



## Is Atrial Fibrillation a Risk Factor for Primary Open Angle Glaucoma?

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Received: February 02, 2025

Published: February 07, 2025

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Glaucoma is the leading cause of irreversible blindness worldwide. Numerous risk factors have been identified for the development and progression of primary open angle glaucoma (POAG). While elevated intraocular pressure (IOP) remains the only proven modifiable risk factor for POAG, repeated episodes of reperfusion injury and ischemic damage, often linked to circulation issues, are regarded as a critical factor of optic nerve damage in glaucoma [1].

POAG is characterized by a slowly progressive remodeling of the optic nerve head and a loss of the retinal nerve fiber layer in combination with corresponding visual field defects. POAG has been divided into high-tension open-angle glaucoma, wherein the intraocular pressure is elevated >21 mmHg, and normal-tension glaucoma, wherein IOP, by definition, falls within a statistically normal range and does not exceed 21mmHg [2].

Glaucoma remains a multifactorial optic neuropathy of unknown etiology. Elevated intraocular pressure is the most important risk factor for the disease, although the exact pathways of glaucomatous optic neuropathy and the associated visual field loss have not yet been elucidated. Several risk factors for the development and glaucoma progression, in addition to IOP, have been identified. Cardiovascular disorders such as systemic hypertension, hypotension, increased blood viscosity, vasospasm, and diabetes are known as potential risk factors, especially when intraocular pressure is not elevated.

Atrial fibrillation (AF) is one of the most common cardiac arrhythmias characterized by an irregular heart rate and becoming the major cause of stroke, heart failure, and sudden death. This irregular heart rate can lead to unstable ocular perfusion pressure, subsequently affecting ocular blood flow. A notable consequence of AF is the formation of intracardiac thrombi, which can cause embolisms. Such microemboli can lead to transient ischemic events,

potentially causing perfusion disturbances and retinal ganglion cell death [3].

The concept that vascular changes in the eye may be an early indicator of heart diseases was also presented. Like glaucoma, atrial fibrillation is a disease of significant social importance. AF is one of the most common supraventricular arrhythmias, which is quite easy to detect. This type of arrhythmia is characterized by a completely irregular heart rate.

The estimated number of people with AF worldwide was >33 million. The number of patients with AF is predicted to rise steeply in the coming years. By 2030, 14 to 17 million AF patients are anticipated in the European Union alone.

AF remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity. It is independently associated with a 2-fold increased risk of all-cause mortality in women and a 1.5-fold increased risk in men.

Cerebrovascular events are major complications of AF. It has been estimated that as many as 30% of all ischemic strokes are AF-related. The eye is among the organs potentially threatened by the adverse effects of AF-related embolism, especially the optic nerve and retinal ganglion cells, which are particularly sensitive to ischemia. Even transient ischemia of the optic nerve can raise the risk of glaucoma development.

Patients with primary open angle glaucoma had an increased incidence of cardiac arrhythmias, particularly AF, compared with those without glaucoma. Moreover, those with AF were found to exhibit more severe visual field defects than those without AF. In a study using a national cohort from South Korea, it was reported

that individuals with AF had a 30% higher risk of developing glaucoma compared with those without AF [4].

The presence of atrial fibrillation and related microvascular damage might accelerate visual field loss. This underscores the need for a comprehensive medical history and management of cardiovascular risk factors to mitigate increased visual field loss in glaucoma [5].

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