



SHORT COMMUNICATION

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A New Proposed Classification for Ocular Adnexal Injuries -a Way to Analyze and Systematically Describe Adnexal Injuries

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Abstract

Ocular adnexa are superficial and accessory structures of the eye. Their major role is protection of the globe by various means. Being the front army they bear the brunt of trauma. If adnexal injuries are not managed properly regarding the severity of trauma, distortion and malfunctioning of adnexal structures may alter the visual acuity and facial aesthetics. As ocular trauma is an evolving sub specialty of Ophthalmology, we have to develop proper understanding, analysis and management of impact of trauma on adnexal tissue. The classification of adnexal injuries is one step towards this aim.

Key words

Ocular adnexal injuries, Adnexal injuries, Ocular adnexal injury classification, Ocular trauma, Mechanical trauma, Burn, Electrocution, Chemical injuries, Mobile blast injuries, Warfare injuries, injuries, Ocular trauma classification

Introduction

Ocular appendages or adnexa are the accessory structures of the eye. They include - orbits with extra ocular muscles, eyebrow, eyelids, conjunctiva and lacrimal sys-

tem (lacrimal glands, puncta, canaliculi, lacrimal sac and nasolacrimal duct). They are also known as protectors of eye. They protect globe from impact of trauma by various mechanisms. Thick orbital margins with orbital fat cushion and extra ocular muscles give protection from heavy mechanical forces. The eyelids help to keep the corneas moist, and protect against injury and excessive light, regulating the amount of light reaching the retina. (1) Glands of zeiss and moll are situated along the eyelashes and secrete sebum which lubricate lashes and act as filter for dust particles. Conjunctival mucous cells and accessory lacrimal glands situated in conjunctiva secrete mucus plus aqueous layer in tear film which contains lysozyme and other immunoglobulins that provides local active immunity. Lacrimal system moistens and lubricates globe and helps in tear drainage thus decreases bacterial load.

How they get affected during trauma

Various inflicting agents like mechanical force, chemical agents and heat, electrical injury, etc producing factors first come in contact with ocular adnexa before actually harming eye ball. Adnexal injuries may cause severe ocular morbidity. They can lead to permanent facial disfigurement, enophthalmos, proptosis, and entropion, and ectropion, squint on behalf of mechanical entrapment

of muscles, connective tissue or fat within orbital wall fractures. As an ocular trauma surgeon the first thing we are concerned about is intactness of globe and vision. If both are saved from the impact of trauma we are much relieved, so are the patient and relatives. Is this the right attitude? In spite of good vision with intact globe there can be an alarming situation if ocular adnexa suffer from trauma. This can lead to disfigurement and need multiple surgeries to restore function plus cosmesis. Disfiguring and derailed function of adnexa do affect even the elderly and general public apart from celebrities and showbiz. There are very few reports, highlighting the incidence and pattern of adnexal injuries. (2, 3, 4, 5)

Need for classifying adnexal injuries

BETTS classification classify ocular injuries into open and closed globe injuries, while (OTS) ocular trauma score tells us about the prognosis of open globe injuries. (6,7) Researchers have emphasized the need for amendments in BETTS classification, also given place to adnexal injuries in their classification.(8,9) Elaborate details of ocular adnexal injuries are missed everywhere. A new classification of ocular trauma was proposed in 2009 where the authors suggested that the term “ocular trauma” include structures of ocular adnexa such as the lids, orbit, lacrimal apparatus, and the conjunctival, not just the eyeball or globe.(9) Diagnosing and describing the adnexal injuries is not sufficient. It does not indicate the impact and outcome of trauma. This is very important for further management and may be needed for economical compensation. Routine use of non-standard terminology neither helps in standardization of records nor in accessing the effects of trauma. There is lack of information about adnexal injuries. More work is needed and necessary for describing spectrum of adnexal injuries for development of evidence based treatment guidelines. A standard classification will help in standardization of information in the literature.

Ocular adnexal injuries classification

New proposed classification for adnexal injuries. When managing a case of trauma first look for life threatening injuries and manage ABC airways, breathing and circulation (brain and cardiac functioning). In case of chemical injuries give saline or plain water wash. After taking proper history of trauma, look for the number of adnexal tissues involved; eyelids, eyebrow, conjunctiva, lacrimal system, orbit and extra ocular muscles. Examine

each adnexa in detail for involvement and type of response to trauma. Record the signs of trauma on each adnexal tissue. Advise X- ray orbit, CT scan and cranial MRI. Manage the injuries of adnexa by prescribing systemic antibiotics, analgesic, topical antibiotics, and tear supplements. Last treatment decision is made after reviewing the reports.

Trauma to the ocular adnexa is classified on the basis of mode, pattern and severity of injury.

Mode of injury classification

Inflicting agent should be identified whether mechanical, chemical, heat, electric current, animal bite, warfare, mixed type or mobile blast. (10) (Table 1)

Table -1. Mode of injury classification on the basis of inflicting agent

Inflicting agent	Examples
Mechanical	Assault by fist, fall from height, injury by rod, door handle, pencil, Road traffic accidents, sports injuries
Chemical	Acid, Alkali
Heat/Thermal	Firecracker
Electric current	
Warfare injuries	
Animal bite	Dog, monkey, bear
Mobile blast	
Nuclear /Radiation	
Other	

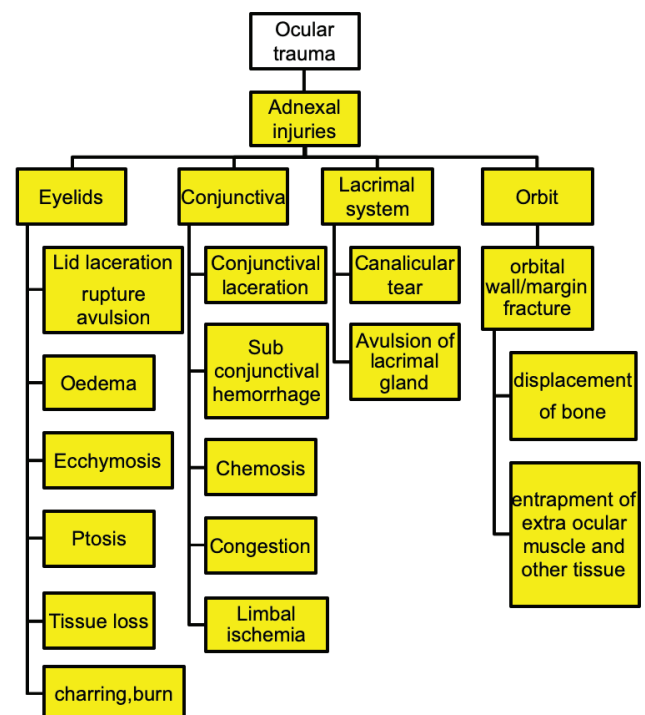


Fig. 1. Pattern classification based on structures affected (E.C.L.O.) and their response to trauma

E=eyelid, C=conjunctiva, L=lid, O=orbit

Pattern classification is based on structures affected and their response E, C, L, O; eyelids, conjunctiva, lacrimal system and orbit with extra ocular muscles.(Figure1) Eyelids

Table – 2. Pattern classification based on structures affected (E.C.L.O.) and their response to trauma E=eyelid,C=conjunctiva,L=lid,O=orbit

Conjunctiva	Eye lids	Lacrimal system	Orbit
Conjunctival laceration	lid laceration	Canalicular tear	Orbital wall, margin fracture
Conjunctival chemosis	Rupture of lid	Avulsion of lacrimal gland	hair line crack
sub-conjunctival hemorrhage	Avulsion of lid		entrapment of extra ocular muscle and other tissue
Conjunctival congestion	Ecchymosis of lid		displacement of bone or separation of a piece of bone
Conjunctival ischemia	Oedema of lid		
Conjunctival foreign body	tissue loss		
	charring, burn		
	Ptosis		

(E) - response to trauma can be lid laceration, rupture, avulsion extending above or below involving forehead, eyebrow or cheek, ecchymosis, oedema, tissue loss, charring, burn, and ptosis. Conjunctiva (C) – laceration, chemosis, sub-conjunctival hemorrhage, congestion, or ischemia. Lacrimal system (L) - canalicular tear, avulsion of lacrimal gland. Orbital (O)- Orbital wall, margin fracture, hair line crack, entrapment of extra ocular muscle and other tissue, displacement of bone or separation of a piece of bone (Table 2).

Table-3. Severity of adnexal injury classification

Grade	Eyebrow	Lid	Conjunctiva	Orbit	Lacrimal apparatus
I	Eyebrow cut <2/3 rd Oedema, burning of hairs	Oedema, ecchymosis, lid abrasions skin muscle deep less than 2/3 rd tear restricted to palpebral part of lid , one lid only involving superficial skin burn	Chemosis, congestion, sub conjunctival hemorrhage, conjunctival laceration <5 mm, Limbal ischemia <1/3 of limbus, superficial conjunctival foreign body	Hair line fracture	
II	Muscle deep cut , eyebrow cut > 2/3 rd of eyebrow	Tear involving lid margins, Medial side of lid tear involving canaliculi, both lids, extending above or below involving forehead, eyebrow or cheek burn involving more than 1/3 rd of lid	conjunctival Laceration >5 mm, affecting palpebral, bulbar conjunctiva Limbal ischemia > 1/3 of limbus conjunctival foreign body granuloma	Fracture of medial wall	Avulsion of lacrimal gland
III	Avulsion of eyebrow, Involvement of both eyebrow	Tissue loss more than 1/3 rd of lid when primary repair not possible, lid avulsion	Limbal ischemia > 2/3of limbus	fracture of roof or floor , fracture with displacement, dislodgment of bony piece	Upper and/or lower Canalicular tear

Severity classification

Try to assess what adnexal structures are affected and the type of injury. On the basis of response to trauma of various adnexa we can grade the severity of trauma as grade I, II, III respectively (Table 3). Grade I – Lid trauma-

Edema, ecchymosis, lid abrasions, skin muscle deep laceration involving less than 2/3rd of lid horizontally, one lid only, restricted to palpebral part of lid, superficial skin burn. For conjunctiva - chemosis, congestion, sub conjunctival hemorrhage, conjunctival laceration <5mm, limbal ischemia <1/3 of limbus. In Orbit - Hair line fracture. Grade II adnexal injuries for lid - laceration involving lid margins, medial side of lid laceration involving canaliculi, both lids, burn involving more than 1/3rd of lid, conjunctiva - laceration >5 mm, affecting both palpebral and bulbar conjunctiva. Limbal ischemia > 1/3 of limbus, Orbit Fracture of medial wall. In lacrimal apparatus- Avulsion of lacrimal gland. Grade III injuries are : Lid Tissue loss more than 1/3rd of lid when primary repair not possible, lid avulsion, limbal - ischemia > 2/3of limbus, Orbit -fracture of roof or floor fracture, entrapment of extra ocular muscle, fat, other tissue, displacement, dislodgment of bony piece, Lacrimal apparatus - Upper and/or lower Canalicular tear.

Thus examine, assess and grade the adnexal trauma, calculate the severity. Try to know whether function or physiognomy will be affected, requiring multiple surgeries to correct. Especially children require thorough examination, sometimes under general anaesthesia to rule out retain forge in body in lid. (11)

Conclusions

This classification has to be tested over time by the whole ophthalmic fraternity, adding amendments in it to evolve a full proof classification. This will help in further understanding for the the complexity of adnexal injuries and will help us to reform a better management of ocular trauma.

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