Title: Rapid Containment of *Pseudomonas* Keratitis by Continuous Infusion of Topical Antibiotics through a Morgan Lens

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Purpose: Despite following standard treatment, *Pseudomonas* keratitis can continue to progress and result in loss of vision or eye. Therefore, rapid containment of aggressive and refractory infection is imperative. Our cases are to demonstrate that Morgan lens can be an effective topical antibiotic delivery vehicle in cases of advanced keratitis.

Methods: Two patients (three eyes) were included in this report. Patient 1 was an 11-year-old healthy female diagnosed with contact lens-related *Pseudomonas* keratitis in the right eye. Over a 2-week treatment including topical 15mg/ml tobramycin q1h and ciprofloxacin qid, the keratitis worsened and corneal perforation appeared imminent (figure 1A). Patient 2 was an 11-month old female with Apert syndrome who was admitted for a complicated pneumonia and on a respirator. Bilateral lagophthalmos led to exposure keratitis and subsequent *Pseudomonas* keratitis. Aggressive fortified antibiotics q1h over two days did not contain the destructive infection (Figure 1B). In all affected eyes, a Morgan lens (MorTan, Inc., Missoula, MT) was inserted under both eyelids, connected to an IV tubing and the tubing taped to the forehead (Figure 2A). In the intubated 11-month old patient with bilateral infections, the Morgan lens was further secured in place by a temporary tarsorraphy (Figure 2B). Ceftazidime (50mg/ml) was the key antibiotic infused at 20ml/hour through the IV tubing and Margan lens over the ocular surface.

Results: Three days after infusion through the Morgan lens, corneal culture became negative in all eyes. The infusion was continued for at least a week to ensure definitively eradication of the infection before switching to standard topical antibiotic therapy. Topical steroid and amniotic membrane were used as adjuncts when necessary in the acute recovery phase to control inflammation. A combined cataract and corneal transplant surgeries 9 months later in patient 1 lead to a spectacle corrected vision of 20/60 (Figure 3A). In patient 2, the corneas remain epithelialized with stable scars (Figure 3B) and await transplant surgeries after the lagophthalmos are corrected.

Conclusions: The application of Morgan lens is non-invasive and requires minimal training. It can timely deliver high concentration antibiotics to the entire ocular surface and possibly, to the intraocular tissues as well. IV tubing connectors allows for easy switch between medications or simultaneous administration of multiple medications, and titration of dosing. Additionally, monitoring of therapeutic effects is not hindered. Our cases suggest that Morgan lens can be very effective in treating severe and aggressive infectious keratitis or sclerokeratitis.