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Early and late complications of ocular burn injuries

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KEYWORDS
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Summary *Background:* Ocular involvement in facial burns may lead to significant long-term morbidity. The aims of this study were to analyse the epidemiology, management and outcomes of ocular burn injuries, as well as to identify risk factors for developing early and late ocular complications.
Methods: A retrospective medical chart review was conducted for 125 patients with ocular burns who were admitted to the Victorian Adult Burns Service (VABS), from November 2000 to January 2010. Univariate analyses was utilised to identify demographic and injury related variables associated with early and late complications.
Results: The majority of patients were male ($n = 101$, 80.8%), and the mean (range) age was 40.7 (15–86) years. The most common mechanism was flame burns ($n = 77$, 61.6%), and most were accidental ($n = 114$, 91.2%). Early ocular complications occurred in 50 (40.0% [95% CI: 31.3%–49.1%]) patients, with the commonest being visual loss ($n = 39$, 31.2%). Chemical burns, ocular discomfort, peri-orbital oedema, corneal injury, as well as eyelid and facial burns of increasing severity were associated with developing an early complication. Late ocular complications occurred in 19 (15.2% [95% CI: 9.4%–22.7%]) patients, with visual loss being the most frequent ($n = 13$, 10.4%). Chemical burns, ocular discomfort, corneal injury of increasing severity, visual loss on presentation, ectropion, as well as eyelid burns of increasing depth were associated with late morbidity.

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Conclusion: Chemical burns, ocular discomfort, as well as corneal injury and eyelid burns of increasing severity were risk factors for both early and late ocular complications.

Level of evidence: III (retrospective comparative study).

Introduction

Ocular involvement in facial burns is not uncommon, occurring in approximately 7.5—36% of patients admitted with burns injuries.[1—5] Early diagnosis and optimal management of ocular burns is challenging, and may be delayed due to coexisting life-threatening injuries requiring immediate intervention. Furthermore, proper ophthalmic examination may also be difficult to perform due to factors such as sedation and associated peri-orbital oedema, further increasing the risk of missing major ophthalmic injuries.

Ocular burns may either directly or indirectly result in: eyelid retraction causing ocular exposure; direct injury to the globe; a blunted Bell's and blink response secondary to sedation; and peri-orbital tissue oedema due to aggressive fluid resuscitation.[6] All of these factors, alone or in combination, may progressively lead to exposure keratopathy, corneal infection, ulceration and ultimately corneal scarring or perforation. Awareness of patients at risk of developing ocular morbidity is important, to ensure prompt diagnosis and appropriate management. To date, only a few studies have explored predictors for early and late ocular complications in patients presenting with ocular burns.[7,8]

The aims of the study were to analyse the epidemiology, management and outcomes, as well as to identify the risk factors for developing early and late ocular complications, in patients with ocular burns managed in a tertiary care burns unit.

Methods

A retrospective medical chart review was conducted on 125 patients who were admitted to a statewide burns referral service, the Victorian Adult Burns Service (VABS) (The Alfred Hospital, a tertiary care centre in Melbourne, Victoria, Australia), with facial burns affecting the eyelids and/or eyes, from November 2000 to January 2010.

Ethics approval was obtained from the Hospital Research Ethics Committee prior to data collection.

Inclusion criteria

Patient records with the following ICD-10 discharge coding classifications were included; T26.0 (burn of eyelid and periocular area), T26.1 (burn of cornea and conjunctival sac), T26.2 (burn with resulting rupture and destruction of eyeball), T26.3 (burn of other parts of eye and adnexa) and T26.4 (burn of eye and adnexa, part unspecified). These cases were then confirmed by examining the medical record in detail.

Data collection

Data on potential risk factors for ocular complications were collected using a standardised proforma, including; patient demographics, disposition, presence of inhalational injury, need for intubation, length of hospital stay, mechanism of injury, percentage of total body surface area burned, peri-orbital and ocular injuries (peri-orbital oedema, singed eyelashes, facial and eyelid burn surface area and depth, fluorescein test result, corneal injury (graded 1—4)[9] and ocular surface pH where available), past medical history (of diabetes, hypertension, smoking status, obesity and prior ophthalmic history) and timing of initial ophthalmologic assessment. Depth of eyelid burns were graded as; superficial dermal (SD), mid-deep dermal (MDD) and full thickness (FT). Types of medical (lubricating, antibiotic and steroid eye drops, continuous irrigation) and surgical management, as well as follow up data were also recorded.

Early and late complications

Early ocular complications were defined as those diagnosed as an inpatient and occurring within two weeks of injury: visual loss on presentation, eyelid malposition (early ectropion and lagophthalmos), increased intraocular pressure (IOP) and microbial keratitis. In patients with no pre-existing ophthalmic history, visual loss was defined as a subjective loss in visual acuity (VA) as well as a VA less than 6/12 on examination.

Late complications included injuries identified on outpatient follow up: eyelid contractures (cicatricial ectropion and lagophthalmos), visual loss, exposure keratopathy, corneal infection, scarring or perforation and raised IOP.

Statistical analysis

Data were analysed using the SAS software version 9.2 (SAS Institute, Cary, NC, USA). The main outcomes were early and late ocular complications. Comparisons between groups were made using Student's *t* test for continuous variables with approximate normal distribution, Wilcoxon rank sum test for continuous variables with skewed distribution and chi-square or Fisher's exact test as appropriate for categorical variables. 95% confidence intervals (CI) were estimated to show the magnitude of the difference between groups [early complication (Yes/No) and late complication (Yes/No)]. Continuous data were summarised using mean (standard deviation) or median (inter-quartile range) depending on the underlying distribution of the