Eye Care in PICU

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References:

- NHS (National Health Service) 2023
- Royal College of Ophthalmologists . **Eye Care in the Intensive Care Unit (ICU)** 2020
- Starship hospital guideline 2023

Objectives

- To protect the eye in patient with risk factor in PICU
- Management of minor eye disease
- Identify ocular disease and those requiring referral

Introduction

- Patients in intensive care are at risk of developing corneal defects as normal ocular defence mechanisms are challenged.
- Condition interfere with eyelid closure. (conjunctival chemosis ,sedative and NMB)

the exposed cornea becomes dry, and small defects may develop Keratitis occurs if micro-organisms adhere to the damaged corneal surface.

- Lack of blinking fails to renew the tear film leading to the potential retention of micro-organisms.

possible problems affecting the front of the eye in ICU

- Direct injury to the cornea - most often a superficial corneal abrasion (scratch)
- Exposure keratopathy
- Chemosis (conjunctival swelling)
- Microbial conjunctivitis and keratitis

Risk factors for ocular surface disorder in PICU

- Effects of gas flow from CPAP or oxygen masks
- Positive pressure ventilation
- Prone position
- Fluid overload causing conjunctival oedema
- Lagophthalmos
- Reduced level of consciousness
- Medications such as muscle relaxants and sedation
- Vasoactive medication
- Immunosuppressants
- Corticosteroids >5 days
- Bacterial contamination from respiratory secretions during endotracheal suction(open suction)

Routine eye care

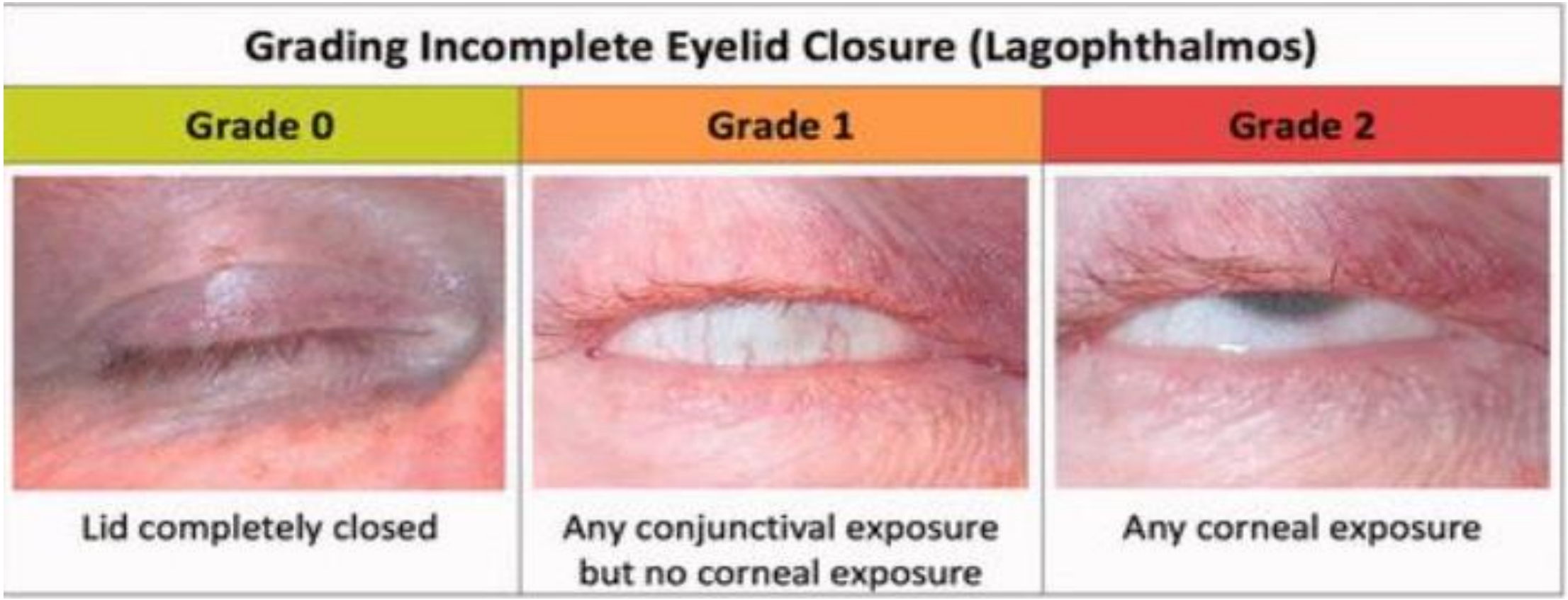
- Perform hand hygiene
- Eyelid bathing

Use 0.9% saline and ensure the lids are closed. Use a new piece of gauze and ensure this edge is not above the lid margin (lower lid) or below it (upper lid). Ensure the gauze swab goes from the inner to the outer canthus and dry it in the same manner.

ensure there is no cross contamination between the eyes

- Examine the eye for signs of infection, exposure or swelling and take appropriate action as necessary
- Instil 1 - 2 drops of **lubricating eye drops** to each eye
- Ensure the lashes are outside of the eye
- Ensure the eyelid is fully closed, and if unable to do so, follow the Grade 1 flowchart pathway
- Repeat **2 – 4 hourly**

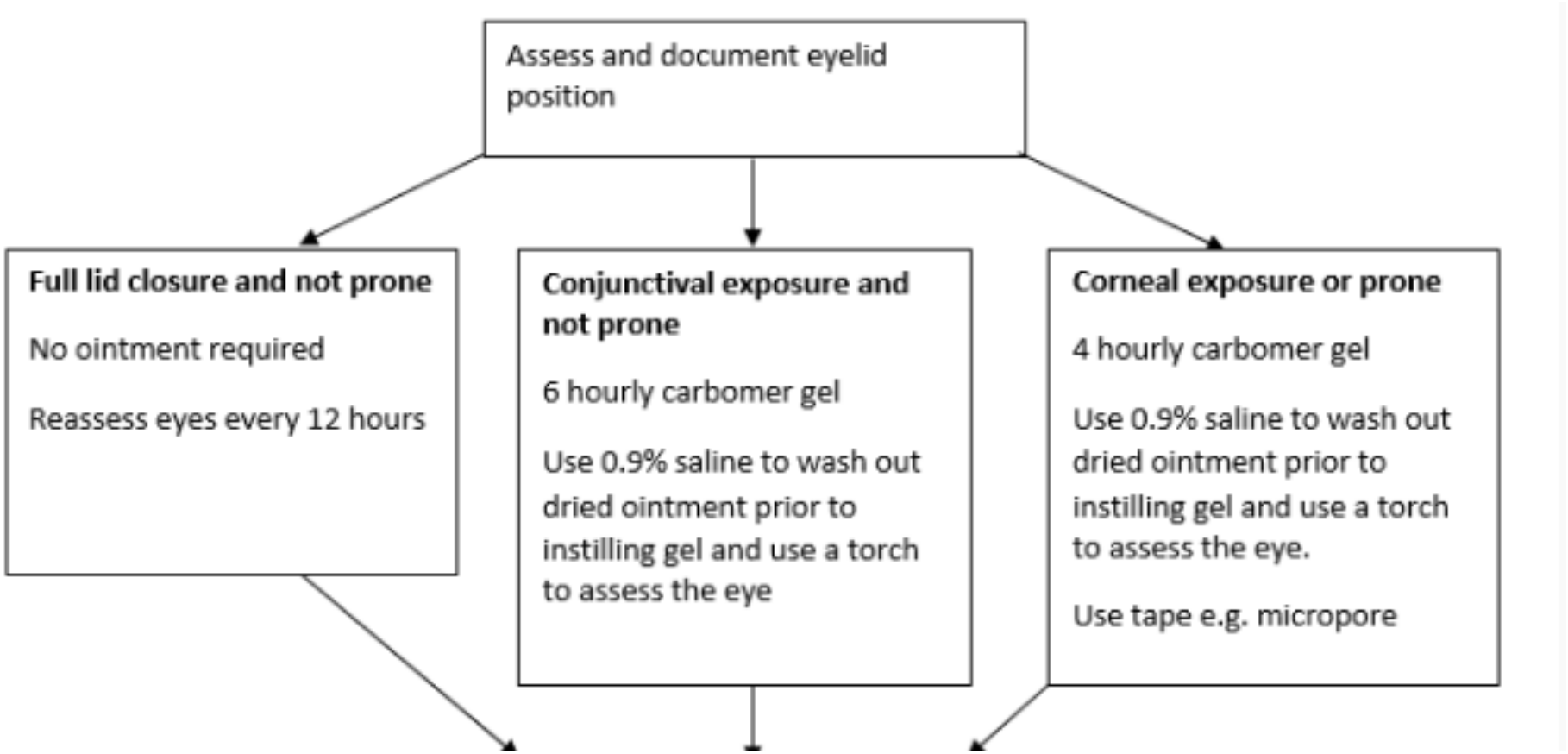
Assessing eye lid integrity



Delivering treatment to the eye when it is prescribed

- When giving several different drops, do not give them at the same time as one drop may wash out another, thereby reducing its effectiveness. Allow ideally 5 minutes and at least 1 minute between each medication
- Always put drops in before ointment. The ointment is water repellent and prevents the drops from getting into the eye tissues.
- When putting in ointment in poor lid closure, after instilling ointment manually shut eyelids to ensure ointment is spread over whole eye surface.

Eye care algorithm for children who are intubated and ventilated



این دارو بر پایه نفتی استریل، (وازلینی) بوده و حاوی لانولین است.

Additional eye care in incomplete eyelid closure

- For grade 1 or 2 lagophthalmos **routine eye care** should be performed plus:

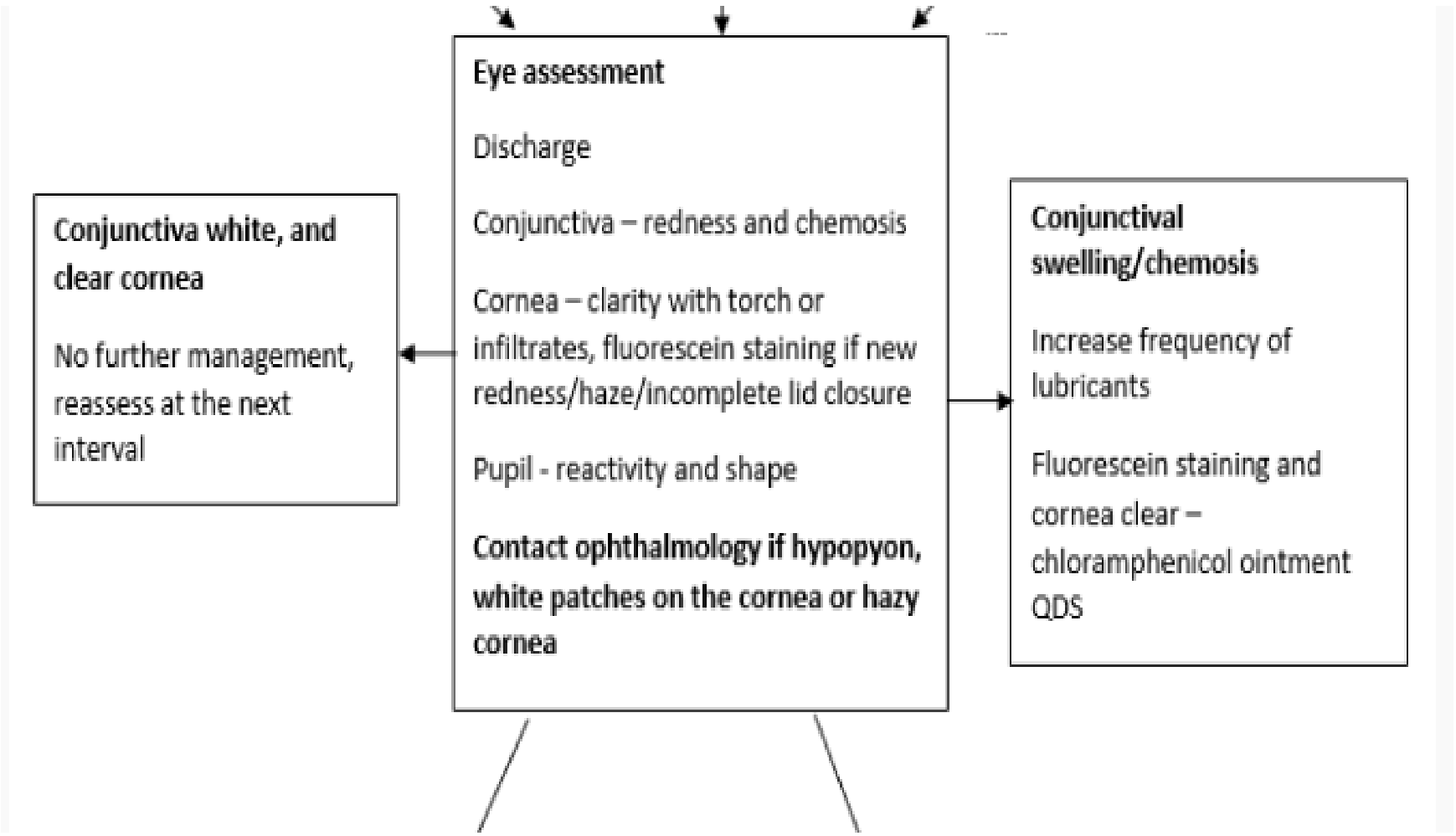
Poly Visc™ lubricating ointment should then be applied to maintain the moisture chamber of the eye and cornea:

- If grade 2 lagophthalmos is present or a patient is nursed prone, the use of **eye covers** is recommended to form a moist closed chamber to protect the cornea. This should be used in addition to routine eye care and the use of lubricating ointment.

Application of eye ointment

- Pull down the lower eyelid and apply a small amount of eye ointment to the inside of the eyelid and manually close in poor lid closure to ensure ointment is spread over the eye. The ointment should not be applied over closed eyelids.
- Ensure a different tube is used for each eye.
- Lubricants used should always be ointments as these last longer than drops.
- Hylonight should be used in the first instance, however if this is not available then carbomer gel or simple eye ointment can be used.
- If drops are also required, use these prior to ointment. Wait 5 minutes between drops if multiple drops are required.

- A randomized controlled trial comparing ocular lubricant to passive eye closure, found **lubricant to be favorable** .
- When lubricant was compared to eye taping or covering there was no significant difference between the treatments.
- We have selected lubricants with/without taping as treatments in the first instance, as these are easy to use, effective and cost-efficient. Complications of this form of management are expected to be minimal.


Eye assessment
Discharge
Conjunctiva – redness and chemosis
Cornea – clarity with torch or infiltrates, fluorescein staining if new redness/haze/incomplete lid closure
Pupil - reactivity and shape
Contact ophthalmology if hypopyon, white patches on the cornea or hazy cornea
Conjunctiva white, and clear cornea
No further management, reassess at the next interval
Conjunctival swelling/chemosis
Increase frequency of lubricants
Fluorescein staining and cornea clear – chloramphenicol ointment QDS

Conjunctiva red and corneal fluorescein staining with no discharge

Start chloramphenicol ointment QDS

Increase lubricant frequency – can be omitted when chloramphenicol ointment used

Consider eyelid taping if corneal exposure

Contact ophthalmology if no improvement in 48 hours or worsening after 24 hours

Conjunctiva red with discharge

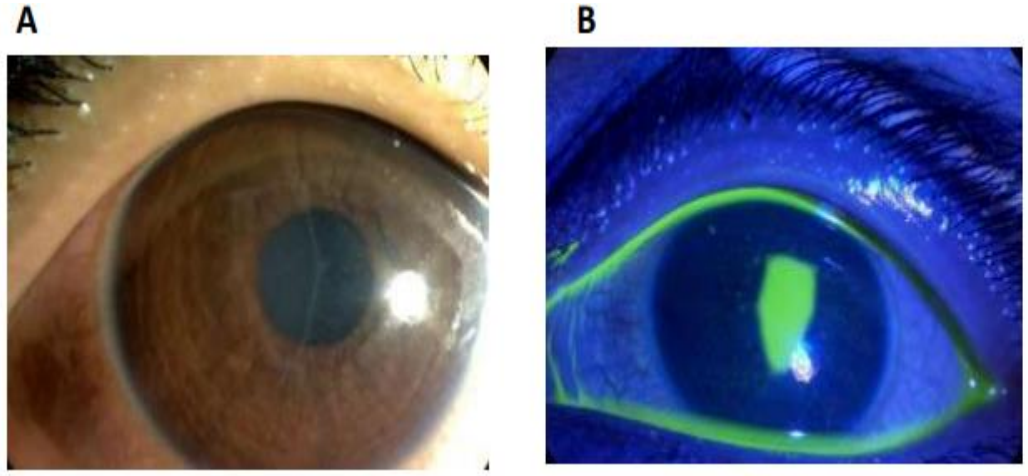
Start chloramphenicol ointment QDS – lubricants can be omitted at times where chloramphenicol ointment is used

Consider bacterial and viral swab

If no improvement in 48 hours or worsening after 24 hours, contact ophthalmology for advice

Fluorescein eye stain

- A piece of blotting paper containing the dye is touched to the surface of the eye. Sometimes the dye comes in a drop form which also contains anesthetic. then shines a blue light at the eye. Any problems on the surface of the cornea will be stained by the dye and appear green under the blue light. white light will also work but the injury is less obvious.

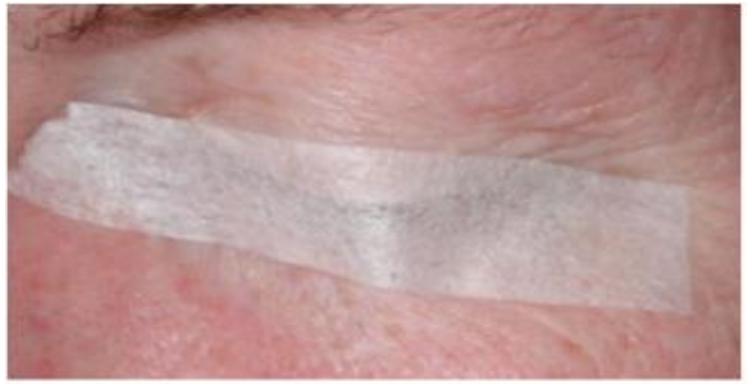


A) Eye without fluorescein B) stained with fluorescein with blue light showing abrasion on cornea

Age related considerations:

- Chloramphenicol 0.5% **drops** are **contraindicated** in patients under 2 (theoretical fertility issues related to boric acid) **Chloramphenicol 1% ointment** does not contain boric acid so is safe to use in this age group.
- Under the age of 7, sensory deprivation can irreparably damage vision causing amblyopia. In PICU, maintaining the integrity of the corneal surface to prevent corneal scarring in this age group is a priority. Sensory deprivation may be reversible.

Closing the eyelids



Photograph of eyelid taping [12]

This may be done via the following methods:

- **Manual closure:**

Eyelid taping

after applying lubricant, the outside of the eye must be free of the lubricant ointment for tape to stick properly. Micropore tape is then applied horizontally across the lids to seal them.

repeated removal cause eyelid injury or irritation and can be distressing to relatives so should only be undertaken where necessary.

It is crucial when using taping that the lids are completely shut and the tape not touching the eye surface as more damage will be done than prevented.

Closing the eyelids

Cling film

safe alternative to tape to protect the eye

it does not cause damage if in contact with the eyeball

Apply a 10cm x 10cm square over each eye and change it every shift.

Hydrogel or silicone dressings/pads

Use with care to avoid damage to the eye, eg Kerrapro, Gelliperm may be used instead of taping if oedema prevents manual lid closure. They should be changed at least once per shift or sooner if drying out (curling edges).

Photograph of Gelliperm

Ocular pathology within PICU

- **corneal abrasion**

The corneal can be accidentally injured and nearly always in ICU this is in the form of a corneal abrasion (a superficial scratch removing the surface epithelium).

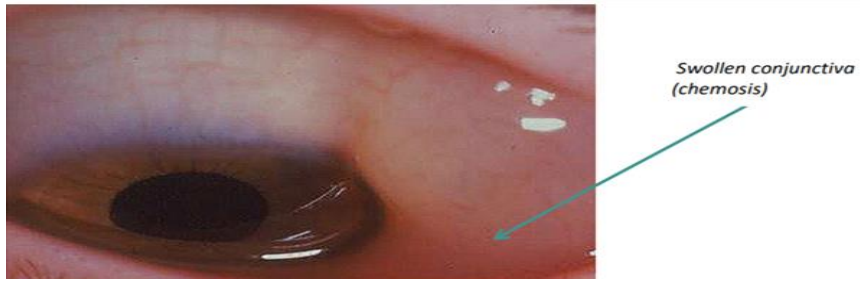
It will cause the eye to become **red** and is best seen using **fluorescein.**

Treatment of a simple corneal abrasion without secondary infection can be with chloramphenicol ointment four times daily for 5 to 7 days and increased lubrication and lid taping if there is significant unwanted corneal exposure.

Ocular pathology within PICU

- **Exposure keratopathy:**
- This is a corneal epithelial defect which occurs in those with incomplete lid closure. It manifests as a red eye and fluorescein dye drops reveal smaller or larger epithelial defects
- In the first instance, use chloramphenicol ointment 4 times a day, **increase** the frequency of lubricants and consider lid taping if there is significant unwanted corneal exposure.
- Contact ophthalmology if:
- The cornea is not clear with a bright light
- White patches are present on the cornea
- The epithelial defect covers more than one third of the cornea
- There is no improvement within 48 hours after increasing management

Chemosis



- Risk factors include:

compromise venous return from the ocular structures (positive pressure ventilation, or tight endotracheal tube taping)

generalised oedema (such as fluid overload or hypalbuminaemia)

increased hydrostatic pressure (prone ventilation)

increase capillary leak (such as systemic inflammatory response syndromes)

can lead to poor lid closure leading to exposure of the cornea and infection.

These patients can often be managed with **increased lubrication and taping** however refer to ophthalmology if:

- The cornea is not clear with a bright light
- White patches are present on the cornea
- The epithelial defect covers more than one third of the cornea
- There is no improvement within 48 hours after increasing management

Microbial Infections

- The eye commonly becomes colonized with bacteria (in a time-dependent fashion) on ICU

- The most common isolated organisms are Pseudomonas aeruginosa, Acinetobacter spp and Staphylococcus epidermidis

- Respiratory secretions may be a common source of bacteria in those in PICU, so care should be given when suctioning is being performed. This should be done from the side rather than at the head, and the eyes should be covered.

Conjunctivitis

- This is an infection of the conjunctiva.The eye is usually **sticky** with **debris on the lashes** and a **red eye**. If the eye is red without stickiness other causes should be considered. Discuss with ophthalmology if the cornea is not clear.

- Conjunctivitis in this setting is **usually bacterial** and can be very infectious and virulent. Without due care it can be spread to other patients and staff.
- Use chloramphenicol ointment 4 times a day for 7 days and send a viral and bacterial swab. If the swab shows sensitivities to other antibiotics but there is a clinical improvement, continue chloramphenicol. If the eye is still sticky or red, then the ointment can be changed to one containing an antibiotic to which the organism is sensitive, or other antibiotic drops can be used in addition to simple lubricant ointment.

Microbial keratitis

- This is an infection of the cornea.
- exposure keratopathy are more vulnerable to this due to loss of the protective epithelial barrier.
- Red eye, which may be watery or sticky, with a corneal ulcer (an epithelial defect -which stains with fluorescein dye,white patch may be visible on the cornea, the cornea may be hazy with a bright torch
- It is most likely to be virulent bacteria – especially pseudomonas. Therefore, do a corneal scape and start appropriate intensive **topical fluoroquinolone** antibiotic therapy immediately. Try to **avoid lid taping** (which can encourage bacterial growth) and keep lubricated with plenty of ointment.
- These patients **should be referred** to ophthalmology.

BE STRONG