Corneal melt – a rare and unexplained complication of surface ablations?

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in Athens

REFRACTIVE surgeons should keep an eye out for early signs of corneal melt in patients who have undergone surface ablations. Though extremely rare, the complication appears to result from postoperative topical medication and can have devastating consequences, said Timo Tervo MD, Helsinki University Eye Hospital, Helsinki, Finland.

Speaking at the Cornea Day at the 11th Winter Refractive Meeting of the ESCRS, Dr Tervo noted that if the causative agent is withdrawn in time, most eyes with corneal melt will have a good outcome. Otherwise, corneal perforation may occur within a matter of days, he said.

It is as yet unclear what causes the complication, but topical NSAIDS, steroids and antibiotics have all been implicated. Reports in the literature indicate that the complication will sometimes occur as a result of overuse of a prescribed NSAID, as in a case described by Mian et al *(Cornea 2006;25:232-234)* where a patient used ketorolac tromethamine every hour and within five days developed a corneal perforation requiring penetrating keratoplasty.

The complication has also been reported when the surgeon switches from the NSAID they commonly prescribe to a new or different agent. For example, Hargrave et al *(Ophthalmology 2002;109:343-50)* reported that after 1500 uneventful PRKs, two out of 27 patients developed corneal melts when they received a regimen of generic diclofenac instead of suprofen, which had been prescribed to the previous patients.

However, in Dr Tervo's own practice it was a change in corticosteroid regimen that was associated with corneal melts. Their original regimen had been ketorolac t.i.d. for three to seven days, fluorometholone starting on day two or three and levofloxacin t.i.d for seven days. They had used this regimen in several thousand PRKs and LASIK procedures with no untoward effects.

However, when fluoromethalone became unavailable in Finland Dr Tervo switched to prescribing rimexolone b.i.d, and corneal melts occurred in five of nine eyes treated with PRK and in one eye of 53 treated with LASIK.

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The patients lost up to 100 microns in corneal thickness in the early postoperative period, although their corneas recovered near normal thickness in most cases and continued to improve over time. Furthermore, most had better corrected and uncorrected visual acuity than they had pre-operatively, he noted.

"Most patients seem to recover if the therapy is swiftly interrupted. This recovery of the corneal thickness may take six months or more," he noted.

One of the patients who underwent PRK had a pre-operative refraction -4.25 D and after a follow-up of 67 days refraction was +1.75 D sphere with -0.75 D of cylinder. Postoperative visual acuity improved from counting fingers pre-operatively to 1.0 at most recent follow-up, however, the patient's BCVA worsened slightly from 1.5 to 1.2.

Another PRK-treated patient had a pre-operative refraction of -0.75 D and a postoperative refraction of +1.0 D with -1.0 D of cylinder. That patient's UCVA and BCVA were the same as pre-operative values at 0.6 and 1.0 respectively.

The third patient had a nearly ideal outcome with refraction improving from -1.5 D to +0.5 D with -0.5 D of cylinder and postoperative UCVA and BCVA of 1.0, compared to respective pre-operative values of 0.3 and 1.0. The fourth patient was similar to the first patient in having a substantial postoperative refractive error (+1.75 D of sphere and -1.50 of cylinder) but greatly improved UCVA (0.6 vs. counting fingers) and slightly diminished BCVA (1.0 vs. 1.2).

It was the fifth PRK-treated patient, a hyperope with a pre-operative refraction of +4.75 D with 2.0 D of cylinder, who had the most unsatisfactory outcome. At 67 days' follow-up the patient's refraction was considerably overcorrected with -2.25 D of sphere and +2.75 D of cylinder, and UCVA remained at a pre-operative value of 0.2 while BCVA worsened from a pre-operative value of 1.0 to 0.5 postoperatively.

Combination of causes cited

There are several theories as to what causes corneal melting following PRK. It may be that NSAIDS are responsible. Research has shown that NSAIDS can induce the production of collagenases and matrix metalloproteinases. It may also be that steroids have an initiating role in the complication, as they were used in all the cases reported in the literature.

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In addition, fluoroquinolones cannot be ruled out as a possible factor since they were also used in the cases reported. Moreover, fluoroquinolones have been reported to show corneal cell toxicity in tissue culture.

"Actually, we don't know what causes corneal melts in these cases. It could be a combination of agents plus an epithelial defect and maybe the bandage contact lens prolongs the drug effect, because this effect did not come up with LASIK patients, excluding one with a minor epithelial defect where there was only a mild melt."

Dr Tervo noted that although this type of melt is very rare he now no longer prescribes NSAIDS to patients after PRK and LASIK.

"Intra-operational use may be safe but is probably not necessary. It's important to watch for the other drugs as well, as unknown interactions may exist. I would be pleased to have emails or responses from anyone who has had similar experiences because the aetiology of this complication is not clear," he added.

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