

Invited Commentary

Is Binocular Interference a Distinct Clinical Entity?

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Clinicians who treat strabismus are cognizant of the tendency to close 1 eye that some patients display when performing complex or detailed visual tasks. Although the eye closure is frequently attributed



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to an attempt to alleviate binocular diplopia, it may occur even in the absence of double vision. A plausible explanation for this tendency in patients without diplopia is subnormal binocular summation or binocular inhibition.¹ Scarce information is available regarding eye closure in ophthalmic conditions other than strabismus.

In this issue of *JAMA Ophthalmology*, Hatt and colleagues² assessed monocular eye closure in patients with epiretinal membrane (ERM). They conducted a retrospective medical record review of patients with ERM who attended an adult strabismus clinic between 2010 and 2019. Based on the response to the Adult Strabismus-20 questionnaire item, "I cover or close one eye to see things better," they identified 124 patients who reported monocular eye closure and 11 control patients who reported no eye closure. Associations in those with eye closure were binocular interference in 36 patients, central-peripheral rivalry-type diplopia in 34 patients, strabismus in 38 patients, and other conditions in 16 patients. The control group with no eye closure and no diplopia demonstrated similar findings as the binocular interference group regarding worst-eye visual acuity, interocular difference in visual acuity, metamorphopsia, and aniseikonia. Despite these similarities, patients with binocular interference were more likely to have reduced quality of life compared with patients who did not close 1 eye. The authors concluded that binocular interference, manifesting as monocular eye closure, is a distinct entity affecting quality of life in patients with ERM.

To interpret the results of this study,² it is imperative to understand several concepts. Vision with both eyes is usually superior to that with a single eye. This improvement in performance is termed *binocular summation* and defined as the superiority of binocular over monocular performance on visual tasks.^{1,3} It is known that advanced age, interocular differences in visual acuity, and strabismus may impair binocular summation.¹ Conversely, *binocular inhibition* refers to a negative outcome of binocular viewing compared with monocular viewing with the better eye.¹ This may occur in patients with strabismus and ocular conditions that cause clinically significant interocular differences in visual acuity, as with patients with a monocular cataract.^{1,3} In a cohort of patients with monocular cataracts, Taylor and colleagues³ found binocular inhibition for visual acuity in 12 patients and inhibition for contrast sensitivity in 11 patients and suggested that binocular inhibition was the reason why some patients with a monocular cataract perform better with the worse eye occluded. Whereas visual acuity and contrast sensitivity have

been described in binocular summation and inhibition, the frequency of eye closure in patients with binocular inhibition has not been established.

In this study, Hatt and colleagues² define *binocular interference* as reduced binocular vision quality vs monocular vision quality, manifesting as the need to close 1 eye in the absence of diplopia or strabismus. The term *binocular vision interference* has been used by prior authors to describe how unequal inputs in an adult with a monocular, dense, acquired cataract caused worse binocular visual acuity and contrast sensitivity as compared with the better eye alone.⁴ Additionally, binocular interference has been studied by Waheed and Laidlaw⁵ in patients with unilateral full-thickness macular holes. By using a questionnaire to determine the historically dominant eye and whether the eye with the full-thickness macular hole interfered with the vision of the fellow eye during binocular viewing, they found that binocular interference was perceived by 72% of patients with a full-thickness macular hole in their dominant eye but in only 21% of those with a diseased nondominant eye. They suggested that the visual disability perceived by patients experiencing monocular disease may be strongly influenced by disease laterality and ocular dominance.

The study by Hatt and colleagues² has some limitations, many of which are recognized by the authors. The sample size is relatively small, particularly in the control group, which was composed of only 11 patients. Visual acuity or contrast sensitivity measures were not included, which if reduced binocularly, compared with monocular vision of the best eye, would suggest binocular inhibition. In addition, the authors did not report testing of fusion or stereopsis to assess binocularity, so it could not be determined if suppression of the eye with worse visual acuity affected the tendency for eye closure. Another factor that was not evaluated was ocular dominance, which may influence eye closure if the previously dominant eye becomes the eye with worse visual acuity.

In summary, Hatt and colleagues² provide interesting data regarding binocular interference and eye closure in patients with ERM. The authors propose that binocular interference is a distinct entity; however, characteristics that would differentiate this phenomenon from binocular inhibition remain unclear. It is possible that binocular interference or awareness of a poorly sighted eye interfering with vision of the better-sighted eye during binocular viewing, is a subjective, self-reported symptom that may manifest by patients closing the affected eye. Conversely, binocular inhibition is an objective clinical finding, frequently based on visual acuity and contrast-sensitivity testing under monocular and binocular conditions, of which binocular interference may be a symptom. Future studies including broader populations of patients with monocular or asymmetric ocular disease with attention to subjective monocular vs binocular vision quality and objective

measures, such as visual acuity and contrast sensitivity under monocular and binocular conditions, assessment of binocularity and ocular dominance, and systematic evaluation of

eye closure, may help determine whether binocular interference is the subjective expression of binocular inhibition or a distinct clinical entity.

ARTICLE INFORMATION

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