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ORIGINAL RESEARCH

Poor Correlation of Provider and Patient Satisfaction with Anesthesia in Ophthalmic Surgeries: A Secondary Analysis of a Clinical Trial

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Purpose: This secondary analysis of a clinical trial that measured surgeon, anesthesiologist, and patient satisfaction following ophthalmic surgery under monitored anesthesia care (MAC) with a benzodiazepine investigates the degree of association between patient satisfaction with anesthesia compared to surgeon and anesthesiologist satisfaction with anesthesia.

Patients and Methods: Data from analogous 6-point surgeon satisfaction surveys and anesthesiologist satisfaction surveys were compared to data from a 6-point validated patient satisfaction survey collected from a clinical trial investigating satisfaction with different forms of benzodiazepine for patients undergoing cataract, retina, cornea, or glaucoma surgery. Relationships between measures were analyzed using Pearson's correlation coefficient, with further subgroup analysis based on language groups and single-question measures of satisfaction.

Results: A total of 283 ophthalmic surgical cases were analyzed. Mean surgeon satisfaction was 5.27 (range, 1.33–6.00), mean anesthesiologist satisfaction was 5.12 (range, 1.17–6.00), and mean patient satisfaction was 5.28 (range, 2.58–6.00). The correlation between surgeon and patient satisfaction was 0.333 (p = 9.06e-9), while the correlation between anesthesiologist and patient satisfaction was 0.319 (p = 4.28e-8). There was no difference between English and non-English speaking patients in correlation between surgeon and patient satisfaction (p = 0.08) and anesthesiologist and patient satisfaction (p = 0.47).

Conclusion: The data demonstrate a low level of association between patient satisfaction with anesthesia and provider satisfaction, even when patient language is taken into consideration. This suggests that providers are poor predictors of patient satisfaction with anesthesia and are unreliable judges of patient comfort perioperatively.

Keywords: conscious sedation, quality measures, monitored anesthesia care, ocular procedures

Introduction

Conscious sedation with local anesthesia is a commonly used anesthetic technique in many ocular procedures, including cataract, retinal, corneal, and glaucoma surgeries.[1] Currently, the amount of anesthesia administered is determined in part by qualitative metrics such as movement, pain, and expressed degree of anxiety.[2,3] Prior studies have cited high satisfaction rates with anesthesia for surgical procedures in general.[2,4] However, there is no standard for sedation regarding agent or dose, and protocols often vary based on the clinical setting, patient needs, and provider judgement.[1,5] Furthermore, attempting to assess measures of patient comfort can be hindered during ophthalmic surgery because the patient's face is covered by a sterile drape, and the anesthesiologist is usually monitoring the patient from the foot of the bed.

Little is known about the best method for assessing patient satisfaction with anesthesia during ophthalmic surgery. However, patient satisfaction with anesthesia is an increasingly important topic given increasing implementation of value-based payments in the United States.[6] We examined whether surgeon or anesthesiologist satisfaction with anesthesia could act as a proxy for patient satisfaction during ophthalmic surgery by performing a secondary analysis

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of a prospective clinical trial of patient satisfaction with sedation for ophthalmic surgery under monitored anesthesia care (MAC). For this study, all cataract, retinal, corneal, and glaucoma surgeries not planned to be performed under general anesthesia were included in analysis. We examined the level of correlation between surgeon and anesthesiologist satisfaction and patient satisfaction with anesthesia.

Methods

This analysis was performed on data collected from a clinical trial (www.clinicaltrials.gov, identifier: NCT03246724, PI: Manju Subramanian) investigating patient satisfaction with oral versus intravenous benzodiazepine for eye surgery conducted at Boston Medical Center.

Patients 18 years or older scheduled for ophthalmic surgery under MAC, capable of giving informed consent in English, Spanish, or Haitian Creole, and eligible to safely receive a benzodiazepine were eligible for the original study. Written informed consent was obtained from all participants, according to protocol conforming to the tenets of the Declaration of Helsinki and approved by Boston Medical Center's institutional review board. Details of the clinical trial study design, including the satisfaction with anesthesia surveys used, have been previously published for the cataract surgery sub-group.[7]

Surgeries included in the original study were: phacoemulsification cataract extraction with intraocular lens implant (phaco/IOL), pars plana vitrectomy (PPV) with or without phaco/IOL, silicone oil removal, Descemet Membrane Endothelial Keratoplasty (DMEK) with or without phaco/IOL, Descemet Stripping Endothelial Keratoplasty (DSEK) with or without phaco/IOL, conjunctival and/or corneal lesion excision with cryotherapy and amniotic membrane transplantation, pterygium excision, trabeculectomy with or without phaco/IOL, Ahmed or Baerveldt implant with or without phaco/IOL, endocyclophotocoagulation with or without phaco/IOL, Istent with or without phaco/IOL, Kahook with or without phaco/IOL, or Cypass implantation with or without phaco/IOL. Surgeries were performed by a group of 11 surgeons.

All patients received sedation with a benzodiazepine prior to surgery, with supplemental anesthesia administered during surgery as needed. Sedation dose varied based on BMI, with a BMI < 35 receiving a lower standard dose (0.125 mg of oral triazolam or 1.0 mg IV midazolam) and a BMI ≥ 35 receiving a higher standard dose (0.25 mg of oral triazolam or 2.0 mg IV midazolam). Sedation was delivered either via oral tablet given in the preoperative holding area or as an IV injection given in the operating room. Several different anesthesiologists and CRNAs were involved in the administration of sedation for this study.

Patient, surgeon, and anesthesiologist/CRNA satisfaction were evaluated following ophthalmic surgery using surveys (Supplemental Materials). Surgeon and anesthesiologist satisfaction were collected immediately following surgery using analogous 6-question surveys. Patient satisfaction data were collected at the first post-operative appointment using a 12-question survey based on a 6-point Likert scale. The patient satisfaction survey administered has been validated to assess pain, discomfort, anxiety, side effects, and satisfaction with the sedation given.[8] The surgeon and anesthesiologist surveys were developed to complement the patient survey with questions evaluating patient cooperation, pain, and anxiety in addition to assessments of surgical complications and adequacy of sedation.

The association between surgeon and patient as well as anesthesia provider and patient satisfaction were analyzed using Pearson's correlation coefficient. This measure ranges from -1 (perfect inverse correlation) to 1 (perfect direct correlation). Further subgroup analyses were performed based on patient language, categorized as English-speaking versus non-English-speaking, via stratified correlation. Additional subgroup analyses were also performed to assess association between surgeon-patient and anesthesiologist-patient scores for single question measures of pain and anxiety.

All differences in correlation were assessed using linear regression with interaction at a significance level of $p < 0.05$. Analyses were completed using R software version 1.2.5019 (R Core Team, Vienna, Austria).

Results

Mean Satisfaction Scores Among Surgeons, Anesthesiologists, and Patients

Data from a total of 238 ophthalmic surgical cases were analyzed. Across all cases, mean surgeon satisfaction was 5.27 (range, 1.33–6.00), mean anesthesiologist satisfaction was 5.12 (range, 1.17–6.00), and mean patient satisfaction was 5.28 (range, 2.58–6.00). The demographics and medical conditions of the patient population are included in Table 1.

Table 1 Patient Characteristics

Demographic Variables	n (% of Total) (N = 283)
Age (years)	
<40	23 (8.1%)
40–49	42 (14.8%)
50–59	63 (22.3%)
60–69	90 (31.8%)
70–79	48 (17.0%)
80+	17 (6.0%)
Sex	
Male	159 (56.2%)
Female	124 (43.8%)
BMI (kg/m^2)	
<35 (lower dose)	229 (80.9%)
≥35 (higher dose)	54 (19.1%)
Ethnicity	
Hispanic/Latino	101 (35.7%)
Non-Hispanic/Latino	173 (61.1%)
Unknown	9 (3.2%)
Race	
American Indian/Alaskan Native	1 (0.4%)
Asian	2 (0.7%)
Black/African American	110 (38.9%)
Declined	101 (35.7%)
Native Hawaiian/Pacific Islander	1 (0.4%)
Other	10 (3.5%)
White	58 (20.5%)
Language	
English	157 (55.5%)
Spanish	97 (34.3%)
Haitian Creole	29 (10.2%)
Medical Conditions	
Systemic hypertension	179 (63.3%)

(*Continued*)

Table 1 (Continued).

Demographic Variables	n (% of Total) (N = 283)
Tobacco use	55 (19.4%)
Hypercholesterolemia	51 (18.0%)
Heart disease	41 (14.5%)
Diabetes mellitus	138 (48.8%)
Hyperlipidemia	104 (36.7%)
Asthma/bronchitis/COPD	33 (11.7%)
None	52 (18.4%)

Correlation Between Measures

The correlation between surgeon satisfaction and patient satisfaction was 0.333 ($p < 0.001$, 95% CI [0.225, 0.433]) (Figure 1). The correlation between anesthesiologist satisfaction and patient satisfaction was 0.319 ($p < 0.001$, 95% CI [0.210, 0.419]) (Figure 2). Because of the high percentage of non-English-speaking patients in our population (44.5%), we examined whether the degree of correlation between provider and patient satisfaction may be higher in English speakers compared to non-English speakers. However, no significant difference was found between English and non-English-speaking patients for surgeon-patient satisfaction correlation (0.389 vs 0.268, $p = 0.08$) and anesthesiologist-patient satisfaction correlation (0.334 vs 0.280, $p = 0.47$). When looking at pain and anxiety as isolated factors, correlations between surgeon-patient as well as between anesthesiologist-patient were similar to that of overall satisfaction correlations (Table 2).

Discussion

The objective of this study was to determine the degree of correlation between provider satisfaction and patient satisfaction with anesthesia for ophthalmic surgery. Our results indicate that on average patient satisfaction increased with increasing surgeon and anesthesiologist satisfaction; however, there was a low degree of correlation between these

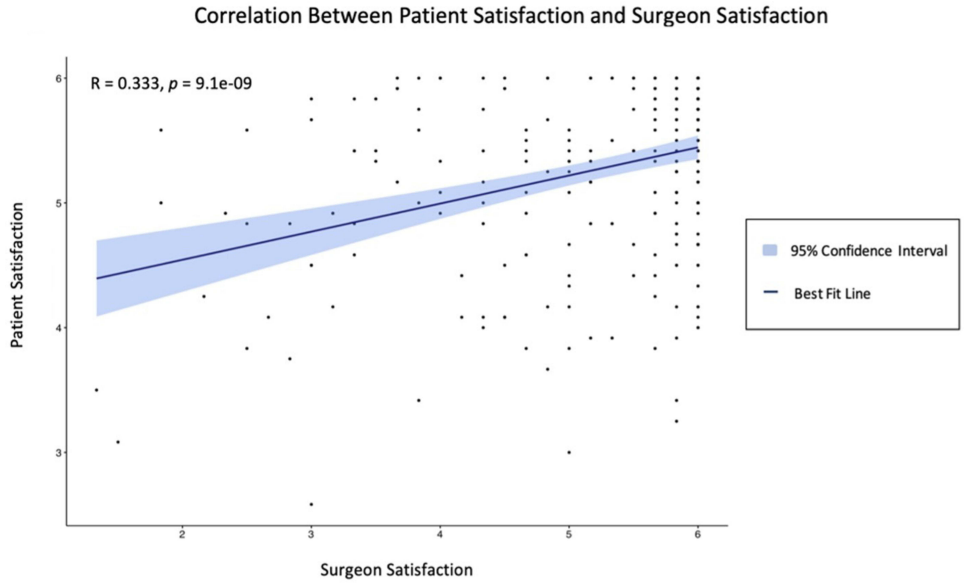

Figure 1 Plot displaying the correlation between patient satisfaction and surgeon satisfaction.

Figure 2 Plot displaying the correlation between patient satisfaction and anesthesia provider satisfaction.

measures, indicating that surgeon and anesthesiologist satisfaction cannot be used to reliably predict patient satisfaction. Moreover, even when individual measures of patient satisfaction, such as pain and anxiety, were isolated, the correlations between provider and patient satisfaction remained low.

Patient satisfaction can be difficult to assess intraoperatively, as patients are completely draped and communication is somewhat limited.[9] Therefore, surrogate measures such as movement, increased heart rate, and patient report of pain and anxiety are often used clinically to determine appropriate levels of sedation in ocular surgery.[2,3] However, there is no evidence in the literature that these proxy measures accurately predict patient satisfaction. Provider judgment and provider satisfaction with anesthesia intraoperatively often determines initial dose of sedation as well as need for additional anesthesia throughout the procedure.[1,5] Thus, if provider assessment is not reflective of patient comfort, patients may not be receiving adequate sedation throughout their procedures, leading to lower patient satisfaction.

The poor correlation we found may also suggest discordant values or expectations pertaining to quality care. For instance, surgeons may value a quiet patient with minimal eye movement during surgery, whereas a patient may value being pain-free or a complete lack of awareness of the surgery. However, a completely comfortable patient may have exhibited excessive eye movement, lowering surgeon satisfaction, or unstable vital signs, lowering anesthesia provider

Table 2 Correlation Between Provider and Patient Satisfaction with Anesthesia for Single Question Measures

	Correlation with Patient Satisfaction R (p-value, [95% CI])
Pain	
Surgeon Satisfaction	0.382 (p < 0.001, [0.278, 0.478])
Anesthesiologist Satisfaction	0.205 (p < 0.001, [0.091, 0.314])
Anxiety	
Surgeon Satisfaction	0.356 (p < 0.001, [0.250, 0.454]
Anesthesiologist Satisfaction	0.242 (p < 0.001, [0.129, 0.348])

satisfaction. Prior research in a diverse range of medical fields has also demonstrated some level of discordance between surgeon satisfaction and patient satisfaction as well as surgeons' prediction of patient pain. In one study evaluating patient and surgeon satisfaction in dental implant surgery, 61% of patients said they were comfortable or neither comfortable nor uncomfortable, while 90% of surgeons felt there was an adequate level of sedation.[10] Another study examining patient satisfaction in phacoemulsification and intraocular lens implantation found that 30.9% of patients felt either mild discomfort or occasional pain with peribulbar block, while only 4.6% of surgeons who utilized this type of anesthesia were not satisfied with the level of anesthesia.[11] Other research investigating satisfaction in retinal surgery found that while 45% of patients receiving sub-tenon's anesthesia felt dissatisfied to extremely dissatisfied and 45% felt pain during surgery, surgeons were only dissatisfied with 25% of cases suggesting a disconnect between surgeon and patient driven metrics.[12] None of these studies were designed to directly correlate patient and provider satisfaction rates and sometimes used very different metrics to assess patient and provider satisfaction, but together these findings are somewhat in line with our own.

Limitations of our study include that factors such as the type of surgery and the type and efficacy of local anesthetic administered during surgery could certainly have an influence on satisfaction with anesthesia for ocular surgery, but our hypothesis was that provider satisfaction would be similarly influenced by these factors. In future studies it would be interesting to examine whether correlations between provider and patient satisfaction differ in subgroups with larger sample sizes. Also, we did not account for educational attainment, which has been shown to affect patient satisfaction.[13] Additionally, although the patient surveys were translated into Spanish and Haitian Creole, they were not validated in these languages. Furthermore, although our provider satisfaction surveys were derived from a validated patient survey, not all of the questions regarding patient satisfaction were translatable to provider satisfaction (eg post-operative vomiting). Alternative questions were included to reflect measures important from the provider perspective (eg complications), which may explain some of the discrepancy. However, even when single measures of satisfaction with anesthesia such as pain and anxiety were analyzed, the correlations between provider and patient satisfaction remained low. Finally, surveys were administered to patients only at their first post-operative visit in order to avoid collecting responses while patients might still be sedated. However, benzodiazepines are known to also cause anterograde amnesia. Thus, patients may not have remembered if they were uncomfortable during their surgery, and this could account for some of the disagreement between the level of provider satisfaction compared to patient satisfaction.

Conclusion

Provider satisfaction is a poor proxy for patient satisfaction. Further research is needed to understand which factors determine and more accurately predict patient satisfaction with anesthesia during ocular surgery to continue to improve patient experience, while maintaining the highest levels of intra-operative and peri-operative safety.

Abbreviation

MAC, monitored anesthesia care.

Data Sharing Statement

Deidentified participant data will be made available upon reasonable request to the principal investigator of the original clinical trial (www.clinicaltrials.gov, identifier: NCT03246724, PI: Manju Subramanian). The satisfaction surveys used as part of this study are included in Supplementary Materials.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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