

Trends in Anesthesia Use in Cataract Extraction with Lens Insertion: 2010–2015

AAAHC Institute for Quality Improvement Study Results

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Abstract

Aim: To examine the trend in anesthesia use during cataract extraction with lens insertion.

Methods: Data were collected from 2010 to January–June 2015. Non-routine, complicated cases were excluded.

Results: Topical anesthesia and oral sedation use increased during the study period. The use of peribulbar and retrobulbar anesthesia dropped significantly from 20% and 7% respectively in 2014 to 10% and 4% respectively in the first half of 2015.

Keywords: cataract extraction with lens insertion; ambulatory surgery; anesthesia use.

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Conclusion: The downward trend in peribulbar and retrobulbar use may be due to increased use of single dose medications, restrictions on compounding within the ASC, and the cost of commercially prepared hyaluronidase.

Introduction

The Accreditation Association for Ambulatory Health Care Institute for Quality Improvement (AAAHC Institute) has conducted an annual or semiannual cataract extraction with lens insertion study since 1999 with the most recent study completed in June 2015. The study examines processes and outcomes associated with cataract extractions with lens insertions performed in the ambulatory setting. The studies are conducted to help organizations measure their performance, benchmark versus similar organizations, receive information on best practices, and use the information for quality improvement studies. The purpose of this article is to examine the trend in the types of anesthesia and sedation administered from 2010–2015.

Part of the rationale for studying cataract is that it is one of the most frequently performed procedures in ambulatory care. A cataract is a cloudiness or opacity in the normally transparent crystalline lens of the eye. This cloudiness can cause a decrease in vision and may lead to eventual blindness. Cataract surgery is a common procedure in which the cloudy lens is removed and replaced by an artificial intraocular lens. Age-related cataract affects more than 24 million Americans¹. That number may rise to 30 million by 2020. Cataract accounts for approximately one half of adult (over age 40) low vision cases. [3] In 2006, of the approximately 2.8 million cataract surgeries performed in the ambulatory setting, 59% (more than 1.6 million) of these were performed in freestanding facilities. [4] The American Academy of Ophthalmology (AAO) has established guidelines for cataract surgery (2011). [5] Cataract surgery has increased steadily, peaking in 2011 at a rate of 1,100 per 100,000 people or approximately 3 million annually. [2] On average, routine, uncomplicated cataract surgery in the United States costs \$3,432 per eye if a patient paid directly for the procedure, according to a report of full-year 2014 fees commissioned by AllAboutVision.com from a leading industry analyst. (In 2010 the average was about \$3,279, in 2011 it was \$2,699, in 2012 it was \$3,429 and in 2013 it was \$3,230.) [6]

Methods

The AAAHC Institute collected real-time data every six months beginning January 2010 through January–June 2015. Both type of sedation and type of anesthesia used were among the data collected from study participants.

All organizations providing ambulatory cataract extraction with lens insertion comprise the potential population. Every six month beginning in January–June 2010 through January–June 2015, the AAAHC Institute solicited participation from AAAHC accredited organizations via blast email and fax and the wider ambulatory health care population via the AAAHC Institute website (www.aaahc.org/institute). Six-month data were combined to report annual data over the 5-year study period. This report represents selected findings for those 867 responding organizations. Demographic information is supplied below.

Results

In 2010–2015, topical anesthesia administered as proparacaine or tetracaine drops, cellulose pledgets or lidocaine jelly, use increased from 64% to 86% of cases. The use of peribulbar anesthesia varied between 10% in the first half of 2015 to 20% in 2014. Retrobulbar anesthesia was used in as many as 14% of patient in 2012 but decreased to 4% by the first half of 2015. As the table above shows, IV sedation was used in a large percentage of total cases – from a low of 74% in 2012 and 2013 to a high of 86% in the first half of 2015. The use of oral sedation more than doubled during this period (6% to 15%).

Table 1 Organisation participation / cases submitted.

Year	Organisations Registered for the Study	Organisations that participated in the Study	Number of Routine (uncomplicated) Cases Submitted
2010	178	155	4946
2011	242	210	5449
2012	174	152	4455
2013	165	142	3786
2014	140	129	3615
2015 (Jan-Jun)	86	79	2127

Table 2 Cataract Surgery Volume.

Year	Range (min-max)	Median	Total
(min – max)	Median	Total	307,162
2011	100 – 10,299	1,600	348,249
2012	17 – 10,000	1,330	290,744
2013	200 – 10,000	1,600	285,754
2014	120 – 16,000	1,600	266,034
2015 (January – June)	92 – 8,000	1,800	163,568

Table 3 Organisation Type.

Year	Single Specialty ASC	Multispecialty ASC
2010	65%	35%
2011	68%	32%
2012	66%	35%
2013	71%	29%
2014	80%	20%
2015 (Jan-Jun)	70%	30%

Table 4 ASA Grade as a percentage of the total.

Year	ASA 1	ASA 2	ASA 3	ASA 4
2010	4%	61%	34%	1%
2011	5%	56%	38%	1%
2012	4%	63%	33%	0%
2013	6%	60%	34%	0%
2014	6%	63%	31%	0%
2015 (Jan-Jun)	5%	61%	34%	0%

Table 5 :Analgesia and sedation used during the study periods.

Year	IV Sedation	Topical analgesia	Peribulbar block	Retrobular block	Oral Sedation
2010	85%	64%	17%	11%	6%
2011	79%	68%	16%	10%	6%
2012	74%	64%	14%	14%	8%
2013	74%	78%	18%	5%	11%
2014	91%	78%	20%	7%	11%
2015 (Jan-Jun)	86%	86%	10%	4%	15%

Discussion

In 2010 to the first half of 2015, peribulbar blocks were consistently used more frequently than retrobulbar blocks with one exception. Peribulbar and retrobulbar blocks were both used in 14% of the cases in 2012. Beginning in 2013, the gap between the use of retrobulbar and peribulbar widened with the use of retrobulbar tapering off in the first half of 2015 to just 4% of cases. Also of note is that beginning in 2013, the use of topical anesthesia and oral sedation increased steadily. In 2010, the use of topical anesthesia and oral sedation was 64% and 6% respectively. These percentages held relatively constant until 2013 when topical anesthesia and oral sedation use jumped to 78% and 11% respectively and in the first half of 2015 their use was 86% and 15% respectively. Topical anesthesia use as a percent of cases exceeded IV sedation use in 2013 and the first half of 2015.

Just as cataract surgery has evolved over time, so have the types of anesthesia used for the procedure. In the 1800s, topical cocaine anesthesia was used. In 1945 the modern technique of retrobulbar anesthesia was formally described and eventually lead to the development and use of peribulbar and sub-tenons anesthesia. As the technique of phacoemulsification with foldable IOLs has grown so has the use of topical anesthesia. There are several advantages of topical anesthesia (i.e., no perforation risk, no extraocular muscle injury, or central nervous system disruption) and patients can leave surgery without an eye patch which may explain the increase in its use over the study period. Topical anesthesia is most often used in uncomplicated cases in patients who can tolerate the microscopic light [7,8]

The data show that the use of retrobulbar anesthesia relative to peribulbar has steadily declined over the study period. This may be the result of the associated higher risks of hemorrhage or injury to the optic nerve associated with retrobulbar blocks.[9,10] However, a recent study by Cochrane found no difference in pain perception during surgery, no difference in complete akinesia or need for additional injections nor any difference in the development of severe complications. [11].

There may be a downward trend emerging in the use of peribulbar and retrobulbar anesthesia for cataract extraction with lens insertion surgery. The use of both peribulbar and retrobulbar anesthesia dropped significantly from 20% and 7% respectively in 2014 to 10% and 4% respectively in the first half of 2015. This may be due to increased use of single dose medications, not being able to compound within the ASC, and the cost of hyaluronidase now that it is commercially prepared.

Limitations and Questions for Future Study

In 2010-January-December of 2015, the limitations of this study include the number of organizations participating and the number of patients/procedures recorded for each facility. However, the facilities participating represented small (less than 20 annual cataract extraction with lens insertion procedure volumes) to large practices (over 15,000 annual cataract with lens extraction procedure volumes) and both single (69% median) and multi-specialty (29% median) facilities. The proportion of single to multispecialty practices remained similar at approximately 2 single to 1 multispecialty organizations with the exception of 2014 in which the ratio was 4 single to 1 multispecialty organization. Additionally, results should be reviewed remembering that the AAAHC Institute's general practice is to use small sample sizes in its studies, with the plan that organizations will participate from year to year —allowing trending of information and increasing statistical power.

Audit/Screening Methodology

This study used a self-reporting data collection method. Clinical staff members were directly involved in the data collection to promote buy-in and support of the comparisons. Each organization was asked to submit a sampling of procedures to form a composite profile of their practice. In 2010 to the first half of 2015, data were collected during a six month period (January-June or July-December) for a total of 11 study periods. For this article, data collected for six month periods were combined to analyze the data on an annual basis over the past 5 years. While organizations could participate in both the January-June and the July-December timeframe in any given year or from year to year, an analysis of the data show the relative small percentage of repeat participants did not skew the overall results.

In 2010 to the first half of 2015, organizations collected their data on printed forms and then entered the data they collected in online surveys forms that mirrored the printed forms. AAAHC Institute staff performs cleaning/checking for consistency and completeness of data before analyzing.

For more information regarding this study, contact AAAHC Institute at 847-853-6060 or info@aaahc.org. Further updates will be posted on the AAAHC Institute website at www.aaahc.org\institute.

About AAAHC Institute for Quality Improvement

The AAAHC Institute, which sponsored the 2010 through January-June 2015 Cataract with Lens Insertion Studies, was created by the AAAHC as a nonprofit subsidiary to offer clinical performance measurement and improvement opportunities to ambulatory health care organizations and others interested in quality patient care.

Acknowledgments

The AAAHC Institute Board of Directors would like to acknowledge the following people for their generosity in giving their valuable time and assistance in conducting these studies.

Sam JW Romeo MD MBA, (2000–2014) & Martin L. Gonzalez MS, (2014–2015) Chairs, Performance Measurement Initiative (PMI)

Deborah Jinks RN (2000-2001), Chair, Ambulatory Surgery Work Group

Marty Gonzalez MS, Chair, Performance Measurement Initiative (PMI)

Terry Edwards RN, Member, PMI Ambulatory Surgery Work Group

Kris Kilgore RN, Member, PMI Ambulatory Surgery Work Group

Naomi Kuznets PhD (2000–2001 and 2015) Vice President & Senior Director, AAAHC Institute for Quality Improvement

Belle Lerner MA (2000-2001 and 2015) Assistant Director, AAAHC Institute for Quality Improvement

References

1. <http://www.ncbi.nlm.nih.gov/pubmed/19506195>
2. Gollogly HE, Hodge DO, St. Sauver JL, Erie JC. Increasing incidence of cataract surgery: Population-based study. **Journal of Cataract and Refractive Surgery** 2013; **39**:9:1383–9.
3. The Eye Diseases Prevalence Research Group. Causes and prevalence of visual impairment among adults in the United States. **Archives of Ophthalmology** 2004; **122**:477–85.
4. Centers for Disease Control and Prevention. National Survey of Ambulatory Surgery. 2006. Calculated from April 2010 revised data for sums of weighted values of cases from Procedure Code 1 = 13.19, 13.41, 13.43, 13.59, 13.70, and 13.72 for freestanding facilities versus freestanding and hospital-based facilities: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Datasets/NSAS/.
5. American Academy of Ophthalmology Cataract and Anterior Segment Panel. **Cataract in the adult eye**. San Francisco (CA): American Academy of Ophthalmology (AAO). 2011.
6. <http://www.allaboutvision.com/conditions/cataract-surgery.htm>
7. Boulton JE, Lopatzidis A, Luck J, Baer RM. A randomized controlled trial of intracameral lidocaine during phacoemulsification under topical anesthesia. **Ophthalmology** 2000; **107**:68–71.
8. Pang MP, Fujimoto DK, Wilkens LR. Pain, photophobia, and retinal and optic nerve function after phacoemulsification with intracameral lidocaine. **Ophthalmology** 2001; **108**:2018–25.
9. Ripart J, Mehrige K, Rocca RD. **Local and regional anesthesia for eye surgery**. The New York School of Regional Anesthesia. August 2013.
10. Fahmi A, Bowan R. Administering an eye anaesthetic: principles, techniques, and complications. **Community Eye Health** 2008; **21**(65):14-7.
11. Alhassan MD, Kyari F, Ejere HOD. Comparison of two forms of local anesthesia for cataract surgery. **Cochrane**. July 2015.

