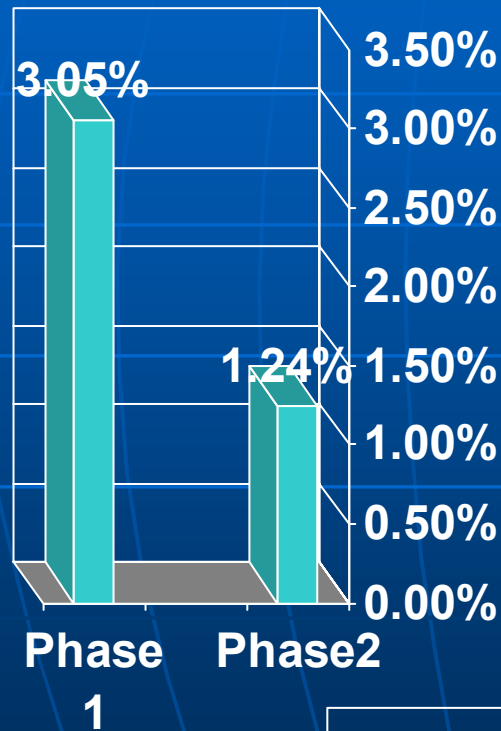




# Prevention of microstriae

- Phase 2: Modified Technique
  - BSS in a 1 cc syringe
  - 726 eyes
  - Smooth over the hinge and lateral to the hinge before applying any pressure over the central cornea

# Prevention of microstriae



- No eye required a relift or refloat
- No eye had a loss of 2 lines of best corrected vision (at three months)

# Conclusion

- Minimizing flap hydration and systemic smoothing around the hinge reduces the incidence of microstriae and microfolds.