

Primary Author: Susan Smith, PhD, APRN, ACNP-BC, FNP-BC, CBRN
Editors: Michael L. Cheatham MD, Howard Smith MD
Approved: 5/8/2026

SUMMARY

Ocular thermal or chemical injuries are common. Appropriate early intervention is important to preserving the patient's vision. Timely identification of corneal burn injuries using a Wood's lamp and fluorescein dye should be performed as part of the initial burn assessment.

RECOMMENDATIONS

➤ Level 1

- Thermal eye injuries should be assessed and triaged promptly.
- Wood's lamp examination with fluorescein should be performed in all patients presenting with possible thermal or chemical eye injury except when open globe injury is suspected.

➤ Level 2

- Ocular chemical injuries should be immediately treated with copious saline irrigation for at least 15 minutes or until ocular pH is normalized.
- Same-day ophthalmology consultation is indicated for Roper-Hall Grade II injuries or above, any limbal ischemia, poor visual acuity, or where diagnosis is uncertain.

➤ Level 3

- Contact lenses should be immediately removed in all patients with suspected corneal burn injury.

INTRODUCTION

Ocular thermal and chemical injuries are common and timely identification and treatment is essential to avoid permanent injury (1). These injuries most commonly result from chemical exposure (especially alkali agents), but may also follow acid, thermal, or radiation exposure (1). Electrocutation injuries can result in cataract development long-term. Patient presentation may range from conjunctival hyperemia and epithelial defects to corneal opacification, elevated intraocular pressure, and extensive limbal ischemia. While most corneal injuries are superficial and heal within a few days, full-thickness corneal destruction may occur resulting in permanent loss of visual acuity.

Chemical burns represent the most vision-threatening category of ocular burns (2). These injuries can be due to alkalis, acids, or alcohols. Injury to the limbal blood vessels can damage limbal stem cells, prevent healing, and result in permanent visual changes. Prompt, copious irrigation of the involved eye(s) to restore normal corneal pH is essential. Long-term sequelae of chemical ocular injury are common and early ophthalmologic consultation and follow-up is crucial.

When evaluating a patient for possible ocular burn injury, a thorough history of the mechanism (flash, flame, liquid, steam or hot gas), duration of exposure, use of eye protection, time of injury, presence of contact lenses, and any first aid received should be obtained from the patient, family, or emergency medical services (1). The patient's visual acuity (blurred or cloudy, absent vision, etc...) and presence of ocular pain, photophobia or foreign body sensation should be documented. The eyes should be carefully and thoroughly examined including eversion of the eyelids to

LEVEL OF RECOMMENDATION DEFINITIONS

- **Level 1:** Supported by multiple, prospective randomized clinical trials or strong prospective, non-randomized evidence if randomized testing is inappropriate.
- **Level 2:** Supported by prospective data or a preponderance of strong retrospective evidence.
- **Level 3:** Supported by retrospective data or expert opinion.

DISCLAIMER: These guidelines were prepared by the Department of Surgical Education, Orlando Regional Medical Center. They are intended as a general statement regarding appropriate patient care practices based on the medical literature and clinical expertise at the time of development. They should not be considered protocol or policy nor are intended to replace clinical judgment or dictate care of individual patients.

identify and remove any foreign bodies. For patients with severe ocular injuries, serial measurements of intraocular pressure are appropriate.

A Wood’s lamp examination using topical fluorescein dye is the cornerstone of bedside ocular assessment following burn injury. A Wood’s lamp is a low-pressure mercury vapor lamp emitting ultraviolet light at ~365 nm. Alternatively, a slit-lamp with a cobalt blue filter may be used. Fluorescein dye, applied to the corneal surface, accumulates in areas of disrupted epithelial integrity and fluoresces brightly under ultraviolet illumination facilitating the identification of corneal and conjunctival epithelial defects.



WOOD’S LAMP PROCEDURE

- Obtain Wood’s Lamp.
- Order and obtain fluorescein-impregnated strips (1-2).
- Obtain at least two 10 mL saline syringes (for irrigation).
- Dim lights over patient.
- Secure a towel around the patient’s face and neck to collect irrigation fluid from the procedure.
- Explain the procedure to the patient (if conscious).
- Apply saline-moistened fluorescein strip to lateral conjunctiva and ask patient to blink 2-3 times to distribute the dye across the ocular surface.
 - Topical anesthetic is not necessary
- Turn on the Wood’s Lamp and hold it 2-5 cm from the eye.
- Assess for accumulation of fluorescein consistent with ocular epithelial burn injury. Ask patient to look up, down, right, and left to assess the entire cornea and conjunctiva for injury. Blinking (or closing and reopening the patient’s eyelids) can redistribute the dye and clarify whether an injury is present. If corneal dye uptake persists in the same location despite blinking, a corneal epithelial injury is confirmed.
- Evert both the upper and lower eyelids to confirm absence of foreign material.
- Repeat test on the contralateral eye using a new fluorescein strip.
- Rinse remaining fluorescein dye from eyes with saline.

FINDINGS

Fluorescein Staining Patterns

Different patterns of fluorescein staining are diagnostic of the mechanism of ocular burn injury.

Pattern	Clinical Interpretation	Example
Diffuse superficial punctate keratopathy (SPK)	Consistent with flash burn, photokeratitis	
Confluent epithelial defect	Severe thermal or chemical contact injury	

Roper-Hall classification of chemical eye injury (2)

All acute thermal eye burns should be graded using the Roper-Hall classification to guide management and disposition decisions.

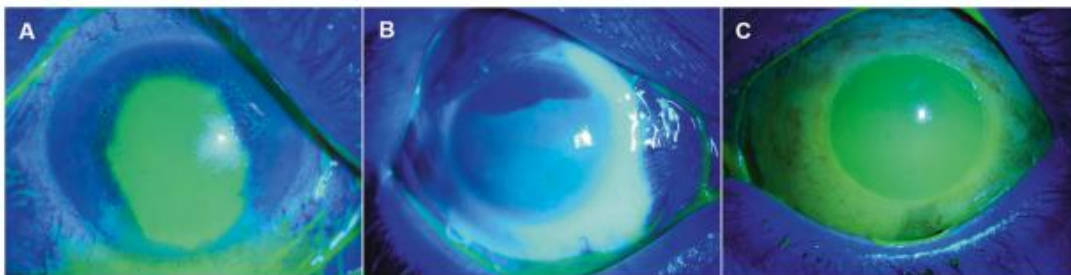
Grade	Corneal Involvement	Limbal Ischemia*	Prognosis
I	Corneal epithelial damage only	None	Good
II	Corneal haze (iris detail visible)	< 1/3	Good
III	Corneal haze (iris detail obscured)	1/3-1/2	Guarded
IV	Opaque cornea	>1/2	Poor

* Limbal ischemia is identified by blanching (white avascular appearance) of the limbal vasculature on Wood's lamp or slit-lamp examination

Dua classification of chemical eye injury (2)

Limbal involvement, as determined by fluorescein staining and/or limbal ischemia (visible blanching), is recorded as the number of clock hours of limbus affected.

Grade	Limbal Involvement (clock hours)	Conjunctival Involvement (%)	Prognosis
I	0	0	Very good
II	≤ 3	≤ 30	Good
III	>3-6	>30-50	Good
IV	>6-9	>50-70	Good-Guarded
V	>9 to <12	>75 to <100	Guarded-Poor
VI	12 (total limbus)	100 (total conjunctiva)	Very poor



A - Grade 0/0 burn indicating that zero clock hours of limbus and 0% of conjunctiva are involved. Note that there is a large area of central corneal fluorescein uptake denoting a corneal chemical injury.
B - Grade 7. 7 clock hours of limbal involvement (denoted by white, avascular area surrounding the corneal).
C – Grade 12/80. Complete limbal involvement (12 clock hours) and 80% of the conjunctiva is affected.
(Adapted from Dua et al.)

TREATMENT

Simple thermal burns to the corneal and conjunctiva (without limbal involvement) will generally heal within several days. Topical ophthalmic antibiotic drops are appropriate. Eye patching has not been found to be beneficial. Chemical burns should be treated with copious irrigation until ocular pH has been normalized. For Roper-Hall and Dua Grade II injuries and above, prompt ophthalmologic consultation is warranted. Topical and/or systemic antibiotics, steroids, and anti-inflammatory medications are commonly indicated. For severe ocular burns, ophthalmologic surgery may be necessary to preserve the patient's vision.

REFERENCES

1. Patek GC, Bates A, Gurnani B. Ocular Burns. STATPearls. <https://www.ncbi.nlm.nih.gov/books/NBK459221/>. Accessed April 29, 2026.
2. Dua HS, Ting DSJ, Al Saadi A, Said DG. Chemical eye injury: pathophysiology, assessment, and management. *Eye* 2020; 34:2001-2019.
3. Roper-Hall MJ. Thermal and chemical burns. *Trans Ophthalmol Soc UK*. 1965; 85:631-640.