

Screening for a brighter future:

Aspects of screening for open-angle glaucoma

On December 15, 2022, Johan Aspberg defended his thesis “Aspects of screening for open-angle glaucoma” at the Department of Clinical Sciences in Malmö, Lund University, Sweden. His main supervisor was Professor Boel Bengtsson, PhD, with co-supervisors Professor Anders Heijl, MD, PhD, and Dorothea Peters, MD, PhD.



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Glaucoma is the leading cause of irreversible blindness worldwide. The most common form is open-angle glaucoma, with a prevalence of 2% in white populations over 40 years of age. Around half of the cases in developed countries are undiagnosed because symptoms are few in the early to moderate stages of the disease. A late diagnosis is the major risk factor for blindness, and many believe that earlier diagnosis through screening could reduce the prevalence of blindness from glaucoma.

In paper I, we investigated how estimates of vision impairment from glaucoma were influenced by applying different criteria for impairment. A large screening of almost 33,000 participants aged 57–77 years had been conducted for open-angle glaucoma in Malmö, Sweden, in the 1990s. In paper II & III, we evaluated its effect on bilateral blindness from glaucoma and estimated open-angle glaucoma’s preclinical detectable phase (PCDP), i.e., the average time from which glaucoma can be detected by screening to its clinical diagnosis. In paper IV, we presented results from a 2020 glaucoma screening of people aged 77–89 in Malmö. Finally, paper V compared the amount of baseline visual field damage in the patients diagnosed at the large screening in the 1990s to patients diagnosed from 2013 to 2017.

Results

Paper I: If one excludes visual field status in the assessment of glaucoma blindness, the prevalence will be seriously flawed; 65% of the patients by the World Health Organization (WHO) and 54% by the United States criteria were blind by visual field constriction but not by visual acuity. By the US definition, 30% more patients were classified as blind than by the WHO definition. Paper II: Our results suggested that bilateral low vision and blindness from glaucoma may be reduced by around 50% with population screening. Paper III: The mean PCDP was estimated by two different methods to be over 10 years, with the lowest 95% CI of 8.7 years. The results suggested that repeated screening could be performed at an interval of at least 5 years. Paper IV: The prevalence of glaucoma was high in people aged

References

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Key points:

- A large population screening for glaucoma in Malmö, Sweden, has reduced the cumulative incidence of blindness by 50% over a 20+ year period.
- The average time from which open-angle glaucoma can be detected by screening to its clinical diagnosis was estimated at 10 years, long enough for repeated screening with at least 5-year intervals.
- Estimates of the prevalence of glaucoma blindness greatly varied when applying different criteria for impairment. Omitting visual field status seriously underestimated glaucoma blindness.
- Glaucoma cases detected today had less visual field loss than in the 1990s, but a considerable proportion still had severe vision loss in at least one eye, with a high risk of developing bilateral blindness.

77–89 years. However, the cases detected at the screening had a low risk of developing severe glaucoma during the remainder of their lives, since most had early stages of glaucoma and normal intraocular pressure. Paper V: Visual field damage at presentation in clinically diagnosed patients in Malmö improved in the last 20 years. Still, almost 20% had severe visual field loss in at least one eye, with a high risk of developing glaucoma blindness.

Conclusions

Estimates of the prevalence of glaucoma blindness vary greatly depending on which vision impairment criteria are applied. Visual field status should not be omitted from the assessment because this seriously underestimated glaucoma blindness. Population screening for glaucoma halved the number of blind individuals in the screened part of the population. Our results on the PCDP length for glaucoma allow for repeated screening with at least 5-year intervals. Screening in the oldest age groups would probably not be cost-effective since the cases detected had a low risk of developing blindness from glaucoma. The glaucoma cases detected today had less visual field loss than in the 1990s, but 20% remain at risk of developing bilateral blindness due to severe vision loss in at least one eye.

Future directions:

- In future studies, we will try to estimate the amount of over-diagnosis in the 1990s screening, i.e., cases detected by screening that would never be detected during their remaining lifetime.
- We will also investigate at what age glaucoma screening would be most effective at preventing blindness.