How to measure intraocular pressure: applanation tonometry

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All adults attending an eye unit should have their intraocular pressure (IOP) measured, unless there is a contraindication (e.g. trauma or corneal ulcer). Many people with glaucoma have no symptoms and do not know they have the condition. All children who have had cataract surgery should also have their IOP measured at every follow-up visit, if possible. Finding glaucoma early allows treatment to be given which will preserve sight. Although elevated IOP is not the only sign of glaucoma, measuring it is simple and quick to do. It should therefore be done routinely on all adults attending eye care facilities. Applanation tonometry, described in this article, is the preferred method (the 'gold standard'). Schiötz tonometry, which will be described in a future issue, is a useful screening test which can be performed by nurses or ophthalmic technicians.

Equipment

- Tonometer, either Goldmann (used on slit lamps) or Perkins (hand-held)
- Applanation prism
- Local anaesthetic drops
- Fluorescein strips
- Clean cotton wool or gauze swabs.

Preparation

- Ensure the prism has been sterilised with isopropyl alcohol 70% (methylated spirit) or sodium hypochlorite, and wiped dry with a clean swab (residue of the disinfectant may cause a caustic burn on the cornea)
- Check that the graduation marked '0' on the measuring prism is aligned with the white marker point on the tonometer head
- Check the calibrated dial of the tonometer is set at 10 mmHg
- Ensure that the patient is sitting comfortably at the slit lamp: at the right height, with their chin on the rest and their forehead against the headband (or in a chair with their head supported, if using the Perkins tonometer)
- Set the magnification of the slit lamp at x10.

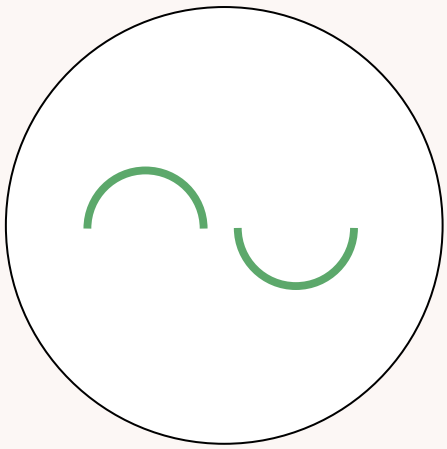
Method

- Instil the local anaesthetic drops and then the fluorescein. Only a very small amount of fluorescein is needed
- For measuring the IOP in the right eye, make sure the slit beam is shining onto the tonometer head from the patient's right side; for the left eye, the beam should come from the patient's left side
- Move the filters so that the blue filter is used to produce a blue beam
- Make sure the beam of light is as wide as possible, and that the light is as bright as possible. This makes visualising the fluorescein rings easier (with the slit diaphragm fully open)
- Ask the patient to look straight ahead, open both eyes wide, fix his or her gaze and keep perfectly still
- With the thumb, gently hold up the patient's top eyelid, taking care not to put any pressure on the eye
- Direct the blue light from the slit lamp or the Perkins tonometer onto the prism head
- Make sure that the tonometer head is perpendicular to the eye
- Move the tonometer forward slowly until the prism rests gently on the centre of the patient's cornea
- With the other hand, turn the calibrated dial on the tonometer clockwise until the two fluorescein semi-circles in the prism head are seen to meet and form a horizontal 'S' shape. (Note: the correct end point is when the inner edges of the two fluorescein semi-circle images just touch)
- Note the reading on the dial and record it in the notes
- Withdraw the prism from the corneal surface and wipe its tip
- Repeat the procedure for the other eye
- Wipe the prism and replace it in the receptacle containing the sterilising fluid.

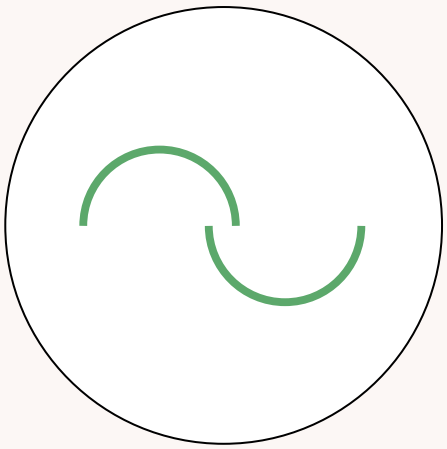
Richard Scawn

Applanation tonometry. UK

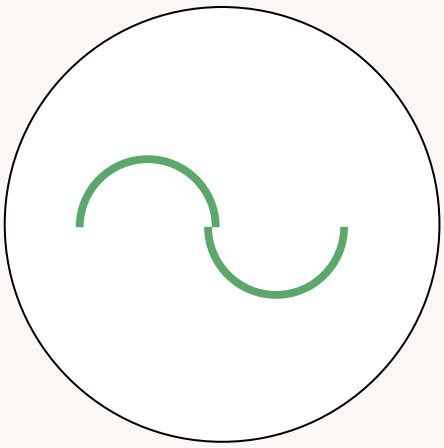
Applanation tonometry rings viewed through the Goldmann prism



High intraocular pressure before the end point is reached will result in this image. Continue to turn the calibrated dial on the tonometer clockwise to reach the correct end point.



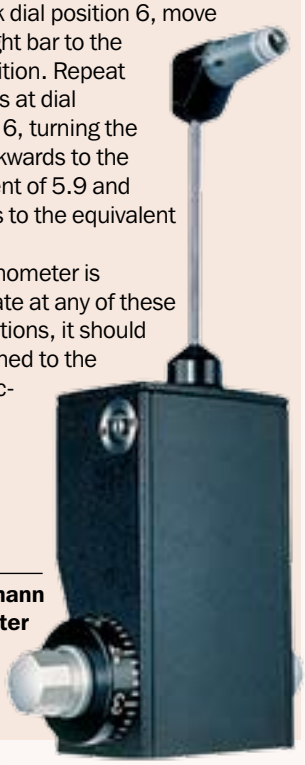
Low intraocular pressure will result in this image. Turn the calibrated dial on the tonometer anticlockwise to reach the correct end point.



This is the correct end point – the inner edges of the rings are just touching. This will give a correct reading of intraocular pressure.

Calibration of the Goldmann tonometer

- It is possible to check the calibration of the tonometer; this should be done every six months. Calibration is done at dial positions 0, 2, and 6 (equivalent to 0, 20, and 60 mmHg)
- Insert the prism in the holder and place the tonometer on the slit lamp
- At dial position 0, the feeler arm should be in free movement. If the dial is turned backwards a small way (to the equivalent of position -0.05), the arm should fall towards the examiner. If the dial is turned forwards a small way (to the equivalent of position +0.05) the arm should fall towards the patient
- If the arm doesn't respond in the above way, the tonometer is inaccurate at dial position 1
- To check dial positions 2 and 6, the check weight is used (this is normally found in the case with the tonometer prisms or in the drawer of the slit lamp). There are five markings engraved on the bar. These represent 0 centrally, then 2 on either side, and 6 towards the edges
- Line up the adjustable holder with index mark 2 on the weight. With the longer end of the bar facing you, put it into the slot on the side of the tonometer and push it all the way in
- Repeat the above steps (for dial position 0), with the dial now at position 2. This time, turn the dial backwards to the equivalent of 1.95 and forwards to the equivalent of 2.05
- To check dial position 6, move the weight bar to the end position. Repeat the steps at dial position 6, turning the dial backwards to the equivalent of 5.9 and forwards to the equivalent of 6.1
- If the tonometer is inaccurate at any of these dial positions, it should be returned to the manufacturer for recalibration.



A Goldmann tonometer

Better vision for safer roads: an instance of accidental advocacy in Nigeria

Barka David Lass

The television interview with Barka David Lass and representatives of the federal road safety commission and vehicle inspection office. NIGERIA

While former MSc student Barka David Lass was testing the vision of commercial drivers at a minibus station (or 'park') in Jos, Nigeria, in July 2007, he was spotted by a television crew, there to film a news insert on lost property. The producer was so taken by Lass's research (conducted for his MSc dissertation, summarised on page 71) – that an interview with him was broadcast on national news the very same day.

Nigeria has seen a five-fold increase in the number of deaths due to traffic accidents over the last twenty years. The interview with Lass highlighted the fact that, although drivers have to satisfy a minimum legal requirement for visual acuity in Nigeria, not even the vision of commercial drivers is routinely tested before licences are issued.

After the news item, Lass was invited to participate in a television programme on vision and safe driving, broadcast by the Plateau Radio Television Corporation. Other participants included representatives of the Vehicle Inspection Office and of the Federal Road Safety Commission.

The participants talked about the definition of vision, how to assess it, and what constitutes good vision for driving. Other topics included the high number of road traffic accidents in Nigeria, the relationship between vision and accidents, and the various laws and penalties related to vision and driving. The programme was watched in over six states and in the federal capital territory of Nigeria.

The following recommendations were put forward at the end of the discussion:

- all commercial vehicle drivers applying for a licence should undergo a comprehensive eye exam, conducted by an ophthalmologist
- all commercial vehicle drivers should have their vision tested before their driving licences can be renewed (every four years)
- staff of the Federal Road Safety Commission and of the Vehicle Inspection Office should be trained to assess vision, so that they can carry out periodic checks on drivers.

Since his return to Nigeria after completing his MSc at the International Centre for Eye Health in London, Lass has met with the producer of the programme; together, they are working on ways to ensure that these recommendations are carried out.

Million-dollar advocacy success for VISION 2020 Australia

The fierce competition between political parties during the run-up to the 2007 elections provided an opportunity for VISION 2020 Australia to secure more than AUS $100 million in funding for eye health and vision care.

VISION 2020 Australia had worked with its global partners to produce a comprehensive proposal to eliminate blindness and visual impairment in the Southeast Asia and Pacific region. In July 2007, this was presented to the minister and shadow (opposition) minister responsible for overseas aid.

On World Sight Day, 11 October, Shadow Minister for International Development Assistance Bob McMullan pledged AUS $45 million over two years to fund the proposal to prevent blindness and improve vision care in the region. Two weeks later, Foreign Minister Alexander Downer pledged funding of AUS $60 million over ten years to implement part of the proposal.

More information on VISION 2020 Australia's advocacy work is available on the VISION 2020 Australia website: www.vision2020australia.org.au

VISION 2020 Australia

Australia's shadow minister for international development assistance on World Sight Day. AUSTRALIA