Effect of dexamethasone in combination with acetylcysteine at different times on corneal wound healing in dogs

Gholipour, M. A. ; Sarchahi, A. A. ; Meimandi Parizi, A. and Eghtedari, M.

1Graduated from School of Veterinary Medicine, Shiraz University, Shiraz, Iran; 2Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran; 3Department of Ophthalmology and Pathology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

*Correspondence: A. A. Sarchahi, Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran. E-mail: sarchahi@shirazu.ac.ir

(Received 9 Mar 2009; revised version 2 Dec 2009; accepted 9 Dec 2009)

Summary

The purpose of this study was to evaluate the effects of different time combinations of dexamethasone and acetylcysteine on experimentally induced corneal ulcers in dogs. Experimental corneal wounds were created surgically to the anterior one third of the cornea in the center of all eyes of 15 mixed breed dogs. The eyes were divided into five groups according to planned post-operative medications: group 1, one drop of N-acetylcysteine 3% and one drop of dexamethasone 0.1% immediately after surgery; group 2, two drops of N-acetylcysteine 3% from day 1, one drop of N-acetylcysteine 3% and one drop of dexamethasone 0.1% from day 15; group 3, two drops of N-acetylcysteine 3%; group 4, two drops of dexamethasone 0.1%; group 5 (control), two drops of normal saline. When applied immediately after corneal ulceration, dexamethasone 0.1% (group 4) decreased corneal haze significantly and did not delay corneal wound healing. Addition of dexamethasone 0.1% to N-acetylcysteine 3% from day 15 (group 2) significantly suppressed opacity at two months after the beginning of the study, but when dexamethasone 0.1% associated to N-acetylcysteine 3% immediately after corneal ulceration (group 1), significant delay in corneal wound healing was induced. It is concluded that combination of dexamethasone 0.1% and NAC 3% immediately after surgery may delay corneal wound healing, also use of these drugs individually, has no obvious clinical effect on corneal haze. On the other hand, use of these drugs in combination with each other may reduce the corneal haze in later months after discontinuation of drugs. However, further studies using larger groups of animals are needed to demonstrate the effectiveness of these pharmacological modulators following experimentally induced corneal wounds in dogs.

Key words: Acetylcysteine, Corneal haze, Dexamethasone, Dogs, Wound healing

Introduction

Corneal wounds still represent an important problem in clinical ophthalmology because of the loss of transparency of corneal scar tissue (Kubota and Fagerholm, 1991; Suzuki et al., 2003). This is probably related to the wound-healing response when activated keratocytes lay down new collagen and proteoglycan matrix (Krueger et al., 1995). The creation of randomly orientated collagen fibrils with differing dimensions and irregular spacing results in the reflection and diffusion of light rather than transmission (Jester et al., 1999). Clinically, this is identified as scarring. On the other hand, in corneal ulcers the combination of overexpression of certain destructive proteinases and reduction in antiprotease activity can lead to rapid degradation of collagen and other components of the corneal extracellular matrix (ECM) (Brown, 1971; Berman, 1980; Ye and Azar, 1998; Strubbe et al., 2000). Matrix metalloproteinases (MMPs) and serine proteinases seem to be the predominant proteinases in the corneal wound healing process in dogs (Chandler et al., 2003). MMP-2 and MMP-9 are increased in the corneal epithelium of dogs with refractory