Nd:YAG Treatment of Epithelial Ingrowth

Eliminating flap lift can reduce the risk of further epithelial ingrowth and infection.

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As of 2011, more than 11 million LASIK procedures had been performed in the United States.1 LASIK and other refractive surgery techniques necessitating flap creation are safe; however, side effects such as epithelial ingrowth can complicate surgery. Epithelial ingrowth is reported in 0.2% to 12.0% of primary treatments and in 32% of cases that require retreatment or an additional flap lift.2-5 These choristomatous epithelial cells may cause glare, halos, ocular surface dysesthesia, and topographic changes.

Evolution of flap construction from mechanical microkeratome to femtosecond laser has reduced the incidence of epithelial ingrowth, presumably due to improved fit at the flap interface and a steeper flap edge profile to prevent epithelial migration. However, other risks factors persist, including ocular surface disease, prior corneal surgery, and prior incision creation—a triad of factors that epitomize refractive fine-tuning following cataract surgery. With the current surge of interest in femtosecond-assisted cataract surgery, the incidence of epithelial ingrowth may stop declining and begin increasing.

Current options to treat choristomatous epithelial cells include doing nothing, as spontaneous resolution can occur, even in advanced cases; and treating with topical steroid. If cells still persist, mechanical or alcohol-assisted debridement6,7 or phototherapeutic keratectomy (PTK)8 have been used with mixed efficacy. Unfortunately, all nonmedical methods necessitate flap lift, a factor strongly predictive of developing further epithelial ingrowth.9 Fibrin glue, corneal sutures, or a bandage contact lens can be used to address the epithelial ingrowth, but application of these can trigger higher incidences of astigmatism, inflammation, and infection.

Using Nd:YAG laser to treat epithelial ingrowth was first described in 2008.9 In this series, 80% of the treated eyes (n=30) achieved complete resolution, and 40% required a second treatment. However, indications suggested that retreatment carried no significant additional risk. Since this pivotal paper, there has been a paucity of supporting data in the literature. In our small series described below, two patients responded favorably to Nd:YAG.

CASE PRESENTATIONS

Patient No. 1. A 40-year-old man developed epithelial ingrowth following myopic LASIK. In this case, flap construction was completed with a mechanical microkeratome (M2 Microkeratome; Moria). The patient required two flap lifts for mechanical removal procedures that eased but did not fully improve his symptoms. Two years later, he presented with worsening glare, grittiness, and development of monocular diplopia. UCVA in the affected eye was 20/20, but a large area of epithelial ingrowth was evident beneath the flap (Figure 1A).

The patient was treated with Nd:YAG laser (32 shots, 0.6 mJ) applied to the aberrant cells (Figure 1B), and 2 months later the lesion had cleared superiorly (Figure 1C). Inferiorly, patches persisted, and a further 19 shots of 0.4 mJ were applied. Four months later, the patient’s vision improved to 20/16, with complete resolution of symptoms and subjective visual complaints. A few microscopic granular deposits visible on slit-lamp biomicroscopy were clinically insignificant (Figures 1D and 1E). From 18 months on, there has been no recurrence or adverse outcomes.

Patient No. 2. A 38-year-old man experienced traumatic flap dislocation 18 months after myopic LASIK. During the original procedure, flap construction was completed with a mechanical microkeratome (M2). After dislocation, the flap was surgically repositioned within 24 hours. Three months later, epithelial ingrowth was noted, which later became symptomatic and visually significant (UCVA 20/25; Figure 2A). At this time, 64 shots of Nd:YAG were

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<td>• An immediate response to this subflap treatment occurs during laser application.</td>
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applied (0.2–0.4 mJ) with topical steroid cover. The immediate postoperative result is shown in Figure 2B. Partial resolution occurred (Figure 2C), and further laser was applied 2 months later to the shrunken islands of epithelial cells (20 shots, 0.2–0.4 mJ; Figures 2D and 2E). At 12 months, the patient’s visual acuity was 20/16 with complete symptomatic resolution. There has been no recurrence in the 18 months since final treatment.

DISCUSSION AND CONCLUSION

The main advantage of Nd:YAG over other epithelial ingrowth treatment modalities is that it eliminates the need for flap lift and therefore eradicates this principal risk factor for further ingrowth. Our two cases concur with the findings of previous work proposing that Nd:YAG laser provides a fast and noninvasive treatment modality for epithelial ingrowth without adverse effects. The mechanism of action is localized plasma-mediated vacuole formation, which evaporates surrounding tissue. The response to this subflap treatment is instant and clearly visible during laser application (Figures 1B and 2B).

No adverse effects have been reported to date for this promising treatment. Eliminating the need to lift the flap theoretically reduces the risk of further epithelial ingrowth, lowers the risk for infection, and is therefore preferable for patients. However, prospective data and longer follow-up are required. A study comparing Nd:YAG treatment with mechanical removal remains a challenge, as incidence is rare and clinical presentation is variable.

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