Improving Compliance with Medical Treatment Using Eye Drop Aids

Subjects: Ophthalmology

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Achieving optimal treatment outcomes in glaucoma requires patients to adhere to their medication regimens. Possible barriers to patients' cooperation include the misunderstanding of a treatment's importance or errors in applying instructions, forgetfulness, financial constraints and others. Due to the fact that glaucoma usually causes no apparent symptoms or pain, on the one hand, and the significant inconvenience that the eye drops used for glaucoma treatment can cause due to local irritation, on the other, patient compliance is a challenge. To address this challenge, we require strategies for improving adherence to glaucoma treatment. The importance of proper eye drop administration techniques cannot be overstated, particularly for vulnerable populations such as the elderly, the sick and the visually handicapped. Studies have shown that failure to comply with glaucoma treatment is a significant factor affecting disease progression, emphasizing the need for interventions that improve patient compliance. Educational interventions, medication reminders and the use of assistive devices such as eye drop aids have been shown to improve adherence to glaucoma treatment. By promoting strategies that can be used to enhance treatment adherence, healthcare providers can ensure that glaucoma patients receive the full benefits of their treatment plans, reducing the risk of disease progression. Many patients struggle with the complexity of their treatment regimens and the challenges of administering eye drops. This entry provides a comprehensive overview of the different barriers to patient adherence to glaucoma eye drop treatment, emphasizing the difficulties associated with eye drop instillation. This entry examines a range of eye drop aids available to patients, evaluating their modes of action, benefits, drawbacks and effectiveness in improving patient compliance. By providing detailed information on the barriers to adherence and the range of eye drop aids available, this entry aims to support healthcare providers in helping glaucoma patients to achieve better treatment adherence and outcomes.

Keywords: glaucoma ; glaucoma aids ; compliance ; eye drops

Primary open-angle glaucoma is a chronic and progressive optic neuropathy characterized by a gradual loss of vision, which often goes unnoticed until the later stages of the disease. The proposed explanations for optic neuropathy include direct pressure on nerve fiber layer axons, local pressure on optic nerve axons at the lamina cribrosa (the "mechanical theory") and vascular insufficiency of the optic nerve head (the "vascular theory"). The fact that intra-ocular pressure is the most important risk factor in glaucoma supports the mechanical theory. Normotensive glaucoma is associated with other diseases characterized by vascular dysregulation (migraine, Raynaud's phenomenon and sleep apnea), which supports the vascular theory of optic neuropathy in glaucoma. Based on these data, one may assume that the optic neuropathy of glaucoma is the result of both mechanisms, whereas the lower the pressure is, the more dominant the vascular component is, and the higher the pressure is, the more dominant the mechanical component is. Recent studies suggested that glaucoma might even be an autoimmune disease—this theory is supported by immune responses to heat shock protein in some glaucoma patients and in animal models of the disease [1]. One of the most significant challenges in glaucoma is the fact that, in many cases, it is diagnosed late in the course of the disease, when the damage is severe. The reason for that is that glaucoma does not cause pain, discomfort or functional disturbances in its early stages, leading many patients to delay seeking medical treatment. Glaucoma is one of the leading causes of blindness worldwide, and if left untreated, it can result in permanent vision loss and blindness [2][3]. The most important risk factors for glaucoma are intra-ocular pressure, age, family history, corneal thickness and myopia. Intra-ocular pressure is unique, as it is the only risk factor that can be manipulated through treatment. The lowering of intra-ocular pressure is the only proven treatment for improving the prognosis of open-angle glaucoma (including normal-tension glaucoma) and preventing the further deterioration of optic neuropathy [3][4].

As in the case of other chronic medical conditions, treatment is warranted for the rest of the patient's life after the diagnosis of the disease. If the chosen treatment is eye drops, this encompasses the instillation of at least one drop from a single bottle daily. In most cases, this requires three drops from two different bottles. No "penalty" that the patient can experience will result from not applying the drops, and the drops usually cause some degree of local discomfort. For this reason, compliance with glaucoma treatment is a challenge, and its promotion is mandatory for improving the prognosis of

glaucoma. These difficulties in patients' adherence to chronic glaucoma treatment are a major challenge for the treating ophthalmologist. Moreover, healthcare providers should recognize that prescribing fewer eye drop instillations for a patient can increase the likelihood of treatment compliance [5][6].

The pharmacokinetics of eye drops necessitates their repetitive and scheduled application, and inaccuracy in timely instillation results in untreated periods in which pressure is high and the optic nerve is damaged. Failure to adhere to timely instillation may result from forgetfulness, an inability to understand the risk–benefit aspects of treatment, reluctance due to the side effects of treatment or difficulties in medication supply.

Lack of compliance in glaucoma patients is a well-known problem that is believed to account, at least in part, for medical treatment failures in glaucoma [5][7][8][9][10]. Age is considered one of the foremost risk factors for the development of glaucoma, as individuals affected by this disease are typically older [2]. Unfortunately, this population is also more likely to experience challenges in adhering to their medication regimens. In older age, people may lack the strength needed to pinch the bottle, experience cognitive problems affecting their ability to remember the drops' schedule or be using many other medications, which leads to confusion and impedes their ability to understand risk–benefit issues and act according to them. Difficulties in instilling the drops due to general medical and cognitive status pose as an additional barrier to compliance [11][12][13][14]. Achieving high compliance rates among glaucoma patients is critical for successful treatment improvement and for decreasing preventable future visual disturbances and blindness.

When measuring intra-ocular pressure at a glaucoma patient visit, we must bear in mind that the measured pressure is a kind of a "snapshot" reflecting the minute value. Intra-ocular pressure is well-known to fluctuate, and neuronal damage is caused whenever the pressure is too high for the nerve. This means that even if we find a normal value at a given time, the pressure may be higher in other parts of the day and cause further damage to the optic nerve. In addition, the timing of the follow-up visit may influence the patient's compliance—patients tend to remember to take their drops better soon after a visit and when facing a visit scheduled close ahead. This may obscure the actual intra-ocular pressure value throughout the year and "hide" non-compliance.

In view of the limited value of intra-ocular pressure as a reliable marker of successful treatment and disease control, more reliable measures of disease control are needed. Two general groups of disease markers are used for this purpose: anatomic and functional.

The anatomic refers to the characteristic appearance of the optic nerve head in the disease. Nerve fiber atrophy creates nerve "cupping" (=enlargement of the central part of the nerve head containing no nerve fibers). This cupping can act as a measure for disease severity if it is stable when the disease is under control and worsens with the disease progressing. Cupping is not influenced by pressure fluctuation and provides an estimation of the possible added damage following the former examination and its severity. Cupping can be estimated clinically or measured via Optical Coherence Tomography (OCT). The main problem with progress estimation based on cupping is its loss in value in severe disease, in which cupping is total or near-total.

The functional refers to visual field testing. Glaucoma causes some characteristic changes in the visual field (e.g., nasal step, arcuate scotomata, paracentral scotomas). Following visual field status and changes can provide an idea of disease control; if the visual field is stable, the disease is under control. If the visual field has deteriorated, the disease is worsening. Just like cupping, changes in visual field are not influenced by moment pressure or pressure fluctuation, and they can effectively summarize the relevant general behavior of the disease between the two tests under comparison.

As mentioned, cupping estimation is limited in advanced disease. Visual field defects are usually not found in early disease contexts. For this reason, cupping is considered a good marker of disease control in early glaucoma, while visual field status is a better marker of advanced disease.

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