Short-term mortality among middle-aged cataract surgery patients

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Abstract

Purpose To investigate the short-term mortality of middle-aged patients undergoing cataract surgery in the United Kingdom (UK), to compare this with the expected mortality for the UK population of similar age and to try to identify at-risk groups.

Methods In a retrospective study, the 5–10 year mortality of all middle-aged patients undergoing cataract surgery between 1989 and 1993 was determined. Expected mortality was calculated from UK Interim Life Tables for 1991. Cox's regression analysis was performed using age, sex and self-assigned ethnic group as variables.

Results From the 709 patients in the study group, there were 86 deaths. This is significantly greater than expected ($p < 0.01$). Ethnic minority status (hazard ratio = 1.72, confidence interval = 1.12–2.64) and male sex (HR = 1.68, CI = 1.08–2.63) were found to be significantly associated with early mortality ($p < 0.05$).

Conclusions This study suggests that, for some middle-aged patients, cataract is associated with a reduced life expectancy and may be a feature of premature ageing, reflecting systemic ill-health. Screening these and younger patients for systemic disease when they present with cataract provides the best opportunity to affect this increased mortality. The findings of this study are particularly relevant for patients from ethnic minority groups.

Key words Cataract, Ethnicity, Mortality

The mean age of patients undergoing cataract surgery in the United Kingdom (UK) is 76 years and for the majority of these patients, increasing age is the most important factor responsible for the development of cataract.^{1,2} Other modifiable risk factors, known to influence both the type and onset of cataract, include diabetes mellitus, body mass index, cigarette smoking and ethnic group.^{3–5} Given these systemic associations,

cataract may be a marker of overall systemic ill-health and patients with cataract may have a reduced life expectancy.

Studies to determine the life expectancy of cataract patients have concentrated on elderly patients and have provided conflicting results.^{6–9} If the life expectancy of cataract patients is reduced, this should be most apparent for younger patients in whom the prevalence of significant cataract is normally low.⁹ In Bradford, middle-aged (aged 40–64 years) patients currently account for 17% of all cataract surgery patients. In this study, we have demonstrated that the short-term mortality of these middle-aged cataract surgery patients is increased.

Subjects and methods

In a retrospective study, all middle-aged patients (aged 40–64 years) undergoing cataract surgery at Bradford Royal Infirmary between 1989 and 1993 were identified. For those patients having bilateral cataract surgery during the study period, only the first surgical procedure was used. The date of death and the interval after surgery were determined in January 1999 from computerised hospital records, death certification or case-note review. This represents a follow-up period of 5–10 years.

Expected mortality was calculated from UK Interim Life Tables for 1991, this being the centre of the study period, using the age and sex distribution of the patient group.¹⁰ Mortality data were expressed as standardised mortality ratio (SMR). This represents the observed number of deaths divided by the expected number. Statistical analysis included chi-squared test and Cox's proportional hazard regression model, using age, sex and self-assigned ethnic group as variables. Rather than excluding the small number of Afro-Caribbean and Chinese patients in the study, these patients were included with those from the Indian sub-continent into a single, ethnic minority group for the purpose of analysis.

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Table 1. Observed and expected numbers of deaths and the standardised mortality ratio (SMR) according to age, sex and major ethnic group

	Age group (years)					
	40–44	45–49	50–54	55–59	60–64	Total
<i>Ethnic minority men</i>						
No. of patients	4	9	18	33	62	126
Observed deaths	1	0	3	9	13	26
Expected deaths						14
SMR						1.86
<i>p</i> value						< 0.001
<i>Ethnic minority women</i>						
No. of patients	3	6	18	38	51	116
Observed deaths	0	0	2	6	6	14
Expected deaths						8
SMR						1.75
<i>p</i> value						< 0.05
<i>Caucasian men</i>						
No. of patients	14	25	22	54	127	242
Observed deaths	0	1	2	9	18	30
Expected deaths						26
SMR						1.15
<i>p</i> value						< 0.41
<i>Caucasian women</i>						
No. of patients	8	17	41	48	111	225
Observed deaths	1	0	2	1	12	16
Expected deaths						16
SMR						1
<i>p</i> value						1

Results

Cataract surgery was performed on 709 patients aged 40–64 years during the study period, of whom 368 were male. The average age of the patients was 57 years (SD 6 years). There were 242 patients from ethnic minority groups, of whom 233 were from the Indian sub-continent, 7 were Afro-Caribbean and 2 were Chinese.

In the observation period, there were 86 deaths, occurring in 46 Caucasian, 38 Indian sub-continent, 1 Afro-Caribbean and 1 Chinese patients. Death occurred a mean of 50 months after surgery (range 5–98 months). The distribution of observed and expected deaths and the SMR according to age, sex and major ethnic group are shown in Table 1. For the entire patient group, the number of observed deaths is greater than the 64 deaths expected from Life Tables analysis ($p < 0.01$). This is largely the result of a significantly greater number of deaths among both men (SMR = 1.86, $p < 0.001$) and women (SMR = 1.75 $p < 0.05$) from ethnic minority groups. The observed mortality among Caucasian patients of either sex was no greater than expected.

Cox’s regression analysis was performed using age at surgery, sex and major ethnic group as variables. Ethnic minority status (hazard ratio = 1.72, confidence interval = 1.12–2.64), male sex (HR = 1.68, CI = 1.08–2.63) and age at surgery (HR = 1.05, CI = 1.00–1.09) were all found to be significantly associated with early mortality ($p < 0.05$).

Discussion

In this retrospective follow-up of middle-aged cataract surgery patients, we have shown that the short-term mortality after surgery is greater than expected. This is

particularly relevant for patients from ethnic minority groups, for whom the SMR was 1.86 for males and 1.75 for females.

This study has several strengths including the large numbers of patients and the long-period of follow-up. The hospital represents the major centre for cataract surgery available to patients in and around Bradford and the number of patients travelling to other centres outside the city is likely to be small.¹¹ The date of death was obtained from computerised hospital records and represents only those deaths made known to the hospital. The figure for the observed number of deaths therefore represents the minimum possible number of deaths, as those deaths occurring outside the area may not be made known to the hospital. The study also has several potential weaknesses. The population for whom cataract surgery is provided by the hospital is city-based and has a high immigrant population. It is therefore not fully representative of the entire UK population, which was used as a control group for mortality comparison. Furthermore, this control group is not necessarily without cataract. We were unable to obtain reliable UK mortality figures either for such a control group or according to major ethnic group. As the study was retrospective, we were also unable to record either the presence of systemic disease at the time of surgery or the cause of the death for all the patients. The limited data available have been presented and the likely reasons for the increased mortality can only be inferred. As there were no deaths within 4 months of the surgery, it is unlikely that any deaths were the direct result of surgical complications.

Previous studies have assessed the mortality among cataract patients, although the groups are not identical and these studies have included both middle-aged and elderly cataract patients. In the Framingham Eye Study, 16% of subjects with lens changes aged between 52 and 85 years died after follow-up of 5–8 years and, in another study, 25% of similar aged patients undergoing cataract surgery died within 5 years of surgery.^{6,12} However, it is not clear whether the life expectancy of these elderly cataract patients is reduced in comparison with control groups as the results are conflicting.^{6–8,12} If cataract is a marker of systemic ill-health and a possible marker of premature ageing, this should be manifest in younger patients in particular. The results of this and other studies demonstrating that the short-term mortality of middle-aged patients undergoing cataract surgery is increased, would tend to support this hypothesis.^{8,12}

In this retrospective study, we have not been able to determine the causes of the increased mortality but age, male sex and ethnic minority status were all associated with early death. To some extent, the association with sex and especially age is not surprising as these represent well-known demographic facts. Ethnic minority status was found to be the most important risk factor and, to our knowledge, this association is new. Bradford has previously had a large influx of economic migrants, especially from Pakistan and with smaller numbers from India, Bangladesh, East Africa and the Caribbean. Patients from these ethnic minority groups comprised 15% of the Bradford population in 1991 and 9% of the middle-aged population at the same time.¹⁴ This is considerably greater than for the UK cataract population.¹ In Bradford, patients from ethnic minority groups currently account for 17% of all cataract surgery patients but 44% of middle-aged cataract surgery patients. They are therefore over-represented in this study by a factor of almost 5. This over-representation has been documented before.^{11,15} Diabetes is associated with premature nuclear cataract and is almost 4 times more common in the middle-aged cataract population.¹⁶ It is also estimated to be 5 times more common in middle-aged Asians in Britain than in people of European origin.¹⁵ Furthermore, cardiovascular disease is the commonest cause of death in both middle-aged cataract surgery and diabetic patients.^{13,17} It seems likely, therefore, that diabetes is one of most important factors involved in both the increased prevalence of cataract and the increased mortality in these middle-aged patients from ethnic minority groups. However, the other features of syndrome X, body mass index and smoking history may also be involved.¹⁸ While it is possible that the increased mortality is entirely a consequence of racial and socio-economic factors, previous studies and the 5-fold excess of cataract in the middle-aged patients from ethnic minority groups make an association more likely.^{6,19}

In this limited retrospective study we were unable to confirm the association of diabetes or other systemic disease with premature death in middle-aged cataract surgery patients. Furthermore, we were unable to

determine whether the onset of cataract pre-dated the identification of any systemic association. A proposal for a prospective study to clarify this question is currently under evaluation. However, it would seem appropriate to investigate middle-aged cataract patients at presentation for the presence of any systemic disease, especially in the absence of a strong family history to suggest a genetic trait. Although it is not certain that treating an associated disease will reduce mortality, early intervention provides the best opportunity to do so and may be of benefit in terms of overall visual disability.^{17,20}

In summary, we have shown that for some middle-aged patients with cataract, life-expectancy is reduced. This is particularly relevant for patients from ethnic minority groups. This supports the idea that cataract is associated with systemic ill-health and premature ageing. Patients presenting with cataract at an age significantly below the national average should be screened for systemic disease and other risk factors.

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