Testing the Calibration of A Goldman Applanation Tonometer

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The accuracy of the intraocular pressure measurements obtained with the Goldman Applanation tonometer critically depends on the accurate calibration of the tonometer used. It is mandatory to check the calibration of applanation tonometer at least twice a year. The Goldman Applanation tonometer has (1) The calibration rod comprising of the control or check weight and weight holder to which it is fixed is provided separately with the Goldman Applanation Tonometer (Figure 1) (2) The axis of the tonometer which the control weight is attached to the holder (Figure 2). The holder and the weight fixed on to the axis of the tonometer are shown in Figure 3. The control weight on the calibration rod has five circles engraved on it. The central mark corresponds to 0 on the dial position, the first markings on either side on 0 correspond to 2 on the dial position and the last markings on either side of 0 correspond to 6 on the dial position.

Step By Step Approach To Test Calibration Of Goldman Applanation Tonometer

The calibration is tested in three positions of the weight on the calibration rod namely 0, 2 and 6 at the corresponding dial positions.

First Step

The first step in testing the calibration of Goldman Applanation Tonometer may be done with or without fixing the calibration rod since it is done at dial position 0. The steps to be followed are –

(1) Set the tonometer in position on the slit – lamp stand with the bi – prism head in place and the tension on the circular dial on the right side as seen from the examiner’s side of the slit – lamp

(2) Slowly twirl the circular dial counter – clockwise until the head rocks back towards you. The tension on the circular dial should read between 0 – 2 mm Hg below zero (Figure 4)

(3) Slowly twirl the circular dial clockwise until the head rocks forwards away from you. The tension on the circular dial should read between 0 – 2 mm Hg (Figure 5)
Second Step

This is the most important step to check calibration of Goldman Applanation Tonometer since measuring of the intraocular pressure in this area is highly significant. For this step, the control weight is used. One of the marks on the weight corresponding to drum position 2 is set precisely on the index mark of the weight holder. The control weight and the weight holder are fitted over the axis of the tonometer so that the longer part of the weight points towards the examiner (Figure 5).

(1) Slowly twirl the circular dial counter – clockwise or backwards (Figure 6) until the head rocks back towards you. The tension on the circular dial should read between 17 – 20 mm Hg below zero.

(2) Slowly twirl the circular dial clockwise (Figure 7) until the head rocks forwards away from you. The tension on the circular dial should read between 20 – 23 mm Hg.

Third Step

One of the marks on the weight corresponding to drum position 6 is set precisely on the index mark of the weight holder. The control weight and the weight holder are fitted over the axis of the tonometer so that the longer part of the weight points towards the examiner (Figure 8).

(1) Slowly twirl the circular dial counter – clockwise until the head rocks back towards you (Figure 9). The tension on the circular dial should read between 56 – 60 mm Hg below zero.

(2) Slowly twirl the circular dial clockwise until the head rocks forwards away from you (Figure 10). The tension on the circular dial should read between 60 – 64 mm Hg.
Examples of errors in measurement of intraocular pressure

If the error of measurement is 2 mm Hg and the intraocular pressure recorded with the tonometer is 12 mm Hg then the actual range of measurement is between 10 and 14 mm Hg.

The points tested should bracket the threshold levels evenly – higher the level being tested, the greater the interval is likely to be. If the tonometer is inaccurate at any of these dial positions, it should be returned to the manufacturer for recalibration.

Reference