

**Title: Standard Operating Procedure for Measurement of
intraocular Pressure (Tonometry) with**

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1.0 Policy Statement:

Measurement of intraocular pressure is a standard component of the clinical examination of an ophthalmic patient. The purpose of this standard operating procedure is to ensure that intraocular pressure measurement is undertaken accurately, consistently, and safely.

2.0 Purpose:

This standard operation procedure is for the routine measurement of intraocular pressure with a Goldmann applanation tonometer mounted on a slit lamp.

3.0 Scope:

This procedure is for all staff who measure intraocular pressure with a Goldmann applanation tonometer.

4.0 Legislation/other related policies:

None or to be inserted

5.0 Glossary of Terms and Definitions: *(definitions etc. to be added, but no sure this is necessary)*

- Anaesthetic (topical). The most commonly used topical anaesthetic is ...
- Applanation
- Colbalt blue filter
- Disinfectant
- Fluorescein / fluorescein strip
- Goldmann Applanation Tonometer (GAT)
- Intraocular pressure
- Mires
- Systole and diastole
- Tonometry
- Tonometer prism / tonometer head

6.0 Roles and Responsibilities:

All staff who perform measurements of intraocular pressure should have appropriate training and documented assessment of competence.

List names of staff who undertake IOP measurements, their profession / work role, documented training and assessment of competence, and date of completion of training.

List names of staff responsible for ensuring compliance with SOP:

7.0 Procedure for measuring intraocular pressure

Infection control

- Hands should be disinfected according to local guidance prior to contact with equipment or the patient.
- The surfaces of the equipment that come into contact with the patient should be cleaned with a disinfectant-impregnated wipe, or cleaned with a hard surface disinfectant.

Preparing the tonometer and prism. (These instructions apply to reusable prisms).

Examinations should only be performed with undamaged measuring prism that is cleaned and disinfected.

- Check the prism for signs of damage before use. If damaged the prism should be discarded and replaced.
- The tonometer prism should be cleaned and disinfected to remove any deposits and microorganisms. Disinfect the prism with an appropriate agent, according to local guidance. The prism should be washed to remove the disinfectant, and allowed to dry prior to use.
- Insert the prism into the Goldmann Applanation Tonometer (GAT). Make sure you support the neck of the GAT whilst inserting the prism. Ensure correct position by aligning the 0 degree reading on the prism with the white line on the GAT.

Preparation of the patient

- Ask the patient to loosen any tight collar or tie.
- Ensure that the patient is aware of what is going to happen during the test and why the test is being carried out. Explain that you are going to check the pressure of their eyes by using drops to numb the front surface of their eye, and that the instrument will gently touch the tear film of the eye, but because of the drops they will feel nothing. Warn the patient that the drops will sting but this will wear off quickly.
- Instil premixed topical anaesthetic and fluorescein into the lower fornix of both eyes, or alternatively instil topical anaesthetic, then moisten the end of a fluorescein strip with the anaesthetic and place it in the fornix near the outer canthus and remove when the tears are sufficiently stained. Gently wipe away any excess tears.

Obtaining the measurement

- Turn the slit lamp switch to maximum illumination. Set the slit lamp magnification to 10X. Position the light source at an angle of approximately 45° to 60°, and open the slit diaphragm to maximum. Move the cobalt blue filter into position. Place the tonometer on the slit lamp base plate. It is viewed unocularly, set either for the observer's right or left eye by placing the pin on its base into either the right or left hole of the horizontal guide plate on the slit lamp. Alternatively the tonometer may be attached by an arm to the slit lamp and swung into position. The slit lamp microscope is perpendicular to the eye. Adjust the force on the tonometer dial to an initial setting corresponding to 10 mm Hg.
- Adjust the patient and slit lamp so that the patient's head is firmly positioned on the chin rest and against the forehead rest without leaning forward or straining. To measure the right eye, ask the patient to keep their eyes wide open and avoid blinking, and to look straight ahead at a distant object or target with their left eye. If it is necessary to hold the eyelids open, hold the eyelids against the orbital rim, taking care not to apply any pressure to the globe. Ask the patient to breathe normally and not to hold their breath.

- Look through the slit lamp eyepiece and gently bring the tip of the prism into contact with the center of the cornea. Ensure the mires are well focused, centered horizontally, and positioned vertically so that they are of equal circumference above and below the horizontal dividing line. Adjust the measuring drum until the inner borders of the two mires just touch each other or, if pulsation is present, until the mires separate a given distance during systole and overlap the same distance during diastole.
- Repeat the same procedure for the left eye (fixating a distant object or target with the right eye).
- Move the tonometer prism away from the cornea and record the reading on the dial, rounded to the next highest integer. If, for example, the measurement indicated is between 16 and 17, 17 is recorded as the measurement.
- One measurement of each eye is usually sufficient. However, if the patient is being followed for glaucoma or the first measurement is suspect, two readings should be taken on each eye.
- The time, date and instillation of drops should be documented with the intraocular pressure measurements, and signed by the person taking the measurements. Any difficulties in obtaining measurements should be noted with comments about the reliability of the results, as appropriate.

Sources of error

If corneal astigmatism is greater than 3.0 D the semicircles will be elliptical and the pressure will not be measured correctly unless the prism is rotated so that the red line on the tonometer head-holder corresponds to the axis of the minus cylinder.

The mires may be too thick or too thin to get a precise alignment. If the mires are narrower than approximately 1/10 of their diameter, the tear film or fluorescein may be insufficient. Ask the patient to blink several times and instill additional fluorescein. Thin mires will underestimate the pressure. If the mires are too thick there is an excess of tears or the tonometer head is in contact with the lid. Wipe excess tears from the eyes and wipe the tonometer tip to remove excess fluorescein. Thick mires will overestimate the pressure.

If there is a large overlap of the semicircles that is unresponsive to rotation of the measuring drum, the tonometer head has been pressed too firmly against the cornea. Move the tonometer away from the eye and start again.

Excessive squeezing of the eyelids, pressure on the globe when holding the lids open, and tight neckwear and breath holding can increase intraocular pressure giving rise to falsely high readings.

Measurement of intraocular pressure should normally be made on an eye that has not received pupil-dilating medications. If the pupil has been dilated this should be clearly documented.

Whenever possible, IOP should be checked at about the same time of day as the to minimize diurnal fluctuation of IOP.

Calibration and maintenance

The calibration of the tonometer should be checked at least every month (? weekly). A log should be kept of calibration measurement and dates.

The attachment piece for checking calibration is inserted into the tonometer's calibration port above the dial on the right hand side, and the bar is positioned so that the middle etched line is aligned with the attachment calibration line. The dial is then rotated to the zero mark. As the dial nears the zero mark, the tonometer head will tilt slightly. Rotating the dial slightly away from zero will cause the head to move back. The calibration bar is then set to the next line, and the dial is rotated to the 2 gm (20 mm Hg) mark, again

causing movement of the tonometer head. Finally, the bar is set at the end line, and the dial is rotated to 6 gm (60 mm Hg). At each calibration point, the tonometer head should rock back and forth within ± 1 mm Hg of that point. If it does not, the whole unit must be sent to the manufacturer for recalibration.

Reusable prisms have a shelf life of five years. To ensure maximum safety it is recommended that they should be used for a maximum of two years. The measuring prism must not be damaged as it might damage the patient's cornea.

Improper preparation of the prism can result in the transmission of diseases to the patient and user as well as damage to the measuring prisms. Residue from cleaning agents and disinfectants can irritate and burn the patient's eye.

8.0 Revision and Audit:

To be added as required

9.0 References/bibliography:

DuBois, L. (1998). Clinical Skills for the Ophthalmic Examination: Basic Procedures.

James, B., Benjamin, L. (2007). Ophthalmology Investigation and Examination Techniques.

Ocular Hypertension Treatment Study (OHTS) Manual of Procedures Version 3.0 (2001).

10.0 Appendices:

To be added as required

11.0 Revision History:

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Section	Changes Made

Signature Page:

I have read, understand and agree to adhere to the attached Procedure:

Print Name	Signature	Area of Work	Date