



Definition and clinical relevance of the concept of functional vision in cataract surgery

ESCRS Position Statement on Intermediate Vision

ESCRS Functional Vision Working Group

Innovations in ophthalmology should be driven by a persistent focus on delivering outcomes that truly matter to patients. However, the emergence of value-based healthcare is hindered by a lack of transparent and standardized outcome data. In addition, a lack of clarity on the definition of value has led to divergent approaches and slow progress in performance improvement. Inherently, visual outcomes are patient-reported, disease-specific, risk-adjusted, and multidimensional in order to reflect quality of life (QoL). Given these specificities, value of care is defined as health outcomes that matter to patients relative to the costs to achieve these outcomes.¹ Based on this value definition, there is a need to accelerate the development of outcome-based quality registries to enable medical teams to evaluate, improve, and incentivize their results. For such purpose, a combination of different fields of expertise in patient care must be promoted, leading to a standardization of the level of vision across all distances that allow the patient to perform his/her daily activities. In other words, a multidisciplinary approach is required for a standard definition of the concept of functional vision.

The concept of functional vision is crucial in ophthalmology, including areas such as cataract surgery. Due to the ageing population, the need for cataract surgery is increasing very steeply in line with demographic change and more adequate tools for measuring the outcomes considering the patient's perception should be introduced in clinical practice. In 2016, cataract surgery was conducted 4.5 million times across European Union member states, making it one of the most common surgical procedures.² Cataract surgery is generally considered to be a highly successful and cost-effective intervention, but the implantation of conventional monofocal intraocular lenses (IOLs) only allows a restoration of distance vision, with minimal postoperative functionality of near and intermediate vision, which are necessary for many common daily tasks.^{3,4} Although the removal of the opacified

crystalline lens has been demonstrated to have a very positive impact on the mental health, daily functioning, and QoL of patients, it is not surprising that the poor visual restoration achieved with conventional monofocal IOLs at different near and intermediate distances might limit patient functioning and consequently QoL, considering changing lifestyles and increased working years.^{5–13} Europeans 55 years and older spend at least 6 hours per day on leisure activities, including playing games and leisure computer use, relaxing/thinking, reading, watching television, socializing and communicating, participating in sports, exercise, and recreation, and other activities including travel.¹⁴ Similarly, in the U.S., the proportion of time spent on leisure and sports activities ranges from 23% of daily time (ie, 5.5 hours) for individuals 55 to 65 years to 32% (ie, 7.7 hours) for individuals 75 years and older.¹⁵ Besides leisure activities, several working distances are also needed for performing other common daily tasks, such as cooking, seeing the speedometer in a car, or walking on uneven ground.^{16,17} Therefore, the analysis of a patient's ability to use vision in activities of daily living is necessary, not only the quantitative measure of visual acuity. Indeed, cataract surgery success is typically described in terms of visual acuity improvement (20/20 vision), but the patient usually expresses his/her complaints in terms of ability loss ie, "I can't work at the computer anymore".

Clinical evidence suggests that visual acuity is poorly correlated with a patient's visual functioning. A prospective study conducted in Norway reported that cataract surgery reduced visual disability, but improvements in self-reported disability and general health were not associated with improvements in visual acuity after surgery.¹⁸ Similarly, a prospective UK-based study reported a poor correlation between visual function and visual acuity in patients after cataract surgery.¹⁹ New measurement tools for visual function are being developed, which are focused on different aspects of function, such as spatial contrast sensitivity, vision

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under low luminance, temporal sensitivity and motion perception, and visual processing speed. A recent paper suggested that the reduction of the binocularity field area (spatial limits of disparate fusional reflex) might be a good parameter for the analysis of cataract surgery results using monofocal, monovision and multifocal optical strategies.²⁰ More studies are still needed to establish the exact relationship between these new measures of the visual function and the ability to perform activities of daily living.

According to the concept of functional vision, the visual acuity threshold used as an indicator for cataract removal should be also reconsidered and adapted to the patient's limitations in terms of activities of daily living. In Europe, patients have been conventionally referred for cataract surgery if they have a visual acuity of 6/12 or worse in 1 or both eyes.²¹ However, this level of impairment is no longer considered an appropriate threshold for surgery because of the increased need of patients to maintain independence and the ability to perform daily activities such as driving. Indeed, the National Institute of Health and Care Excellence guidelines for the management of cataracts state that visual acuity is a crude measure that often fails to detect other vision problems that may justify surgery.²² Therefore, referral of a patient for cataract surgery should not be based on visual acuity alone and should consider the impact of the cataract on the patient's QoL and functioning.²² A meta-analysis of 27 studies found that patients who waited more than 6 months for surgery experienced more vision loss, reduced QoL, and an increased rate of falls compared with patients who waited fewer than 6 weeks.²³

Finally, concerning the assessment of the impact of cataract surgery on vision-related activities of daily living, several tools have been developed, one of them being the Catquest-9SF QoL questionnaire.^{24,25} It includes items that are described by most cataract patients to be problematic (eg, walking on uneven surfaces, seeing to engage in hobbies).²⁴ This tool has shown a robust psychometric performance.²⁶ Future research efforts should focus on including the relevance of new ADLs associated with social change. One example of this is the performance of a great variety of activities with electronic devices that have become routine in the last years.

In conclusion, the maintenance of the functional ability must be the main indicator for cataract surgery and the main objective of the intervention. For such purposes, conventional measures of visual function must be combined with the use of tools, such as the Catquest-9SF, to analyze the impact of the level of vision achieved on ADLs. Future research and efforts should be focused on achieving a better understanding of the relationship between visual function and the ability to perform ADLs in the context of a multi-disciplinary approach, defining a more accurate concept of functional vision and optimizing clinical procedures to promote patient satisfaction and QoL. This will allow the clinician to provide better recommendations and more optimized vision care. This development comes hand-in-hand with greater patient empowerment, as patients are more knowledgeable about their conditions through greater

access to information, and the increased level of activities from and influence of patient organizations and policy decision-makers toward understanding the value of functional vision in their national/regional populations.

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