Original Article

Do the existing systemic diseases overstate anaesthetic intervention during cataract surgery under local anaesthesia? An observational study to correlate the association

ABSTRACT

Context: The objective was to study the extent of anaesthetic intervention and its association with systemic comorbidities. The secondary objectives were to estimate the prevalence of systemic comorbidities in age-related cataracts.

Aims: To determine the prevalence of systemic comorbidities in cataract surgery patients and association with anaesthesiologists' intervention.

Settings and Design: Prospective observational study.

Methods and Materials: The study was done inatertiary care hospital over a period of 3 months. Adult and consenting patients were included and those having sensitivity or toxic reaction to local anaesthetics, uncooperative, and paediatric patients were excluded.

Statistical Analysis: The sample size (717) was calculated according to the formula for the finite population.The total number of patients suffering from comorbidities, adverse events during surgery, and events attended by an anesthesiologist with percentages were calculated.

Results: Of the 717 patients studied, comorbidities were associated with 385 (53.69%) patients; among which hypertension was most frequent and found in 174 (20.30%). As much as 113 (15.72%) patients had adverse events during surgery and required intervention by the attending anaesthesiologist in which 26 (15.72%) patients required drug administration for stabilization of condition of the patient.

Conclusions: From this study, we conclude that there is a correlation between prevalent comorbidities and active intervention by the attending anaesthesiologist in patients undergoing cataract surgery.

Key words: Anaesthetic intervention; cataract; systemic comorbidities

Introduction

In our country50–80% of bilateral blindness is caused by cataract.[1] There has been a 25% of drop in the prevalence of blindness in India as suggested by the World Health Organization's recent data,[2] and this can be credited to improved health facilities.

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With the advancement in surgical techniques like phacoemulsification; requirements of anaesthesia have also changed. Under monitored anaesthesia care topical anaesthesia (TA) has become the technique of choice for most of the phacoemulsification procedures performed on the day-care basis. The incidence of intraoperative systemic complications during cataract surgery under TA tends to be lower (2.9–25.7%). TA provides rapid postoperative recovery and adequate analgesia.[3]

Nevertheless, cardiovascular instability and psychomotor agitation have been reported with TA,[4–6] which requires anaesthesiologist's intervention. However, peribulbar anaestheisa (PA) remains a method of choice in patients who are not able to keep the operating eye in the primary position or with incoercible blinking and photophobia.

The majority of patients undergoing cataract surgery are elderly[7,8] and there has been an increasing prevalence of non-communicable diseases (NCD) like diabetes mellitus, hypertension, and heart diseases.[9-11]

This study was conducted to evaluate the association between prevalent systemic comorbidities and the extent of anaesthetic interventions during cataract surgery performed under either PA or TA.

Subjects and Methods

Local ethical committee approval was taken. As the present study was a hospital-based study, the sample size was calculated using a formula for the finite population. The formula for calculating sample size, (DEFF×Np (1-p))/(d^2/(z(1-∝/2)^2)×(N-1)+p×(1-p)) ; where $Np = 50\%$, DEFF = 01, $d = 5\%$.

Also, we assumed the proportion of comorbidities among cataract patients as 50% ($P = 50\%$) substituting $P = 50\%$ and with 95% confidence interval sample size came around 384. As the data were collected from consecutive patients which were operated in 3 months in our tertiary care center, we ended up collecting data from 717 patients. The preoperative assessment was done on all the patients within 2 weeks before surgery in preanesthesia OPD. History was noted, systemic comorbidities like type of diabetes, status of blood pressure in hypertensive patients, type of heart disease in patients with cardiac illness (IHD, Valvular disease, arrhythmia, Cardiac failure) and types of neurologic (previous diagnosis of chronic cerebral ischemia, Parkinson's disease, Epilepsy, Dementia), psychiatric (previous diagnosis of Major Mood Disorder, Psychosis, Neurosis), and respiratory illnesses (Chronic obstructive airway disease, Asthma, Active Tuberculosis or past history if any) were noted. After a thorough assessment, routine preoperative full blood count, coagulation profile, liver function, and renal function tests were performed in all the patients. Electrocardiography and echocardiography were performed if required on a clinical basis. Depending on the comorbidity found, the patient would be referred to the respective department for preoperative optimization. Routine anti-platelets and anticoagulant regimen during the peri-operative period was not interrupted to reduce the risk associated with respective comorbidities. Patients were admitted 1 day prior to surgery so that any optimization needed could be furnished. Patients were advised to take with routine medication preoperatively on the day of surgery. On the basis of preoperative anesthesia assessment ASA physical status score was determined.

In the preoperative holding area, intravenous access was established by the anesthesiologist. Tropicamide 0.5% and phenylephrine 10% were applied to the operative eye.

Povidone-iodine (10%) on periorbital skin was used for primary disinfection. Anesthesia i.e. either topical or peribulbar block was administered in the preparatory area. PA or TA was administered according to our hospital protocol.

Cataract surgery was performed by two seniors most ophthalmologists divided into two sessions, morning (8 am to 12 pm) and afternoon session (12 pm to 4 pm).

SpO_2 and pulse rate were monitored intraoperatively (monitored anesthesia care) by the anesthesiologist. Adverse events were attended immediately by the anesthesiologist like systolic blood pressure >200 mmHg or diastolic blood pressure >120 mmHg, systolic blood pressure <90 mmHg, heart rate >120 or <50 beats per minute, psychomotor agitation, coughing which could hamper surgery and giddiness or vomiting. At the end of the surgery, ciprofloxacin 0.3% and povidone-iodine 5% were applied to the operated eye.

Any intervention provided by attending anesthesiologistsin the form of involvement during the stabilization of patient and administered treatment was documented.

Patients were monitored in the recovery room for 2–3 hours and any medical events, as described before were handled by the attending anesthesiologist. Patients were discharged after the uneventful stay in the recovery room, intravenous access was taken out with postoperative advice to follow-up on the second day.

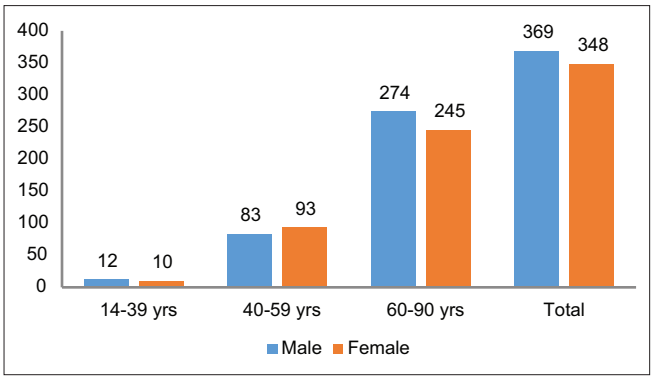

Figure 1: Shows the age-wise distribution of patients in both genders in the present study

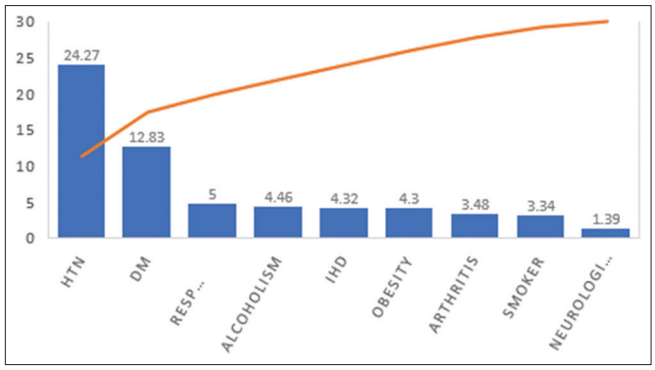

Figure 2: Systemic Comorbidities in Cataract Patients- 24.27% study patients had Hypertension (HT), 12.83% had Diabetes Mellitus (DM), 5% had respiratory conditions, 4.46% had alcoholism, 4.32% had Ischemic Heart Disease (IHD), 4.3% had obesity, 3.48% had arthritis, 3.34% were smokers and 1.39% had neurological conditions

Results

Of the 717 cataract patients, males were slightly more 372 (51.88%) than females 345 (48.11%) [Figure 1].

The age of the patients varied from 14 years to 80 years. The majority of the patients were between 60 years to 80 years i.e., 484 (67.50%) [Figure 1].

Phacoemulsification procedure was done in 511 patients (71.22%) and small incision cataract surgery was performed in 206 patients (28.73%).

Major systemic comorbidities were associated with 385 (53.69%) patients.

Multiple co-existing systemic diseases were present in 150 out of 717 cataract patients (20.92%) and 182 (25.38%) patients had associated conditions like smoking, alcoholism or skin diseases also, along with systemic disorders.

Of the 717 cases, the most frequent illnesses were hypertension in 174 (24.27%) patients, diabetes mellitus in 92 (12.83%), pulmonary diseases in 32 (4.45%), ischaemic heart diseases in 31 (4.32%), obesity in 31 (4.30), arthritis in 26 (3.62%), and addictions like alcoholism were found in 32 (4.46%), smoking in 24 (3.34%), and skin diseases 12 (1.66%) [Table 1].

As much as 113 (15.72%) patients had shown adverse events during cataract surgeries and required active intervention by the attending anesthesiologist in which hypertension (2.79%) and agitation (2.64%) were most frequently encountered followed by coughing (2.51) [Table 2].

Out of 113 patients, 26 (15.72%) patients required drug administration by the anesthesiologist for stabilization of the condition of the patient [Table 3].

Table 1: Number and percentage of patients having various conditions. Out of total 717cataract patients included 385 (53.69%) had major systemic diseases like Hypertension (HT), Ischaemic Heart Disease (IHD) and Diabetes Mellitus (DM) etc., 150 (20.92%) had more than one systemic conditions associated and 182 (25.38%) had other associated conditions like smoking, skin diseases &/or alcoholism

Systemic disease	Total	Percentage
Hypertension (HTN)	174	24.27
Ischaemic Heart Disease (IHD)	31	4.32
Diabetes mellitus (DM)	92	12.83
Respiratory conditions	57	7.94
Seizure Disorder	1	0.13
Arthritis	26	3.62
Thyroid disorder	6	0.83
Stroke	4	0.55
Dementia	3	0.41
Kidney disease	4	0.55
Obese	31	4.3
Skin diseases	12	1.66
Alcoholic	32	4.46
Smoker	24	3.34
Others	25	3.42

Table 4 shows the details of actual adverse events noted on the table in patients with various comorbidities observed in the study population [Table 4 and Figure 2].

Discussion

Simplification in the techniques of cataract surgery has made possible these to be performed under either topical or PA. Owing to, there have been increasing trends of ophthalmic surgeons administrating local anaesthesia themselves without the need for the presence of an anaesthetist.[12] But, patient factors must not be overlooked for successful surgical outcomes. In addition, both PA

and TA are not fail-proof techniques and various complications are associated with them. In our study population 552 cases (76.90%) were done under PA and 165 (23.10%) under TA.

A study done by Jagat Ram *et al.* demonstrated an increased risk of perioperative complications and mortality in patients with coexisting NCD.[13] In their study, out of 6103 patients, 82% of patients were elderly (over the age of 50 yrs) with 17% of the prevalence of the systemic disease. Pulmonary disease was the most frequent systemic disease (4.3% of patients) and 92% of pulmonary disease was caused by chronic bronchitis and/or bronchial asthma. Whereas in our study, there were 53.69% of patients who had associated comorbidity. In total 89.53% of patients were above the age of 50 yrs with 49.51% of the prevalence of the systemic disease. Hypertension was the most common problem in our study (24.27% of patients).We found the prevalence of pulmonary disease was less (7.94%) and the main causes (89.47%) were pulmonary tuberculosis and bronchial asthma. Arthur *et al.* reported 32.81% of patients had systemic comorbidity and diabetes mellitus was the most common co-morbidity (13.62%) followed by hypertension (9.38%).[14] Prevalence of hypertension reported by Jagat Ram *et al.* was 4.1%. Another study by Neima and Ramsayreported 4.7%.[15] In our study, the prevalence of hypertension was very high, i.e. 24.27%. We found that 12.83% of patients had diabetes mellitus.Prevalence of diabetes mellitus was 3.8% reported by Jagat Ram *et al.*, 3.5% by Neima and Ramsay, 3.8% by Kashyap *et al*.[16] and 10% by Caird *et al*.[17] The reason for the higher prevalence of non-communicable diseases in our study could be explained by the fact that our hospital is tertiary care center and many high-risk patients are referred here.

Table 2: Name, number and percentage of adverse events requiring intervention by attending Anesthesiologist. Total 113 (15.72%) patients out of those with systemic comorbidities suffered either of events during surgery

Adverse events	Number	%
Agitation	19	2.64
Tachycardia	11	1.53
Bradycardia	11	1.53
Arrhythmia	8	1.11
Hypertension	20	2.79
Hypotension	10	1.39
Vomiting	4	0.56
Bradypnoea	0	0
Cough	18	2.51
Perioral numbness	3	0.41
Giddiness	9	1.25
Total	113	15.72

Table 3: Adverse events requiring drug administration by Anesthesiologist during surgery. Out of 113 patients (refer Table 2 above) who suffered from adverse events during surgery, 26 (23.01%) events abated only after administration of some indicated medication

Events requiring medication	Number	%	Required drug administration
Tachycardia	3	0.42	Mild anxiolysis in form of IV midazolam in one patient IV Esmolol in two patient
Bradycardia	6	0.84	IV Atropine titrated doses in all patients
Hypertension	8	1.11	IV Esmolol titrated doses in three patients IV Nifedipine in three patients Mild anxiolysis in form of IV midazolam in two patients
Hypotension	4	0.56	IV Fluid boluses in all patients
Vomiting	3	0.42	IV Ondensetrone in all patients
Giddiness	2	0.28	IV Fluid boluses in all patients
Total	26	23.01	

Table 4: Adverse events noted; the number shows number of patients with that comorbidity who suffered the event during surgery. For example, 1 diabetic patient had agitation, 7 diabetics had tachycardia, 7 had bradycardia, 5 diabetics had arrhythmias, 2 had HT, 4 had hypotension and 5 diabetics suffered giddiness whereas 1 vomited on table

Adverse E	DM	HTN	Resp	IHD	Smoker	Alcoholism	Psychiatry	Thyroid
Agitation	1	2	1	1	3	4	3	1
Tachycardia	7	4	-	5	1	-	-	1
Bradycardia	7	8	1	4	-	-	-	-
Arrhythmia	5	4	-	5	-	-	-	-
HTN	2	16	2	1	2	-	-	1
Hypotension	4	9	1	1	-	-	-	-
Cough	-	2	11	-	8	3	-	-
Giddiness	5	4	-	1	-	-	-	-
Perioral N	-	-	-	-	-	-	-	-
Vomiting	1	1	1	-	-	-	-	-
No. of events	32	50	17	18	14	7	3	3

Our hospital protocol includes thorough pre-operative work-up, intraoperative and postoperative monitoring by anaesthesia personnel during cataract surgery. Patient selection plays an important role to avoid episodes of lack of cooperation and overall vital instability during the procedure.

We found that hypertensive patients had the maximum number of adverse events during the procedure followed by diabetic patients [Table 4]. Intraoperative hypertension was most frequently encountered adverse event which required drug intervention (8 patients) for which IV Esmolol in titrated doses was given in 3 patients, IV Nifedipine was given in three patients and IV midazolam for mild anxiolysis was given two patients [Table 3].

A similar study was done byJost B. Jonas[4] the anesthesiologist hadintervened intraoperatively in 2.9% ofsurgeries. Blood pressure lowering drugs were administered intravenously in 28 patients (2.8%) out of which 12 patients received urapidil, 10 patients received clonidine and, nifedipine was administered to 6 patients. The mean intraoperative systolic arterial blood pressure was 156.5 ± 18.8 mm Hg (range 95–210 mm Hg), and the mean diastolic blood pressure was 81.2 ± 9.9 mm Hg (range 45–120 mm Hg) in their study. They did not find any new electrocardiography changes intraoperatively.

One more study which assessed the proportion of anesthesiologist-monitored cataract surgeries that required perioperative intervention by anesthesiologists was by Rosenfeld *et al*.[18] and found that intervention was required in 37% of cataract cases performed using peribulbar injection anesthesia while in our study 15.76% of cataract patients required active intervention by attending anaesthesiologist.

The percent of adverse medical events was 1.95% and 1.23% (1584 patients) intraoperatively and postoperatively, respectively in a study done by Katz *et al*.[19] which needed anaesthesiologist's intervention. Our observation also suggested a relatively lower percentage of interventions that needed pharmacological treatment for the stabilization of patients during cataract surgery procedure (3.62%).

In our study, we noteda very high prevalence of NCD in-patients undergoing cataract surgery. Adverse events and anaesthesiologist's intervention that was required (15.76%) wereseen in cases that were having associated with systemic co-morbidity. Although pharmacological treatment administered was less, i.e. 3.62% but it was important for the overall safer outcome.

Conclusion

The majority of patients who come for cataract surgery are elderly and suffer from systemic comorbidity. From our study, we conclude that intraoperative adverse events are associated with the presence of systemic comorbidity andprompt management of any adverse events greatly delays the development and progress of complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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