

Prevention of Ocular Morbidity for Proned Patients in a Critical Care Setting

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Introduction & Aims

Prone positioning is an established treatment strategy for patients with COVID-19 in ICU.¹ This improves hypoxaemia but can also cause ocular complications. Our aim is to highlight these complications with a focus on preventative strategies.

Methods

<h3>Exposure Keratopathy</h3> <ul style="list-style-type: none"> ❖ Usual ocular surface defence mechanisms compromised in ventilated patients ❖ Lagophthalmos, impaired Bell's and blink reflex caused by sedation & neuromuscular blockers² ❖ Untreated can lead to microbial keratitis, endophthalmitis and even corneal perforation <p>SIGNS: Conjunctival injection, discharge and/or chemosis, lagophthalmos</p>	<h3>Raised IOP & Acute Angle Closure</h3> <ul style="list-style-type: none"> ❖ Prone position and duration of prone position significantly increases IOP⁴ ❖ Gravitational forward movement of lens-iris diaphragm in prone position ❖ Susceptible patients (female, Asian, age >50, hypermetropes) may develop acute-angle closure ❖ Requires immediate IOP-lowering treatment to prevent sight loss <p>SIGNS: Conjunctival injection, high IOP/rigid to palpation, corneal haze, mid-dilated fixed pupil; needs URGENT intervention</p>
<h3>Orbital Compartment Syndrome</h3> <ul style="list-style-type: none"> ❖ Acute rise in intra-orbital pressure causing loss of optic nerve perfusion ❖ Prone position causes increased orbital venous pressure, peri-orbital oedema & raised IOP, and direct orbital compression³ ❖ Urgent intervention with lateral canthotomy & cantholysis required <p>SIGNS: Acute proptosis, peri-orbital oedema, ophthalmoplegia, conjunctival injection & chemosis, fixed dilated pupil +/- RAPD; needs URGENT intervention</p>	<h3>Ischaemic Optic Neuropathy</h3> <ul style="list-style-type: none"> ❖ Vasoconstriction of ophthalmic & ciliary vessels -> optic nerve ischaemia ❖ These patients have higher prevalence of cardiovascular risk factors ❖ Increased risk of hypotension, anaemia, vasopressor use & haemodialysis ❖ Prone position causes increased IOP & intra-abdominal pressure³ <p>SIGNS: RAPD, optic nerve swelling (anterior ION), ON pallor (late sign)</p>

Results

Barking, Havering and Redbridge
University Hospitals
NHS Trust

CRITICAL CARE PROTOCOL FOR OPHTHALMIC CARE IN COVID RESPONSE

Protocol devised in Department of Ophthalmology, Queen's Hospital, Barking Havering & Redbridge University Hospitals NHS Trust, RM7 OAG

INDICATIONS:

- All patients who are intubated / ventilated / sedated / unconscious / GCS < 10
- All patients with neurological problems with loss of blink reflex

ON ADMISSION & DAILY (MINIMUM) CHECK

- Assess and document eyelid position
- Manage as per grading below

EQUIPMENT NEEDED: A bright pen torch

NB: Eyes should be assessed with a pen touch to detect sub-optimal lid closure, masked by patient's eyelashes

GRADE 1

Eye is fully closed:

- Prescribe **eye ointment** (see below) **three times over 24 hours to both eyes** (see box)
- Clean periorcular skin with sterile gauze and sterile water on review
- Review 8 hourly

Eye ointments: Xalin Night®, HvloNight®, Simple eye ointment

GRADE 2

Conjunctiva exposed (white of eye):

- Increase frequency of application of **eye ointment to four times a day** to each eye (see box)
- Apply **Kerrapro®** sheet to closed eyelid; change daily
- Clean periorcular skin with sterile gauze and sterile water on review
- Review 6 hourly

GRADE 3

Cornea exposed, showing iris and / or pupil:

- Increase frequency of application of **eye ointment to 2-hourly** (see box) and add **Chloramphenicol 1% eye ointment ON** to affected eye(s)
- Apply **Kerrapro®** sheet to closed eyelid; change daily
- Clean periorcular skin with sterile gauze and sterile water on review
- Review 2 hourly

If the conjunctiva is red and / or there is discharge:

1. Send bacteriology swab from each eye
2. **Stop lubricating eye ointment**
3. Prescribe **Chloramphenicol 1% eye ointment QDS** to both eyes (use a separate tube for each eye)
4. Increase frequency of eye cleaning to 2-hourly
5. Call for an ophthalmology opinion if not improving within 48 hours

URGENT EYE REVIEW: If the cornea has a white line and / or white spots on the surface:

Signs of infection include redness, discharge +/- lid or conjunctival swelling and / or corneal clouding.

Prone Patient:

- Apply **Kerrapro®** or gel pads to superior and temporal orbit to relieve direct pressure on the globe (eye)
- Ensure both eyelids are fully taped closed
- Perform **routine eye care (cleaning and lubrication)** during head turn intervals (4 hourly)
- Revert to above protocol when patient supine

Additional Notes:

1. It is important for all medical personnel to maintain strict hand hygiene & wear eye protection when cleaning eyes.
2. Apply eye cover during open oropharyngeal suctioning if patient known to have active respiratory infection.
3. Do not withdraw the suction catheter across patient's face after suctioning.
4. **Kerrapro®** sheet must be changed once daily.
5. **Vaseline** may be applied to the periorcular skin as an emollient.

For further reference, please see:
<https://www.rcophth.ac.uk/wp-content/uploads/2017/11/Intensive-Care-Unit.pdf>

Prevention of Morbidity

- ❖ We recommend the use of the BHRUT critical care ophthalmic protocol for Covid-19 patients
- ❖ Frequent ocular assessments for exposure keratopathy guided by grading of severity
- ❖ Horizontal lid taping or Kerrapro^{®5} for mechanical eyelid closure (see above)
- ❖ Regular alternate 4 hourly head turns in prone position to reduce problems in dependent eye (eye towards mattress)
- ❖ Mild reverse Trendelenberg position (preferably 10°)/place head above heart to reduce IOP & peri-orbital oedema in prone position
- ❖ Timely correction of anaemia and hypotension in critically ill



Conclusions

- ❖ Proning may cause significant ocular morbidity in the critically unwell
- ❖ Prevention strategies essential to reduce risk
- ❖ Awareness of complications with prompt intervention may prevent sight loss

References

- 1) World Health Organisation (WHO). Clinical management of COVID-19. Available from: <https://www.who.int/publications/i/item/clinical-management-of-covid-19> [Accessed Jan 27, 2021].
- 2) Grixiti A, Sadri M, Edgar J, et al. Common ocular surface disorders in patients in intensive care units. *The Ocular Surface* 2012;10(1):26-42.

- 3) Kwee MM, Ho YH, Rozen WM. The prone position during surgery and its complications: a systematic review and evidence-based guidelines. *Int Surg*. 2015;100(2):292-303.
- 4) Saran S, Gurjar M, Kanaujiya V. Effect of Prone Positioning on Intraocular Pressure in Patients With Acute Respiratory Distress Syndrome. *Crit Care Med* 2019;47(9):e761-e766.
- 5) Knowles A, Young S, Collins F et al. Report on a clinical evaluation of the KerraPro Heel silicone heel pad. *J Wound Care* 2013;22(11)