Trends in Anesthesia Use in Cataract Extraction with Lens Insertion: 2010-2015 AAAHC Institute for Quality Improvement Study Results

B.K. Lerner*, N.J. Kuznets and K. Kilgore

Institute for Quality Improvement, Accreditation Association for Ambulatory Health Care (AAAHC), Inc. 5250 Old Orchard Road, Suite 250, Skokie, Illinois 60077, USA

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

Methods: Data were collected from 2010 through 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 6% respectively in 2015.

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.

Keywords: Cataract extraction with lens insertion, Ambulatory surgery, Anesthesia use.

1. CASE REPORT

Since 1999, the AAAHC Institute for Quality Improvement (AAAHC Institute) has conducted an annual or semiannual Cataract Extraction with Lens Insertion study. The most recent study was completed in December 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 Americans [1]. That number may rise to 30 million by 2020 [2]. 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 $3,542 per eye if a patient paid directly for the procedure, according to a report of full-year 2015 fees commissioned by AllAboutVision.com from a leading industry analyst. The majority of cataract surgeons charge between $3,001 and $4,500 for standard cataract surgery [6].

2. METHODS

The AAAHC Institute collected real-time data every six months beginning January 2010 through December 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 months beginning in January-June 2010 through July-December 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) (Figure 1). Six-month data were combined to report annual data over the 6-year study period (Figure 2). This report represents selected findings for those 942 responding organizations. Demographic information is supplied on the following page (Table 1 and 2, Figure 3).
Table 1: Organization Annual Cataract Surgery Volume

<table>
<thead>
<tr>
<th>Year</th>
<th>Range</th>
<th>Median</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>20-11,914</td>
<td>1,586</td>
<td>307,162</td>
</tr>
<tr>
<td>2011</td>
<td>100-10,299</td>
<td>1,600</td>
<td>348,249</td>
</tr>
<tr>
<td>2012</td>
<td>17-10,000</td>
<td>1,330</td>
<td>290,744</td>
</tr>
<tr>
<td>2013</td>
<td>200-10,000</td>
<td>1,600</td>
<td>285,754</td>
</tr>
<tr>
<td>2014</td>
<td>120-16,000</td>
<td>1,600</td>
<td>266,034</td>
</tr>
<tr>
<td>2015</td>
<td>36-11,000</td>
<td>1,800</td>
<td>326,763</td>
</tr>
</tbody>
</table>

Table 2: Organization Type

<table>
<thead>
<tr>
<th>Year</th>
<th>Single Specialty ASC</th>
<th>Multispecialty ASC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>65%</td>
<td>35%</td>
</tr>
<tr>
<td>2011</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>2012</td>
<td>66%</td>
<td>35%</td>
</tr>
<tr>
<td>2013</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>2014</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>2015</td>
<td>69%</td>
<td>31%</td>
</tr>
</tbody>
</table>
For more information on the data collection methodology, refer to section 4.2. Audit/Screening Methodology.

3. RESULTS

In 2010-2015, topical anesthesia use administered as proparcaine or tetracaine drops, cellulose pledgets or lidocaine jelly, increased from 64% to 85% of cases (Figure 4). The use of peribulbar anesthesia varied between 10% in 2015 to 20% in 2014. Retrobulbar anesthesia was used in as many as 14% of patients in 2012 but decreased to 6% by 2015. As the chart below shows, IV sedation was used in a large percentage of total cases – from a low of 74% in 2012 and 2013 to highs of 91% in 2014 and 88% in 2015. Oral sedation use doubled during this period (6% to 12%).

4. 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 2015 to just 6% 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 2015 their use was 85% and 12% respectively. Topical anesthesia use as a percent of cases exceeded IV sedation use in 2013.

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 6% respectively in 2015. This may be due to increased use of single dose medications, not being

![Percent of Types of Anesthesia Used by Year](image-url)
able to compound within the ASC, and the cost of hyaluronidase now that it is commercially prepared.

4.1. Limitations and Questions for Future Study

In 2010-2015, 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 multispecialty (32% median) facilities. The proportion of single to multispecialty practices remained similar at approximately 2 single to 1 multispecialty organization 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.

4.2. 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 2015, data were collected during a six month period (January-June or July-December) for a total of 12 study periods. For this article, data collected for six months 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 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.

4.3. About AAAHC Institute for Quality Improvement

The AAAHC Institute, which sponsored the 2010 through 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.

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REFERENCES


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