Paradigm Shift in the Treatment of Periocular Necrotizing Fasciitis – Neutralizing the Toxin

Purpose To highlight a medical paradigm shift in the management of periocular necrotizing fasciitis.

Methods Retrospective, non-comparative case series.

Results Three patients were identified who presented with periorbital necrotizing fasciitis. All three patients were treated with standard medical treatment, tissue sparing surgical treatment along with local tissue irrigation of NeutroPhase, a dilute form of hypochlorous acid (HOCl).

Case 1 The index patient presented with rapid onset of group A *Streptococcal* toxic shock syndrome and severe bilateral periorbital necrotizing fascitis with left facial nerve palsy. Her course was complicated by acute respiratory distress syndrome requiring intubation, hypotension and bradycardia with need for pressor support and a transvenous pacer. As she continued to decline with multi-organ failure, internet resources were searched for alternative treatments. National Necrotizing Faciitis Foundation (NNFF) recommendation of NeutroPhase, a dilute form of hypochlorous acid (HOCl), was identified. The 0.01% HOCl solution was sprayed every 2 hours to the periocular area and the 0.03% HOCl solution irrigated via perforated catheters to the infected orbital areas and to the left cheek, through a penrose drain, every 12 hours. Aggressive topical and local antibiotic infusions were also given. Within 24 hours of the initiation of NeutroPhase (Day 8 of intensive care treatment), the patient was extubated and within 48 hours she was up walking. The progression of the infection stopped and her laboratory values normalized. The patient survived. She retained vision in both eyes and required periocular reconstruction.

Case 2 A 28 year old intravenous drug user developed a pimple at the head of the left brow 3 days prior to presentation. The redness and swelling rapidly progressed and the eyelid was swollen shut. Her physician parent facilitated consultation. On exam, the extraocular movements were limited on the left side. The orbital computed tomogram showed a fluid collection in the superior orbit to the mid orbit. The patient underwent immediate operative drainage of the abscess. Culture showed heavy growth Methicillin-resistant *Staphylococcus aureus*. Irrigation of the wound with 0.01% HOCl solution was sprayed every 8-12 hours to the periocular area. There was no loss of tissue and no need for reconstruction.

Case 3 76 year-old male with a PMH of HTN who was transferred from an outside hospital intensive care unit for high level care of right periocular necrotizing fasciitis. The patient initially developed redness and swelling of the dorsum of his left hand 2 days earlier after injuring the back of his hand on a metal portion of the door at work (McDonald's). The redness and swelling of his left hand worsened over the next two days. The night before presentation he went to bed with an area of "puffiness" over the medial aspect of his right brow. He awoke up at 2 am the next morning with pressure in his right orbit, his right eyelids very red and swollen completely shut. The orbital CT scan demonstrated evidence of right severe preseptal cellulitis with extensive enhancement of the fascial planes. Emergent operative exploration, drainage and debridement was performed. Perforated catheters were placed for local decontamination of the infected area. Neutrophase solution 3cc flush was instilled every 4 hours (alternating q2h with vancomycin). Intraoperative cultures from the periocular tissues grew *Streptococcus pyogenes*. The patient required a small area of tissue support with a urinary bladder matrix to

the right lower eyelid and a lateral canthoplasty for reconstruction.

Conclusions

A novel therapeutic technique for periocular necrotizing fasciitis, which includes topical treatment with a pure hypochlorous acid solution 0.01% (NeutroPhase, NovaBay Pharmaceuticals Inc, Emeryville, CA) along with debridement and antibiotics is described in this study. Pure hypochlorous acid is a naturally occurring, well-known, broad-spectrum, fast-acting antimicrobial agent produced as part of the innate immune system's response to infection during oxidative burst by neutrophils and monocytes. Group A *Streptococcus* and Methicillin-resistant *Staphylococcus aureus* produce a number of superantigens, hemolytic exotoxins and toxic enzymes. Once secreted, superantigens can cause pathogenic response even after all the bacteria have been killed.The toxins lyse connective tissue and cause thrombosis of vessels. Inactivation of superantigens by HOCl solution attenuated the virulence of the pathogen and mitigated of the course of infection in these patients. These three cases illustrate and support the use of HOCl in periocular necrotizing fasciitis.

References

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