

Cataract surgery and quality of life implications

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Abstract: Cataract surgery in the developed world has undergone a revolution over the last 20 years. An operation which used to require a stay in hospital and long visual rehabilitation is now a quick day-case procedure with immediate benefits. As with any surgery there is an associated morbidity, but there is now the potential to provide cataract surgery at an earlier stage of cataract maturation and save patients from a period of severe visual impairment. This article reviews the new techniques available to measure the impact that cataracts have not only on a patient's visual acuity but also their general physical health, function, cognition, and emotional well-being. New research is described that takes into account these more holistic tests and how they can be used to judge the best time to refer and operate on a patient with cataracts.

Keywords: eye disease, cataract, surgery, quality of life, visual impairment

Introduction

Lens opacities in the eye are inevitable in later life (McCarty et al 1999). A cataract is a symptomatic lens opacity that obstructs the passage of light and causes a reduction of vision (originally translated from Greek "downrush" or Latin "waterfall") (Pavan-Langston 1991). Fortunately cataract surgery has undergone a revolution over the last 20 years so that a previously feared in-patient stay is now a relatively pleasant day-case procedure. Visual rehabilitation is usually fast and the majority of patients are delighted with the result. However, as with any other invasive procedure, there is an associated morbidity and potential mortality in cataract surgery (Schein et al 2000).

There is good evidence to show that cataract surgery improves visual acuity (Desai et al 1999) and ophthalmologists are constantly striving for "20/20" vision from their patients. It is also just as important to assess the effect of this visual improvement on the patient's general health and day-to-day activity.

Recent studies suggest that poor vision has a far greater impact on patient's lives than was previously thought, comparable with major medical conditions such as stroke (Chia et al 2004). There have even been studies showing a correlation between cataract and increased mortality, although no causal link has been found (McCarty et al 2001). Decreased vision is also associated with subsequent physical disability, especially hip fractures in females (Salive et al 1994). Decreased visual function, regardless of cause, is associated with diminished quality of life and general functional living activities (Knudston et al 2005).

Cataracts are the main cause of decreased vision in the elderly of the developed world (Thylefors et al 1995) and cataract surgery is becoming ever more accessible. The purpose of this article is to examine the effect of cataract surgery from the perspective of the patient as a whole rather than just their visual acuity.

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How are patients selected for cataract surgery?

Visual acuity is the ability to resolve fine detail and is usually measured using letters of diminishing size such as a Snellen chart. However there is poor correlation between visual acuity and visual function when calculated using more holistic tests (Bernth-Petersen 1981). For example glare and decreased contrast sensitivity often affect cataract patients more than expected, especially in extremes of illumination (Rubin et al 1993). There are tests to measure this, but they are rarely used in practice because of practicality and time constraints (Beckman et al 1992; Williamson et al 1992).

Although visual acuity is used as an objective measure when considering cataract surgery, it is standard practice to select patients on their symptoms of visual function and quality of life rather than purely on their visual acuity. Patients have widely differing visual demands and it is vital to take these into account when considering surgery.

It is also important to assess general co-morbidity which may hinder the improvement of function following cataract surgery and this should be taken into account when the decision to operate is taken, especially as some factors, such as deafness, poor mobility, and decreased cognition can increase the risk of peri-operative complications (Wong 2001).

In the past the surgical technique for cataract extraction was associated with higher complication rates, longer rehabilitation time, and poorer visual outcome than modern phacoemulsification (Minassian et al 2001). It was therefore common to delay surgery well beyond the point where the patient was slightly symptomatic until the cataract was mature. By this time, due to visual impairment, the patient may have been struggling to function normally. It is now possible to use different criteria to list patients for cataract surgery earlier and therefore avoid interfering with their lifestyle and general function.

How is visual function assessed?

Various tools have been designed to test visual function. These have mainly been research driven to provide an objective measure of a subjective topic in studies of cataract surgery outcome. Other tools are used to indirectly test how visual function affects other aspects of patients' lives. Unfortunately they are rarely used in the setting of the eye clinic, perhaps because one single test does not cover all the questions that need to be answered or due to time constraints.

In general terms, the tests can be divided into the following headings with examples of each given below:

- Visual function
 - The Cataract Symptom Scale (CSS) (Crabtree et al 1999)
 - Visual Function-14 (VF-14) (Steinberg et al 1994)
 - Daily Tasks Dependent on Vision Questionnaire (Hart et al 2005)
 - National Eye Institute Visual Function Questionnaire (NEI VFQ) (Mangione et al 1998)
- Vision Core Module 1 (VCM1) (Frost et al 1998)
 - Visual Disability Assessment (Pesudovs and Coster 1998)
 - Visual Symptoms and Quality of Life Questionnaire (VSQ) (Donovan et al 2003)
 - Houston Vision Assessment Test (HVAT) (Prager et al 2000)
 - Cataract TyPE specification (Javitt et al 2003)
 - Quality of Vision Questionnaire (Aslam et al 2004)
- General function
 - Nottingham Extended Activities of Daily Living (NEADL) scale (Nouri and Lincoln 1987)
 - Activities of daily living scale (Mangione et al 1992)
- General physical health
 - General Health Questionnaire (GHQ) (Goldberg and Hillier 1979)
 - Sickness Impact Profile (Desai et al 1996)
 - Medical Outcomes Study Short Form Health Survey (SF-36) (Ware and Gandek 1998)
- Cognition
 - Mini Mental State Examination (MMSE) (Folstein et al 1975)
- Mood
 - Hospital Anxiety and Depression (HAD) scale (Zigmond and Snaith 1983)

Is visual function improved following cataract surgery?

Visual acuity

The UK National Cataract Survey clearly showed an improvement in quantitative visual acuity in over 18,000 patients. At final refraction, 92% of patients without ocular comorbidity and 77% of patients with ocular comorbidity achieved 6/12 or better visual acuity (Desai et al 1999).

Visual function

The overall benefits of cataract surgery on visual function have been recently demonstrated in the Sunderland Cataract Study (Gray et al 2006). This correlates well with previous

studies (Desai et al 1996; Abrahamsson et al 1996) suggesting that cataract surgery improves functioning in everyday life with respect to vision dependent activities.

General function

Visual impairment is strongly associated with falls in older adults. (Ivers et al 1998) which can have a massive impact on overall patient well-being, causing sudden deterioration in health, enforced hospital stay, decrease in confidence, and significant mortality. The areas of visual function pertinent to falls include visual acuity, contrast sensitivity, depth perception, and visual field, some of which can be affected by cataract surgery. This has been demonstrated in several large studies showing a decrease in the rate of falls in patient cohorts after cataract surgery (Harwood 2001; Brannan et al 2003). As most cataracts are bilateral, second eye surgery can be important in improving binocular vision and preventing falls (Foss et al 2006). Health and vision-related quality of life have been shown to improve even further following surgery to the second eye, presenting a good economic argument for second eye surgery (Desai et al 1996).

General physical health

It has been shown that improved visual function following cataract surgery is associated with better health-related quality of life (Mangione et al 1994).

Cognitive and emotional well-being

The Sunderland Cataract Study (Gray et al 2006) showed that cataract surgery causes significant improvement in visual function, cognitive, emotional, and general well being after both their first and second eye was operated on. There was also no decline in symptoms during an average 9 month wait for surgery.

Why does cataract surgery sometimes fail to improve visual function?

In the UK National Cataract Surgery Survey, one in three patients had pre-existing ocular conditions that could significantly affect the result of cataract surgery; the most important of these being age related macular degeneration (AMD) (15%), followed by glaucoma (10%), and then diabetic retinopathy (3%) (Desai et al 1999). The prevalence of all these conditions increases with age and this can severely interfere with the patient's perception of the success of their cataract surgery, despite careful counseling.

Conversely, if a patient has AMD, their best corrected Snellen visual acuity may not change following cataract surgery, but other measures of visual function may significantly improve, with no risk of worsening their AMD (Ambrecht et al 2000). The risk of cataract surgery must be balanced against the perceived subjective benefit by the patient and not just the potential objective increase in visual acuity.

What are the limitations to cataract surgery?

It is important that patient expectations following cataract surgery are not exaggerated as this may lead to eventual disappointment. Not all operations are successful and there is a small, but significant, risk of permanently reduced vision or even death following surgery. Patients should therefore be counseled appropriately and offered full support in the event of an unforeseen complication.

Increasing age appears to worsen the outcome of cataract surgery (Wong 2001). This may be due to co-existing ocular disease or possibly because their surgery is too late to significantly improve their visual ability and social function (Bruce and Gray 1991).

Can cataracts be prevented?

Age and trauma are definite risk factors for the development of cataract. Other factors which can be more readily influenced include previous intraocular inflammation, chronic systemic steroid use, diabetes, under-nutrition (possibly due to a lack of antioxidants), and perhaps UV radiation, high alcohol intake, and smoking (West and Valmadrid 1995).

Conclusion

Many ophthalmologists continue to use distance visual acuity as the primary indication for surgery, despite the many different tools available for measuring quality of life related to visual function (Frost and Sparrow 2000). These tests should be assimilated into pre-operative cataract assessment to shift the requirement for surgery to fit the patient's needs. This is an exciting area that needs further research.

Cataract surgery is an extremely effective and economical procedure which has far greater implications for the lives of the aging population than can be measured on a visual acuity chart. The continuing false assumption by many patients and physicians that a cataract should not be extracted until "ripe" is depriving many people of an enhanced quality of life.

References

- Abrahamsson M, Carlsson B, Tornqvist M, et al. 1996. Changes of visual function and visual ability in daily life following cataract surgery. *Acta Ophthalmol Scand*, 74:69–73.
- Ambrecht A, Findlay C, Aspinall PA, et al. 2000. Is cataract surgery justified in age related macular degeneration: A visual function of quality of life assessment. *Br J Ophthalmol*, 84:1343–8.
- Aslam TM, Gilmour D, Hopkinson S, et al. 2004. The development and assessment of a self-perceived quality of vision questionnaire to test pseudophakic patients. *Ophthalmic Epidemiol*, 11:241–53.
- Beckman C, Scott R, Garner L. 1992. Comparison of three methods of evaluating glare. *Acta Ophthalmol*, 70:53–9.
- Bernth-Petersen P. 1981. Visual functioning in cataract patients. Methods of measuring and results. *Acta Ophthalmol*, 59:198–205.
- Brannan S, Dewar C, Sen J, et al. 2003. A prospective study of the arte of falls before and after cataract surgery. *Br J Ophthalmol*, 87:560–2.
- Bruce DW, Gray CS. 1991. Beyond the cataract: visual and functional disability in elderly people. *Age Ageing*, 20:389–91.
- Chia E, Wang J, Rochtchina E, et al. 2004. Impact of bilateral visual impairment on health-related quality of life: the Blue Mountains Eye Study. *Invest Ophthalmol Vis Sci*, 45:71–6.
- Crabtree HL, Hildreth AJ, O'Connell JE, et al. 1999. measuring visual symptoms in British cataract patients: The Cataract Symptom Scale. *Br J Ophthalmol*, 83:519–23.
- Desai P, Reidy A, Minassian DC, et al. 1996. Gains from cataract surgery: visual function and quality of life. *Br J Ophthalmol*, 80:868–73.
- Desai P, Minassian DC, Reidy A. 1999. National cataract surgery survey 1997–8: a report of the results of the clinical outcomes. *Br J Ophthalmol*, 83:1336–40.
- Donovan JL, Brookes ST, Laidlaw DAH, et al. 2003. The development and validation of a questionnaire to assess visual symptoms/dysfunction and impact on quality of life in cataract patients: The Visual Symptoms and Quality of life (VSQ) questionnaire. *Ophthalmic Epidemiol*, 10:49–65.
- Folstein MF, Folstein SE, McHugh PR. 1975. “Mini-Mental State”. A practical method for grading the cognitive status of patients for the clinician. *J Psychiatr Res*, 12:189–98.
- Foss AJE, Harwood RH, Osborn F, et al. 2006. Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial. *Age Ageing*, 35:66–71.
- Frost NA, Sparrow JM, Durant JS, et al. 1998. Development of a questionnaire for measurement of vision-related quality of life. *Ophthalmic Epidemiol*, 5:185–210.
- Frost NA, Sparrow JM. 2000. Use of vision tests in clinical decision making about cataract surgery: results of a national survey. *Br J Ophthalmol*, 84:432–4.
- Goldberg DP, Hillier VF. 1979. A scaled version of the general health questionnaire. *Psychol Med*, 9:139–45.
- Gray CS, Karimova G, Hildreth AJ, et al. 2006. Recovery of visual and functional disability following cataract surgery in older people: Sunderland Cataract Study. *J Cataract Refract Surg*, 32:60–6.
- Hart PM, Stevenson MR, Montgomery AM, et al. 2005. Further validation of the Daily Living Tasks Dependent on Vision: identification of domains. *Br J Ophthalmol*, 89:1127–1130.
- Harwood RH. 2001. Visual problems and falls. *Age Ageing*, 30-S4:13–18.
- Ivers RQ, Cumming R, Mitchell P, et al. 1998. Visual impairment and falls in older adults: The Blue Mountains Eye Study. *J Am Geriatr Soc*, 46:58–64.
- Javitt JC, Jacobson G, Schiffman RM. 2003. Validity and reliability of the Cataract TyPE Spec: an instrument for measuring outcomes of cataract extraction. *Am J Ophthalmol*, 136:285–90.
- Knudston MD, Klein BEK, Klein R, et al. 2005. Age-related eye disease, quality of life and functional activity. *Arch Ophthalmol*, 123:807–14.
- Mangione CM, Phillips RS, Seddon JM, et al. 1992. Development of the “Activities of Daily Vision Scale”. A measure of visual functional status. *Med Care*, 30:1111–26.
- Mangione CM, Phillips RS, Lawrence MG, et al. 1994. Improved visual function and attenuation of declines in health-related quality of life after cataract extraction. *Arch Ophthalmol*, 112:1419–25.
- Mangione CM, Lee PP, Pitts J, et al; for the NEI-VFQ Field Test Investigators. 1998. Psychometric properties of the National Eye Institute Visual Function Questionnaire (NEI-VFQ). *Arch Ophthalmol*, 116:1496–504.
- McCarty CA, Keefe JE, Taylor HR. 1999. The need for cataract surgery: projections based on lens opacity, visual acuity, and personal concern. *Br J Ophthalmol*, 83:62–5.
- McCarty CA, Nanjan MB, Taylor HR. 2001. Vision impairment predicts 5 year mortality. *Br J Ophthalmol*, 85:322–6.
- Minassian DC, Rosen P, Dart JKG, et al. 2001. Extracapsular cataract extraction compared with small incision surgery by phacoemulsification: a randomised trial. *Br J Ophthalmol*, 85:822–9.
- Nouri FM, Lincoln NB. 1987. An extended activities of daily living index for stroke patients. *Clin Rehab*, 1:301–3.
- Pavan-Langston D. 1991. Manual of ocular diagnosis and therapeutics, 3rd ed. Boston: Little Brown and Co.
- Pesudovs K, Coster DJ. 1998. An instrument for assessment of subjective visual disability in cataract patients. *Br J Ophthalmol*, 82:617–24.
- Prager TC, Chuang AZ, Slater CH, et al. 2000. The Houston Vision Assessment Test (HVAT): An assessment of validity. *Ophthalmic Epidemiol*, 7:87–102.
- Rubin G, Adamson I, Stark W. 1993. Comparison of acuity, contrast sensitivity and disability glare before and after cataract surgery. *Arch Ophthalmol*, 111:56–61.
- Salive ME, Guralnik J, Glynn RJ, et al. 1994. Association of visual impairment with mobility and visual function. *J Am Geriatr Soc*, 42:287–92.
- Schein OD, Katz J, Bass EB. 2000. The value of routine preoperative medical testing before cataract surgery. *N Engl J Med*, 342:168–75.
- Steinberg EP, Tielsch JM, Schein OD, et al. 1994. The VF-14: An index of functional impairment in patients with cataract. *Arch Ophthalmol*, 112:630–8.
- Thylefors B, Negrel AD, Pararajasegaram R, et al. 1995. Global data on blindness. *Bull World Health Organ*, 73:115–21.
- Ware JE, Gandek B. 1998. Overview of the SF-36 Health Survey and the International Quality of Life Assessment (IQOLA) project. *J Clin Epidemiol*, 51:903–12.
- West SK, Valmadrid CT. 1995. Epidemiology of risk factors for age-related cataract. *Surv Ophthalmol*, 39:323–4.
- Williamson TH, Strong NP, Sparrow J, et al. 1992. Contrast sensitivity and glare in cataract using the Pelli-Robson chart. *Br J Ophthalmol*, 76:719–22.
- Wong TY. 2001. Effect of increasing age on cataract surgery outcomes in very elderly patients. *Br Med J*, 322:1104–6.
- Zigmond AS, Snaith RP. 1983. The hospital anxiety and depression scale. *Acta Psychiatr Scand*, 67:361–70.