Adhesives for LASIK Epithelial Ingrowth Removal

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Have done research, consulting, or speaking for:
Allergan, AMO, Calhoun Vision, CXL-USA, ESI, Humanoptics, Oculus, OSD, Quantel, TLCV
Some of the information may represent off-label uses of approved drugs or devices

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Epithelial Ingrowth

Complication of LASIK surgery

- Incidence 0.5 to 15%
- Usually observed in first few weeks
- May be nonprogressive or progressive
- In most advanced stage may result in flap melt

Signs

- Isolated nests/sheets of cells
- Decreased UCVA and/or BCVA
- Induced astigmatism on refraction
- Irregular astigmatism on topography

Treatment - Removal

Removal
- Lifting and scraping epithelial cells
  - Blunt spatula, Merocel sponge
  - Ethanol used to supplement complete removal
  - MMC – has no role in management
  - PTK to remove additional cells can induce significant irregular astigmatism
- Nd:YAG Laser treatment
  - Useful for stable pockets of ingrowth where the elevation of the cornea causing changes in comfort or vision

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Treatment – Prevention of Recurrence

Prevention of Recurrence
- Suturing flap edges
  - Induce striae, irregular astigmatism, requires suture removal, longer recovery
- Fibrin adhesive application
  - Useful for recurrent cases
  - Longer recovery

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Tisseel Fibrin Glue

Baxter (tissuesealing.com)
- Mixture of:
  - Fibrinogen & Thrombin
  - Also has fibrinolysis inhibitor (bovine)
- Mixed on surface of the eye
- 30-60 seconds to manipulate it
- Thrombin can be diluted to slow the setting time
- 8-10 minutes to dry so BSCL can be placed
- Dissolves in 10-14 days

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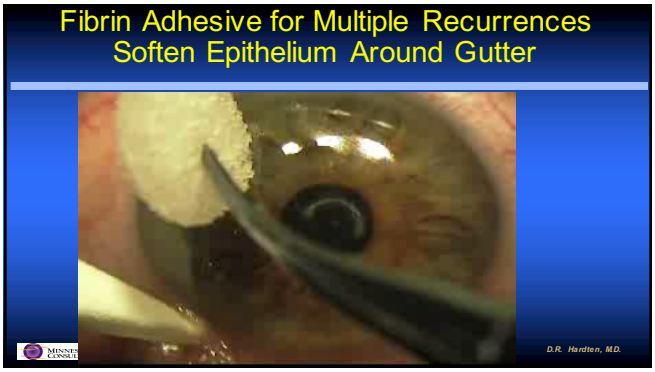
Fibrin Adhesive for Multiple Recurrences Soften Epithelium Around Gutter

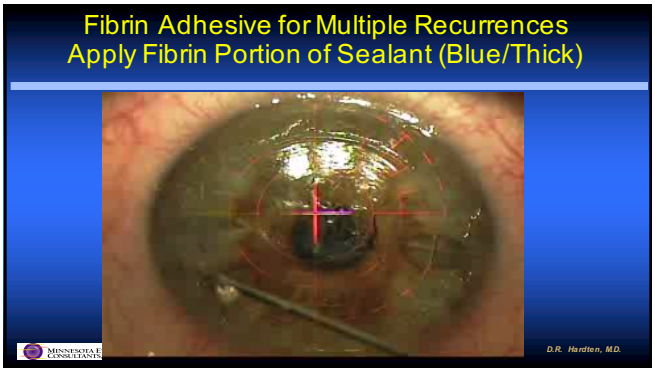


Fibrin Adhesive for Multiple Recurrences Remove Epithelium around Gutter

Fibrin Adhesive for Multiple Recurrences Remove Epithelium from Stromal Bed & Gutter

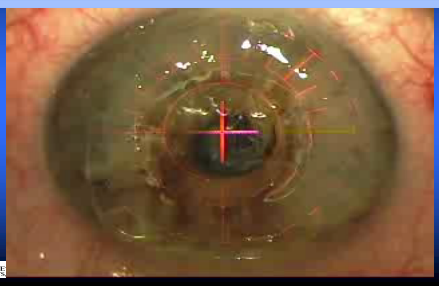
Fibrin Adhesive for Multiple Recurrences
Remove Epithelium from Back of Flap

Fibrin Adhesive for Multiple Recurrences
Apply Fibrin Portion of Sealant (Blue/Thick)



Fibrin Adhesive for Multiple Recurrences
Apply Thrombin Portion of Sealant (Black/Thin)

Fibrin Adhesive for Multiple Recurrences Allow Glue to Dry



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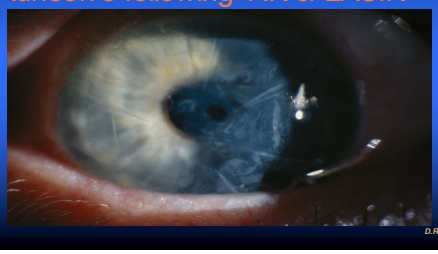
Postoperative Day 1

Fibrin Adhesive following RK & LASIK



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Results in Study of 39 Eyes

Fibrin Glue
- LASIK surgery
- Epithelial ingrowth recurred despite prior removal or enhancement

Risk factors present
- Following LASIK enhancement: 32 eyes
- Slipped Flap: 1 eye
- S/P RK and LASIK enhancement: 4 eyes
- No obvious risk factors: 2 eyes

Prior Removals
- 9 eyes with prior removals
- Up to 5 removal attempts previously
- Mean 1.7 $\pm$ 1.3 removal attempts

Success
- No recurrence: 79.5%
- 3 clinically significant recurrences requiring subsequent removal (7.7%)
- One patient combined with 10-0 nylon and 10-0 polyglactin sutures due to high fistula
- Average 23.0 $\pm$ 19.1 months follow-up

Hardten, et. Al., JCRS 2014, Combination of MEC & Duke University Eyes

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Results

Eyes with ≥ 3 months follow-up (3 to 66 months):

- Two eyes underwent flap amputation due to irregular astigmatism.
- One eye had ectasia with subsequent Intacs placement
- One eye had poor vision from glaucoma (2/200 to CF)
- 92.3% had unchanged or improved BCVA
- 5.1% lost one line of BCVA
- BCVA improved from 61% with 20/25 BCVA preop to 76% at 3 months postop and 84% at last follow-up.

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Nd:YAG Laser

Epithelial Ingrowth Removal

- Ayala, et. al.: AJO 2008;145:630.
- 0.6 mJ
- Variable number of spots depending on amount of ingrowth
- 40% of cases required 2 or more sessions

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Epithelial Ingrowth

Nd:YAG Laser

30 eyes

Starting in the center of the ingrowth

Average energy 0.6mJ

FML TID 2 weeks postop

Opacities resolve fully in 80%

Mild opacity remained in 20%

Ayala, et. al.: AJO 2008;145:630.

FIGURE 1. Photograph from Case 1 showing very dense epithelial ingrowth with bubbles in the area treated with neodymium:yytrium–aluminum–garnet (Nd:YAG) laser.

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Epithelial Ingrowth

Nd:YAG Laser

Before | Immediately After | 2 months after

FIGURE 3. Photograph from Case 2 showing epithelial ingrowth previous to treatment.

FIGURE 4. Photograph from Case 2 obtained immediately after treatment with Nd:YAG laser. The bubbles in the epithelial ingrowth area are observed.

FIGURE 5. Photograph from Case 2 obtained two months after carrying out Nd:YAG laser treatment showing with minimum opacities in the treated area of epithelial ingrowth.

Ayala, et. al.: AJO 2008;145:630.

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Conclusions

Fibrin Adhesive

- Tisseel/Artiss may be a useful adjunct in epithelial ingrowth removal in complicated cases
- May reduce incidence of recurrent epi ingrowth
- Tisseel/Artiss is well tolerated and there were no complications associated with its use
- Larger randomized studies would be needed to determine safety and efficacy of this technique as compared to primary removal or sutures
- Reports of ReSure along the graft edge shows it may also be useful
  Yesilirmak, et. al., JRS 2015;31:275
- Nd:YAG may be useful for stable long-standing ingrowth destruction
  Hardten, et. al., JCRS 2014, Anderson, et. al.: JCRS 2003;29:1425 Ayala, et. al.: AJO 2008;145:630

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