



Stress perimetry: An Alternative for Early Detection of Open Angle Glaucoma in High Risk Population

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Abstract

Glaucoma is a significant public health problem worldwide, defined by a typical appearance of the optic nerve head and visual field defects. The most common type of glaucoma is Primary Open Angle Glaucoma (POAG). Glaucoma has been reported to be the second most common cause of visual loss in the world, and a worldwide upsurge in POAG prevalence is expected by 2012. According to numerous population-based studies, the rate of undiagnosed cases of glaucoma is more than 50%. The current unsatisfactory situation with early diagnosis and protection against glaucoma has motivated us to look for new solutions. Our method can rapidly detect suspected glaucoma. Any increase in perimetry threshold after stress test would be considered positive and high risk for glaucoma.

Keywords

Glaucoma, Early Detection, Stress perimetry

Introduction

Intraocular pressure (IOP) is the main risk factor for the development and progression of glaucoma. Routine office measurements may not detect IOP peaks in roughly 30% of patients, and this detection failure may be responsible for visual field progression in apparently controlled patients (1).

Stress tests, such as the glucose-50 test for diabetes (2) and dobutamine stress echo in cardiology

(3) have been used in general medicine to assess risk factors for different types of disease.

The water drinking test (WDT) has been proposed initially by Schmidt (4) as a tool for the diagnosis of glaucoma. Different studies demonstrated the correlation between IOP peaks detected during this provocative test and the pressure curve (5, 6).

LASIK (laser-assisted in situ keratomileusis) procedures necessitate the application of a pneumat-

ic suction ring to the cornea, which creates a vacuum chamber against the globe and holds the cornea in place. The amount of pneumatic suction involved causes significant elevation in IOP, noted to be beyond 90 mmHg with real-time IOP measurement during keratomileusis (7).

The apparent lack of long-term adverse effects on the optic nerve after vitreoretinal surgery and acute angle-closure glaucoma, when there is sustained elevation of IOP for hours, seems to support the notion that a transient increase in IOP does not lead to significant optic nerve damage (8).

The Hypotheses

Transient acute rises in IOP may have relevance to glaucoma, via alteration in the biomechanical equilibrium, compromise of blood supply at the optic nerve head, or direct damage to the ganglion cell axons. It is possible to assess the depth of sensitivity loss in decibells during this condition.

It is possible to assess the depth of sensitivity loss in decibells during this examination. Static variants of screening perimetry, under stress perimetry could be acquiring more significance in the future clinical and preclinical studies. Any increase in perimetry

threshold after stress test would be considered positive and high risk for glaucoma.

Evaluation of Hypotheses

The suction cup consists of suction pump that is connected by plastic tubing to a rigid, plastic suction cup with an inner diameter of 11 mm. After topical anesthesia the cup is placed on the temporal conjunctiva and with an increment of the negative pressure in the suction cup the intraocular pressure rises (9).

We suggest 5 steps for stress perimetry:

1. IOP measurement with Goldman applanation tonometry
2. Perimetry
3. Placement of suction cup on the temporal conjunctiva near limbus connected to a vacuum machine (After topical anesthesia) Figure 1
4. Increasing IOP with vacuum pump machine to 10 mmHg from baseline (Monitored by Goldman applanation tonometry) Figure 1
5. Repeat perimetry while suction cup is attached to the eye
6. Removal of Suction cup

Overview Box

First Question: What do we already know about the subject?

Glaucoma is a significant public health problem worldwide, defined by a typical appearance of the optic nerve head and visual field defects. The most common type of glaucoma is Primary Open Angle Glaucoma (POAG). Glaucoma has been reported to be the second most common cause of visual loss in the world.

Second Question: What does your proposed theory add to the current knowledge available, and what benefits does it have?

The current unsatisfactory situation with early diagnosis and protection against glaucoma has motivated researchers to look for new solutions. The method we propose can rapidly detect not only suspected glaucoma, but also assess them quantitatively.

Third question: Among numerous available studies, what special further study is proposed for testing the idea?

The suggest steps for stress perimetry includes baseline perimetry, placement of suction cup on the temporal conjunctiva near limbus connected to a vacuum machine (after topical anesthesia), increase IOP with vacuum pump machine to 10 mmHg from baseline (Monitored by Goldman applanation tonometry), repeat perimetry while suction cup is attached to the eye, and finally removal of suction cup. Any increase in perimetry threshold after stress test would be considered positive and high risk for glaucoma.

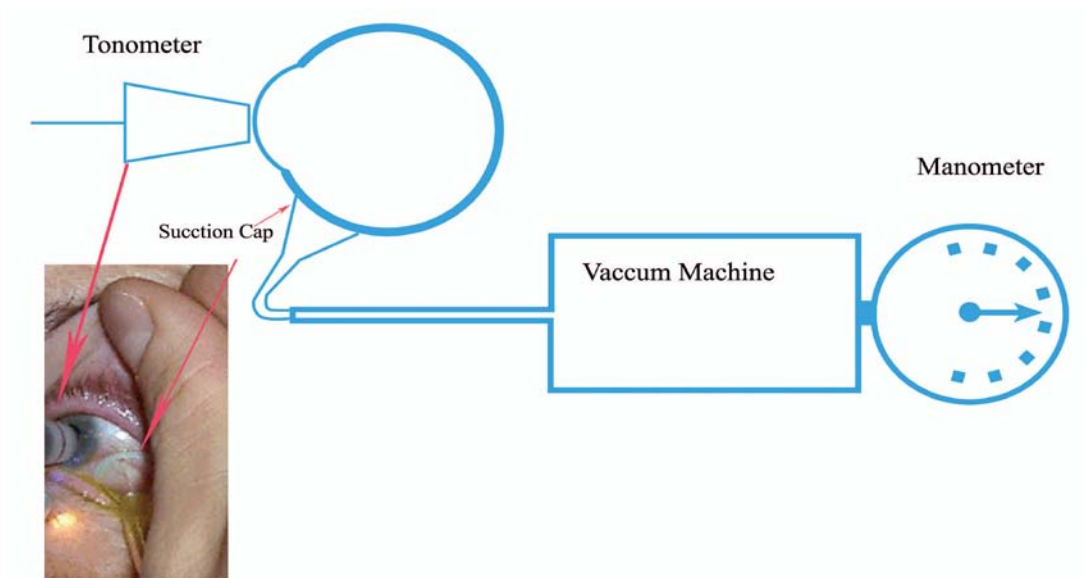


Figure1: Placement of suction cup on the temporal conjunctiva near limbus connected to a vacuum machine (after topical anesthesia) and increase IOP with vacuum pump machine to 10 mmHg from baseline (Monitored by Goldman applanation tonometry)

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