Dry Eye

Medicilon Ophthalmic Animal Models

Dry eye, also known as dry eye disease (DED), dry eye syndrome, and keratoconjunctivitis sicca (KCS), is a multifactorial disease of the ocular surface. Dry eye is characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiologic roles.

Dry eyes affect a significant number of people, the cause of dry eye is multifactorial, in which ocular, anatomical and systemic factors play crucial roles. Prompt treatment significantly improves long-term quality of life, provides relief from dry eyes, and improves outcomes.

Model of Dry Eye Syndrome

Healthy rats were selected and given subcutaneous injections of scopolamine four times daily for 4 weeks and placed in dry room. Schemer‘s test and corneal conjunctiva stained with tiger red and fluorescein were performed before administration and on the 1st, 3rd, 5th, 7th, 14th, and 28th days after administration. The animals were euthanized on the 35th day after administration, and the conjunctiva, cornea, and lacrimal gland tissues were taken for light microscopic examination.

Testing parameters

- Tear film break up time (BUT)
- Schemer's test
- Slit Lamp exam: Corneal fluorescent staining test
- Histopathology

Schimer test results (tear secretion, mm)

Group	N (eye)	Experimental Period					
		Pre-dose	Day 3	Day 7	Day 14	Day 21	Day 28
Control	10	10.1±2.3	9.9±3.5	8.9±1.5	9.1±3.1	8.5±2.9	8.2±3.4
Scopolamine	16	9.8±2.8	6.2±3.8*	4.3±2.2*	2.2±1.4*	1.6±1.0*	2.0±0.2*

Note:Compared with Control group , *P < 0.01.

Methods

After suctioning off the excess tear fluid from eyes, take 5 × 35 mm test paper with scale, fold one end back for 5 mm, gently put it into the middle and outer 1/3 of the inferior conjunctival sac of the testing eyes, take out the filter paper after 5 minutes and measure the wet length. Generally, 10-30 mm/ 5 min is normal. Less than 5 mm can be diagnosed as tear deficiency, 6-10 mm may be suspected of decreased secretion, and more than 10 mm is normal. If the filter paper is fully wet in less than 5 minutes, the time of full wetness will be recorded.

Tear film break-up time (s)

Group	N (eye)	Experimental Period					
		Pre-dose	Day 3	Day 7	Day 14	Day 21	Day 28
Control	10	8.5±2.3	8.7±3.5	8.2±1.5	7.9± 3.1	8.1±2.9	8.6±3.4
Scopolamine	16	8.8±2.4	7.6±2.8	4.6±1.8*	3.1±1.4*	2.9±0.8*	2.5±1.1*

Note:Compared with Control group , *P < 0.01.

Methods

Drop 1 μL of 10 g/L fluorescein sodium into the conjunctival sac and close the eyelid, observe under slit lamp microscope with the cobalt blue light. After three blink reflexes (BR), the time from the last BR to the appearance of the first dark spot in the cornea is defined as tear film break-up time.

Fluorescein staining

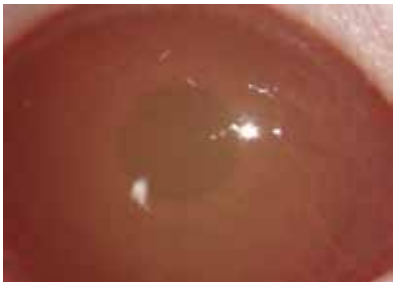
Group	N (eye)	Experimental Period					
		Pre-dose	Day 3	Day 7	Day 14	Day 21	Day 28
Control	10	0	0	0.10	0.10	0	0.2
Scopolamine	16	0	0.38±0.3*	2.00±0.5	4.63±0.8*	8.38±1.5*	7.69±1.0*

Note:Compared with Control group , *P < 0.01.

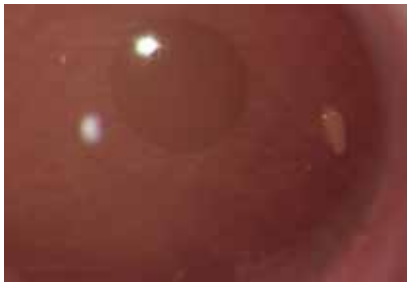
Methods

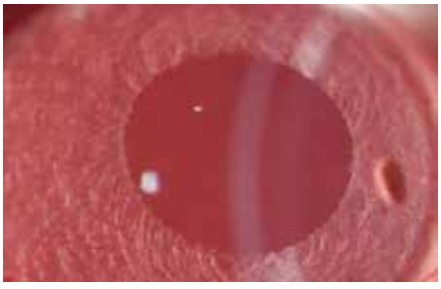
Positive results of fluorescence staining reflect corneal epithelial cell defects, the cornea is divided into four quadrants, 0 points for no staining, three grades for light, medium, and heavy staining, 1 point for less than five staining dots, 3 points for lumps or filaments staining, and 2 points between the above two, total 0-12 points.

Slit lamp examination (typical symptom Ⅰ)



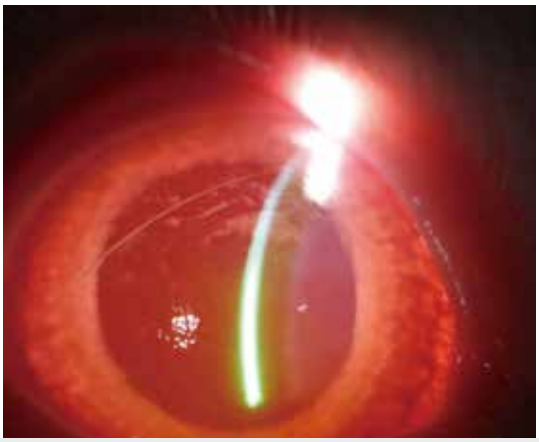
Significant corneal staining was seen above the nasal side, and slight corneal injury was seen locally, after fluorescent staining, obvious light green bands appeared.



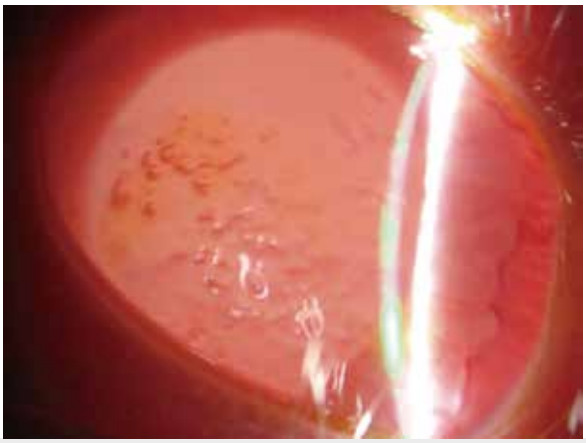


Corneal ulcer with a grain size of 2 mm*1mm appeared on the nasal side, accompanied with yellow purulent discharge.

Slit lamp examination (typical symptom II)

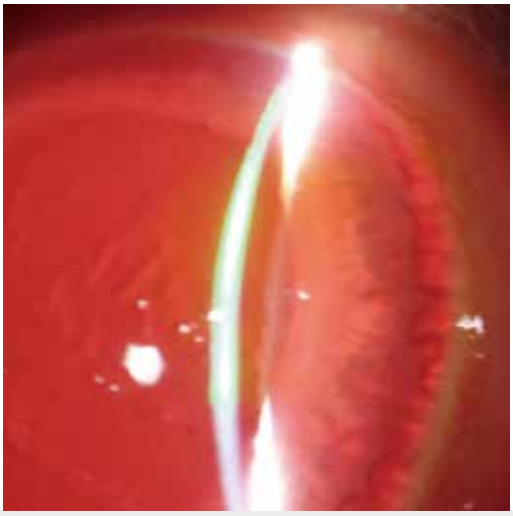


After fluorescence staining, a patchy corneal injury appeared above, and under the irradiation of slit light band, it was evident that the temporal cornea was not smooth. At the same time, obvious new blood vessels can be seen invading the corneal edge.

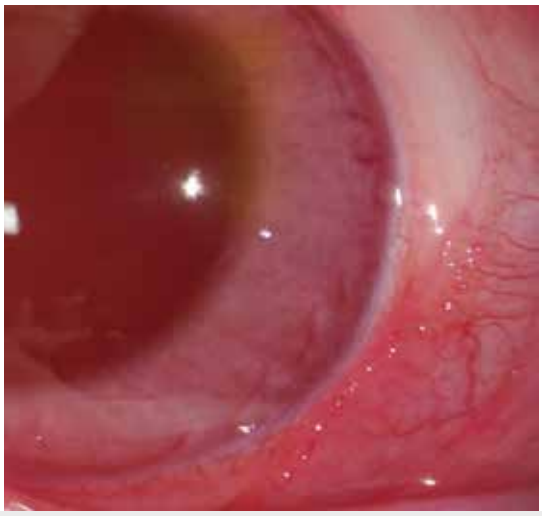


More punctate corneal ulcer lesions could be seen below the temporal side, and the depression had formed. Some lesions had deep depression and perforation tendency.

Slit lamp examination (typical symptom III)



New blood vessels could be seen at the corneal edge, about 2 mm into the cornea, and the widest part was 4 mm, all of which were superficial blood vessels.



The blood vessels in the conjunctiva are dilated, red blood streaks were increased. The blood vessels were bright red and locally surrounded the conjunctiva in diffuse form.

MEDICILON

Email: marketing@medicilon.com

Address: 50 Soldiers Field Place, Boston, MA 02135

Website: www.medicilon.com **Tel:** +1(626)986-9880