Infectious Crystalline Keratopahthy – A Rare case

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A crystalline appearance within the stroma of cornea may be caused by a variety of conditions including lipid and metabolic disorders such as cystinosis and monoclonal gammopathy in association with multiple myeloma. It rarely occurs as a complication of Penetrating Keratoplasty following either infection or rejection.[1-4]

Infectious Crystalline Keratopathy (ICK) is characterised by an indolent infectious keratitis in which needle-like, branching crystalline opacities are seen within the corneal stroma, in the absence of appreciable corneal or anterior segment inflammation.

We report a patient who developed crystallinekeratopathy following a graft. The cause of keratopathy was considered to be infective and the condition resolved on antibacterial treatment. After that, the patient underwent cataract surgery with a toric posterior intraocular lens implant.

CASE REPORT

A 44-year-old woman with right eye leucomatous corneal opacity underwent an uneventful optical Penetrating Keratoplasty in November 2010. The postoperative examination revealed an epithelial defect that healed within 48 hours. Anterior chamber was maintained and all interrupted sutures were in situ and buried. Patient was in regular follow up and at 4 months postopertaive follow up she came with loose sutures at 3o'clock and 7o'clock which were removed.

In the 9th month, patient came with complaints of foreign body sensation, dimunition of vision and some white opacification in graft. Decrease in vision was very gradual painless and progressive. Past history did not reveal any significant point. The patient was using topical prednisolone eye drops (twice daily) and lubricants eye drops (twice daily).

On examination the best corrected visual acuity (BCVA) of patient reduced from 6/24 to 5/60. Slit lamp examination showed white eye i.e. no congestion with a focal area of non-suppurative intrastromal white opacities (3.1 /4.8 mm^2) in branching pattern with crystalline deposits (figure 1). The lesion extended from the graft-host interface at 3 o'clock to 5 o'clock. Its extension was noted towards the centre and at approximately 60% of stromal depth. The epithelium was intact and the anterior chamber had occasional cells and flare (Grade 1). The area of involvement corresponded to the area of suture removal. Differential diagnosis of following diseases were made:

- Herpes simples keratitis due to branching pattern. But crystalline nature of the opacity was against this differential. Moreover stain was negative and corneal sensation showed normal senstivity.
- Graft rejection was another diagnosis due to differential corneal edema. But mnimal cells and no congestion ruled out the diagnosis.
- Clinically the diagnosis of crystaline keratopathy was made due to typical crystalline opacities in branching pattern.

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The biopsy of lesion could not be taken as the epithelium was intact and pupillary area was clear moreover suture biopsy could not be taken as suture was already removed from that area.

Fig. 1

Fig. 2

Fig. 3

So the patient was put on broad spectrum antibiotics assuming infectious etiology because spectrococcus viridans is the most common organism implicated.[2] So Azithromycin (1%) ophthalmic drops with fortified Tobramycin (1.3%) and Vancomycin (5%) was started every hour. Topical prednisolone was reduced to once daily. Topical homatropine (2%), three times daily was also added. Lubricants were continued. The patient was kept under strict follow up by monitoring her symptoms and the size of the lesion and crystals by slit-lamp examination and photographs. Initially the lesion did not show any regression although it did not increase either. The medications were continued in view of resistant nature of the disease. At 2 weeks follow up the patient showed some response to the treatment and improved symptomatically. On slit lamp examination, the density length of the lesion decreased although size remained the same (figure 2). The continued treatment showed reduced crystals size at 2 months follow up. The course of treatment was uneventful with no worsening of symptoms or any signs of rejection. The ICK resolved in 5 months and 15 days duration (figure 3). Topical antibiotics were then tapered in 6 months. The BCVA regained to 6/36 as there was increased astigmatism with lenticular opacity. She had astigmatism of -3.00D cylinder at 40°. So cataract surgery by Phacoemusification and toric posterior chamber intraocular lens implant was planned. Surgery went as planned and was uneventful. At first day post surgery media was clear, anterior chamber was well defined with no cells, lens implant was in place, fundal glow was good. The final BCVA was 6/9 with -0.5 D of sphere.

DISCUSSION

Infectious crystalline keratopathy may occur with a bacterial infection. The infection can arise de novo or as a sequelae of surgical procedures, such as refractive surgery and corneal transplants, if the cornea is traumatized chemically or mechanically. Infectious crystalline keratopathy is a rare complication typically following penetrating keratoplasty, but it can occur in an ungrafted cornea in patients with herpes simplex, herpes zoster, *Acanthamoeba*, or local anesthetic abuse.[2,3] It was first described by Gorovoy et al. in patients of corneal transplant who received prolong corticosteroids.[5]

The various predisposing factors are Penetrating keratoplasty long term steroid, previous HSV keratitis, neurotrophic keratopathy, topical anaesthetic abuse, persistent epithelial defects, loose sutures, contact lenses, radial keratotomy scars, post-LASIK etc.[1]

Many organisms have been isolated in cases of ICK, but the most common are gram positive aerobic streptococci which have been reported in 42% of cases, of which *S. viridans* is the most common (1,4). Another 12% of cases are reported with staphylococci as the organism isolated, including *Staphylococcus aureus* and *haemolyticus*. Fungi have been implicated in 8% of cases, including *Candida tropicalis, albicans*, and *parapsilosis*, and *Alternaria*. Additional organisms that have been isolated include *Mycobacterium fortuitum*, *Peptostreptococcus*, *Corynebacterium*, *Pseudomonas* and *Acanthamoeba*. Often, multiple organisms are isolated. Eyes undergoing refractive surgery are at higher risk for infections with atypical organisms such as mycobacteria (acid-fast bacteria) and *Alternaria* (fungi). With the increasing number of patients undergoing refractive surgery and the relevance of early intervention, it is important to recognize ICK. The organisms gain access along the suture track or through the micro defects in epithelium and form a biofilm that prevents proper penetration of antibiotics.[6]

Infection-related crystalline deposits have a fine branch like shape, develop over time and may be associated with inflammation. Diagnostic testing such as gram staining, acid-fast staining, routine bacterial and fungal cultures, as well as mycobacterial cultures, should be obtained whenever feasible.

The treatment of choice for ICK is with intensive topical antibiotics. Most treating surgeons use "fortified" antibiotics such as cefazolin,vancomycin or tobramycin.[4] When the organism has not been identified, broad-spectrum antibiotics should be used. The antibiotics as persensitivity should be switched and tailored once the organism and antibiotic sensitivities have been obtained. If symptoms do not resolve, it is reasonable to expand coverage or one can start systemic antibiotics. It is common for treatment of ICK to be continued for weeks or even months. In some cases it can even do not regress at all and compel the surgeon to repeat the keratoplasty.

Legends:

Figure 1: ICK lesion at presentation

Figure 2: Reduced density of lesion at 2 weeks of treatment

Figure 3: Resolved lesion at 6 months with corneal opacity

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