INPLASY

Optimal Timing for Intraocular Pressure Measurement Following Phacoemulsification Cataract Surgery: A Systematic Review and a Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 2 September 2024 and was last updated on 2 September 2024.

INTRODUCTION

Review question / Objective What is the optimal period following routine phacoemulsification cataract surgery to measure intraocular pressure (IOP) in adult cataracts patients?
The objective of this literature and meta-analysis was to review and synthesize the available evidence to determine if there is an optimal period following phacoemulsification cataract surgery to measure IOP.

Rationale Post-operative increases in intraocular pressure (IOP) are a frequent complication following phacoemulsification cataract surgery. Assessment of IOP is an essential element in post-operative checks. Despite this, guidance regarding the optimal timing remains vague.

Condition being studied A cataract is a cloudy area in the lens of the eye that leads to a decrease in vision. It is a normal physiological change associated with aging and the leading cause of reversible visual impairment worldwide.

METHODS

Search strategy A literature search was conducted in the following two databases: MEDLINE and EMBASE. The search had no limitations placed on publication date and therefore included all studies published before February 7th, 2023. Sets of keywords relating to Intraocular Pressure, after (i.e. post, following), and Cataract Surgery (i.e. cataract surgery, cataract surgeries) were used with restrictions placed on adult human subjects, English-published literature, and randomized clinical trials. All articles were then imported into Covidence (Veritas Health Innovation, n.d.), which is a web-based systematic review screening tool that was used to remove duplicates and create two levels of screening: title and abstract screening, and full text screening.

Participant or population The population of interest consisted of human adults (older than 18 years old) who following routine cataract surgery had their intraocular pressure measured.

Intervention The intervention that is being evaluated is phacoemulsification cataract surgery which is the primary method for cataract removal in developed countries. It consists of using ultrasound energy to break apart the cataract so that it may be extracted.

Comparator Not applicable.

Study designs to be included Randomized Control Studies.

Eligibility criteria Inclusion Criteria:
1.) Report a measurement of IOP through tonometry and after completion of phacoemulsification cataract surgery
2.) At least one IOP measurement had to have taken place at three different timepoints: at baseline before cataract surgery, within the first 48 hours following cataract surgery, and after these first 48 hours
3.) Participants that in addition to cataract also had glaucoma and pseudoexfoliation syndrome (PXF) were include
4.) Only randomized clinical trials published in English were considered for this review

Exclusion Criteria:
1.) If the cataract surgery was combined with another ophthalmologic surgery
2.) Participants younger than 18 years old
3.) Participants with an ophthalmologic condition other than cataract or glaucoma
4.) Non-human participants
5.) Did not report IOP in figure form that could not be accurately determined were also excluded

No limits were placed to study location, publication date, or sex.

Information sources The only information sources used were the electronic databases of MEDLINE and EMBASE.

Main outcome(s) The main outcomes of interest were the mean and standard deviation (SD) of pre- and post-operative IOP. For change in IOP, standardized mean difference (SMD) was calculated as the mean difference in IOP from baseline.

Data management Records of article screening and final included articles was kept within Covidence. Following this data entry was extracted manually from studies into an Excel sheet.

Quality assessment / Risk of bias analysis The quality of each study was assessed using the CLARITY risk of bias instrument for randomized controlled trials.13 This assessment tool measures the risk of bias based on five factors: 1) adequacy of allocation sequence generation, 2) adequacy of allocation concealment, 3) study blinding which is further subdivided into 3a. patient blinding, 3b. healthcare provider blinding, 3c. data collectors blinding, 3d. outcome assessors blinding, 3e. data analysts blinding, 4) frequency of missing outcome data lost during follow-up, 5) degree of selective outcome reporting, and 6) Other potential problems that could put the study as risk of bias. For missing data, various pieces of available information (such as the range, p-value, and confidence interval) were utilized and converted to the common effect measure.

Strategy of data synthesis After all articles had been imported into Covidence, two reviewers independently screened titles and abstracts for articles that measured IOP following uncomplicated cataract surgery. Articles that were accepted past the first level of screening then proceeded through a second level of screening where three reviewers independently screened full texts for publications that accurately measured IOP following uncomplicated phacoemulsification cataract surgery. Conflicts at both levels of screening were resolved through discussion to find a consensus between the reviewers. In cases where consensus was not achieved, a third reviewer was brought in to provide a decision. After each screening level, chance-corrected kappa statistic was used to assess interobserver agreement for the inclusion of studies.

Subgroup analysis A brief subgroup analysis was performed for patients that in addition to cataract either had glaucoma or pseudo exfoliation syndrome. Through this we explored these subgroups unique IOP trends. However, no statistical subgroup analysis was performed.

Sensitivity analysis To test heterogeneity, statistics, Z-value, and $\chi 2$ statistics were computed. A value of less than 50% implies low heterogeneity, and in these cases, a fixed-effect model was com-puted. Statistics of 50% or more represented high heterogeneity, and in these cases a random-effect model was calculated. Additionally, a high Z-value, a low p-value (< 0.01) and a large value implies significant heterogeneity and, therefore, a random-effect model using

DerSimonian and Laird methods was computed. The study adopted a significance level of 0.05. Forest plots were also generated for each case. Funnel plots were generated to check publication bias. Causes of heterogeneity were also explored.

Language restriction Only articles published in the English language will be included.

Country(ies) involved This study is being carried out in Canada.

Keywords Cataract; Intraocular pressure; Phacoemulsification; Cataract surgery; Cataract Extraction; Post-operation; Timing.

Dissemination plans Findings will be shared with the academic and medical community through conference presentations and academic publications.

Contributions of each author

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