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Macular Pathology in Patients with Unilateral Amblyopia: An Observational Case Series

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ABSTRACT

Background: Amblyopia is a developmental disorder of visual function traditionally regarded as having no known direct relationship to retinal pathology. However, prior studies have suggested a potential protective association between amblyopia and the development of age-related macular degeneration (AMD), particularly the wet subtype (wAMD). This study evaluates whether unilateral amblyopia confers a protective effect against macular disease across a broader spectrum of retinal conditions.

Case presentation: This observational, non-randomized sequential case series included 70 patients (140 eyes) with unilateral amblyopia and a presenting macular pathology, assessed at a single UK NHS district general hospital over an average follow-up of 62 months using best corrected visual acuity (BCVA), clinical examination, and retinal optical coherence tomography (OCT). Patients were stratified according to whether the amblyopic or non-amblyopic eye presented with the macular disease, with those showing bilateral symmetrical pathology at presentation excluded from statistical analysis. Presenting diagnoses included wAMD, diabetic macular oedema, retinal vein occlusion-related oedema, and central serous retinopathy. In Group 1, 46 non-amblyopic eyes presented with macular disease and 10 amblyopic fellow eyes later developed pathology, while in Group 2, 21 amblyopic eyes initially presented with disease and 4 non-amblyopic fellow eyes were subsequently affected. Fisher's exact test and Chi-square analysis demonstrated no significant association between amblyopia status and either the presenting eye or the likelihood of developing macular pathology.

Conclusions: This case series found no evidence that amblyopia protects against macular pathology. Due to small and varied subgroups, larger disease-specific studies are needed to more reliably assess any potential protective effect.

Keywords: Pathology; Amblyopia; Case Series

INTRODUCTION

Amblyopia is a disorder of abnormal visual development occurring during childhood, resulting in reduced best-corrected visual acuity not attributable to structural ocular abnormalities.[1] While traditionally considered a cortical condition, recent literature has explored possible interactions between amblyopia and retinal diseases, including suggestions of a reduced risk of age-related macular degeneration (AMD) in amblyopic eyes.

Großpötzl et al[2] conducted a retrospective cross-sectional study in a total of 327,443 patients where it was concluded that the non-amblyopic eye had more presentations of the advanced form of age related macular degeneration (ARMD) suggesting a protective effect. Similarly, Storey et al[3] conducted a pilot studied which suggests that eyes with a history of amblyopia may manifest decreased severity of AMD compared with non-ambylopic eyes in the same patient.

The hypothesis suggests that decreased metabolic demand or altered retinal signalling in amblyopic eyes may exert a protective or trophic effect on the macula later in life. This was proposed to be the case by Ye et al[4] who reported that amblyopic eyes demonstrated reduced vascular density in parafoveal/peripapillary areas compared with non-amblyopic eyes, suggesting lower microvascular demand or under-development possibly linked to reduced metabolic signalling.

This study aims to evaluate whether patients with unilateral amblyopia display a lower incidence of macular pathology in their amblyopic eye compared with their non-amblyopic eye across a spectrum of macular conditions.

CASE PRESENTATION

This observational, notes-based review included 70 consecutive patients (37 females, 33 males; age range 48-97 years) attending a single NHS district general hospital eye clinic with a confirmed history of unilateral amblyopia and presentation with a macular pathology.

Clinical Evaluation

All patients underwent:

- Best-corrected visual acuity (BCVA)
- Slit-lamp biomicroscopy
- Fundus examination
- Optical coherence tomography (OCT)

Patients were then followed prospectively for a mean of 62 months to document whether similar macular pathology developed in the contralateral eye.

Patient Grouping

Patients were classified into:

- Group 1: 46 non-amblyopic eyes presenting with macular pathology.
- 10 amblyopic eyes developed similar pathology during follow-up (total eyes = 56).
- Group 2: 21 amblyopic eyes presenting with macular pathology.
- 4 non-amblyopic fellow eyes became affected during follow-up (total eyes = 25).
- Group 3: Three patients with bilateral symmetrical pathology at presentation (6 eyes).
- Excluded from statistical analysis.

Types of Macular Pathology

The presenting conditions were:

- Wet age-related macular degeneration (wAMD)
- Diabetic macular oedema
- Retinal vein occlusion-associated macular oedema
- Central serous retinopathy

Statistical Analysis

A 2×2 contingency table comparing Groups 1 and 2 was analyzed using:

- Fisher's exact test ($p = 1.000$)
- Chi-square test with and without Yates' correction ($p = 0.8382$)

No statistically significant association was found between amblyopia status and the likelihood of presenting with or developing macular disease.

DISCUSSION

This case series examined whether amblyopia confers a protective effect against macular pathology-a concept that has emerged from limited prior publications, particularly in relation to wAMD.[2,3] Physiological theories have suggested that reduced visual input and altered neurosensory activity in amblyopic eyes might decrease metabolic stress on the retina and retinal pigment epithelium. If true, this could theoretically translate into a reduced lifetime risk of degenerative macular disease. This could be thought about based on the study by Ye at al[4] where reduced vascular density in parafoveal/peripapillary microvasculature in the amblyopic eyes compared with fellow non-amblyopic eyes. However, this study was undertaken on children and no long term follow up was established.

However, the findings from our cohort do not support this hypothesis. The distribution of macular pathology between amblyopic and non-amblyopic eyes was statistically indistinguishable. Both eye types were susceptible to a wide range of macular pathologies, and the amblyopic eye did not demonstrate relative protection either at presentation or during long-term follow-up.

Limitations:

This case series has several limitations, including a modest sample size that became smaller once stratified by disease subtype, and the inclusion of multiple macular pathologies, which may obscure condition-specific patterns. Amblyopia severity was not graded, limiting assessment of whether degree of visual impairment due to amblyopia influences outcomes. Additionally, as an observational study, the findings are associative only, and causation cannot be inferred.

Larger multicentre studies with stratification by macular disease and amblyopia severity may clarify whether any protective mechanism exists.

CONCLUSIONS

This case series found no evidence that amblyopia reduces the risk of macular pathology, contradicting previously published hypotheses regarding potential protective or trophic effects. Given the small and heterogeneous subgroups, these results should be interpreted cautiously. Robust, condition-specific research in larger populations is required to better understand the relationship between amblyopia and future macular disease risk.

REFERENCES

1. Nentwich MM: Amblyopia-Basic principles and current diagnostic and therapeutic standards. Ophthalmologe . 2019;116(4):391-404.
2. Manuel Großpötzl , Lorenz Kloeckl, Andreas Guttmann, Michael Kruger, Jakob Gran, Lukas Hoeflechner, et al. Protective Effect of Amblyopia on Age-Related Macular Degeneration. Am J Ophthalmol. 2024, 259:1-6.
3. Philip P Storey, Hassan A Aziz, Ghazala A Datoo O'Keefe, Mark Borchert , Linda A Lam, Carmen A Puliafito, et al. Decreased severity of age-related macular degeneration in amblyopic eyes. Br J Ophthalmol. 2018;102(11):1575-1578.
4. Haiyun Ye, Siying Wang, Yidan Zhang, Wangyi Fang, Han Ye, Luya Chen, et al. Microvasculature evaluation of anisometropic amblyopia children by Angio-OCT. Sci Rep. 2023;13(1):2780.