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# Epidemiology of acute endophthalmitis after intraocular procedures: a national database study

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**Abbreviations and acronyms:**

**CI** = confidence interval; **IVT** = intravitreal injection.

**Running head:** Endophthalmitis trend after intraocular procedures

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## **Abstract**

**Objective:** To describe the causes of postoperative acute endophthalmitis at a national scale longitudinally.

**Design:** Cohort study from 2009 to 2018 in France.

**Participants:** Patients diagnosed with acute endophthalmitis following intraocular procedures.

**Methods:** The French Medical-Administrative Database was used, endophthalmitis cases and intraocular procedures were identified by means of billing codes in all French hospitals and private practices.

**Main Outcomes and Measures:** Incidence of acute endophthalmitis within 42 days of the procedure.

**Results:** From January 1, 2009 to October 31, 2018, 7522 cases of acute endophthalmitis occurred following 14 438 854 intraocular procedures. Most cases occurred after standalone cataract surgery (4808 cases for 7 316 077 procedures, 63.92%), followed by IVTs (1 296 cases for 5 455 631 IVTs, 17.23%), vitreoretinal surgery (698 for 442 263 procedures, 9.28%), anterior segment surgery (245 cases, 3.26%), combined cataract and vitreoretinal surgery (191 cases, 2.54%), cornea surgery (142 cases, 1.89%), and glaucoma surgery (80 cases, 1.06%). The overall incidence of acute endophthalmitis was 1 per 1920 procedures (0.0521% procedures, 95% CI, 0.0520–0.0522). The surgeries with the highest incidence of endophthalmitis were the scleral and globe surgery group, 0.1827% (95% CI, 0.1757–0.1898), followed by

vitreoretinal surgery combined with cataract surgery, 0.1685% (95% CI, 0.1663–0.1706). The incidence of endophthalmitis after IVTs was stable over the study-period and patients were the oldest, 75.4 years (SD±12.0),  $P < 0.001$ . The onset of endophthalmitis following intravitreal procedures, after IVTs and vitreoretinal surgery, was shorter than for other procedures ( $P < 0.001$ ).

**Conclusions:** The profile of patients referred for acute endophthalmitis has been evolving over a decade, with a decrease in the raw number of endophthalmitis cases after cataract surgery as opposed to an increase in the number of patients presenting with endophthalmitis after IVTs.

## 1 Introduction

2 Endophthalmitis is one of the most dreaded complications after intraocular procedures  
3 and may lead to severe irreversible vision loss. Indeed, the visual consequences after  
4 endophthalmitis are often severe, with approximately half of the patients having a final  
5 visual acuity less than 20/40, and a third having less than 20/100.<sup>1</sup> Most cases of  
6 endophthalmitis are exogenous, i.e., occurring after intraocular or surgical procedures or  
7 intravitreal injections (IVTs), or they occur in connection with eye trauma or corneal  
8 infection. Fortunately, the occurrence of this complication remains rare, its incidence  
9 varying according to the type of procedure performed. Indeed, for cataract surgeries and  
10 IVTs the incidence is approximately 0.1% and 0.05%, respectively.<sup>2, 3</sup> In addition, some  
11 authors have reported a change in the proportion of patients presenting with  
12 endophthalmitis, i.e., more patients presenting for endophthalmitis after IVTs than  
13 cataracts, related to an increase in the number of IVTs performed over the past 10  
14 years.<sup>4, 5</sup> For less frequently performed procedures, the reported incidence is more  
15 variable, due to the small number of series.<sup>6, 7</sup> Limitations in having an accurate estimate  
16 of the overall incidence could be overcome by using data obtained from medico-  
17 administrative databases,<sup>3, 8, 9</sup> such as the French National Health Database (*Système*  
18 *National des Données de Santé* [SNDS]), gathering surgical and medical procedures at  
19 the national scale.<sup>10, 11</sup> In France, acute endophthalmitis is an emergency always treated  
20 in an inpatient unit, either private or public,<sup>9</sup> as such the event is recorded in this  
21 database. Knowledge of the incidence of endophthalmitis is essential for patient  
22 education and for assessing the effectiveness of preventive measures. Furthermore,

23 evaluating endophthalmitis onset according to the type of procedure could lead to both  
24 optimal postoperative timing for follow-up visits and optimal recommendations for the  
25 patients. We sought to describe the causes of acute postprocedural endophthalmitis in  
26 France from 2009 to 2018.

## 27 **Material and Methods**

### 28 **Data source**

29 The French National Health Information database (*Système National des Données de*  
30 *Santé* [SNDS]) was used for this study. This is a medico-administrative database that  
31 collects anonymous data on hospital discharge codes (International Classification of  
32 Diseases, 10th Revision), office visits, procedures performed (French Common  
33 Classification of Medical Acts, CCAM), and drug consumption for almost the entire  
34 French population, i.e., more than 65 million inhabitants during the study period. The  
35 study presented here is part of the French Epidemiology and Safety (EPISAFE)  
36 collaborative program.<sup>11</sup> It was approved by the French Institute of Health Data  
37 (registration number 115306, 01/24/2019) and by the French Data Protection Authority  
38 (registration number D.R. 2019-100, 04/12/2019). This study adhered to the tenets of  
39 the Declaration of Helsinki.

### 40 **Study design and setting**

41 The subset of data available for this study included all patients in the database who  
42 underwent ocular surgery, identified by billing codes, from 2007 to 2018.

### 43 **Outcomes**

44 The event considered was the occurrence of acute endophthalmitis, as defined by the  
45 Endophthalmitis Vitrectomy Study (EVS), in the 42 days following a procedure<sup>12</sup>  
46 identified by the presence of a hospital discharge code of purulent endophthalmitis or of  
47 other endophthalmitis (ICD10th H440 or H441). Only procedures performed between  
48 January 1, 2009 and October 31, 2018 were considered for the occurrence of  
49 endophthalmitis; previous procedures were used to verify the uniqueness of cause and  
50 medical consumption since exact dates of hospitalization were not available for 2007  
51 and 2008. It should be noted that for 2018, only 10 months out of 12 were taken into  
52 account for raw data on the procedure and endophthalmitis cases. The standard in  
53 France is to hospitalize all patients with endophthalmitis because of the severity of the  
54 condition, the need for medical monitoring and IVT of antibiotics, and vitrectomy when  
55 indicated. Intraocular procedures were identified based on their billing codes and  
56 grouped according to the anatomical structure involved, considering combined surgeries  
57 (see Appendix 1). The date of the procedure was defined as the index date if performed  
58 within 42 days prior to infection.<sup>12</sup> We reviewed cases where a diagnosis of  
59 endophthalmitis was made up to 42 days after several different procedures had been  
60 performed on various dates with an interval of less than 7 days between procedures; in  
61 these cases, the allocation decision was defined by an algorithm. The causes of  
62 endophthalmitis were prioritized according to the highest probability of being responsible  
63 for the case of endophthalmitis recorded. Vitreoretinal surgeries were given priority,  
64 followed by filtering surgeries, lens surgery, corneal surgery, IVTs, and anterior segment  
65 surgery. In addition, for cases where no procedure was recorded in the 42 days before  
66 endophthalmitis, a complete review was made of the patients' hospitalization codes,

67 medical procedures, and long-term conditions, over the entire study period, accounting  
68 for medical management outside ophthalmology. Demographic data such as age and  
69 sex were extracted.

## 70 **Statistical analysis**

71 The annual incidence of endophthalmitis is expressed per 100 procedures per year with  
72 95% confidence intervals. Comparisons were made using the chi-squared test for  
73 categorical variables and the signed-rank test for continuous variables. Statistical  
74 significance was set at  $P < 0.05$  (two-tailed tests). All data processing and statistical  
75 analyses were performed using the SAS statistical analysis software package (SAS  
76 Enterprise Guide® version 7.1; SAS Institute, Inc., Cary, NC, USA).

## 77 **Results**

78 From January 1, 2009 to October 31, 2018, we recorded 7522 cases of acute  
79 endophthalmitis following 14 438 854 intraocular procedures. The mean age at  
80 diagnosis was 71.7 (SD±13.0) years, and 51.12% of the patients were female (see  
81 Table 1 for descriptive statistics). Approximately two thirds of the cases of  
82 endophthalmitis occurred after standalone cataract surgery (4808 cases for 7 316 077  
83 procedures accounting for 63.92% of all endophthalmitis cases), and approximately one-  
84 fifth occurred after IVTs (1296 cases for 5 455 631 IVTs, 17.23%). The next surgical  
85 groups responsible for endophthalmitis were, in decreasing order of frequency,  
86 vitreoretinal surgery (698 for 442 263 procedures, 9.28%), anterior segment surgery  
87 (245 cases, 3.26%), combined cataract and vitreoretinal surgery (191 cases, 2.54%),  
88 corneal surgery (142 cases, 1.89%), and glaucoma surgery (80 cases, 1.06%). The  
89 number of cases by procedure and by year for the three main sources of  
90 endophthalmitis is presented in Figure 1. While IVTs accounted for only 6.72% of  
91 endophthalmitis cases in 2009, this figure rose to 30.75% in 2018. When all procedures  
92 were considered, the incidence of endophthalmitis was 0.0521 cases per 100  
93 procedures (1 in 1920; 95% CI, 0.0520–0.0522), as presented in Table 2. The highest  
94 incidence of endophthalmitis was found in the scleral and globe surgery group, at  
95 0.1827% (1 in 547; 95% CI, 0.1757–0.1898). The next procedures responsible for  
96 endophthalmitis in descending order of incidence were: (i) vitreoretinal surgery  
97 combined with cataract surgery, then as standalone surgery; (ii) anterior segment  
98 surgery; (iii) filtering surgery combined with cataract surgery, then as standalone  
99 surgery; (iv) cataract surgery; (v) IVTs; and (vi) corneal surgery.

100           Regarding the frequency of endophthalmitis cases per procedure per year, we  
101 found an increase in endophthalmitis after IVTs during 2009–2018, from 61 to 210  
102 annual cases, in conjunction with an increase in the number of IVTs performed over the  
103 same period, from 188 330 to 822 491. The incidence of endophthalmitis was stable  
104 over the study period (see Figure 2A). On the contrary, despite an increase in the  
105 number of cataract surgeries during 2009–2018, from 584 188 to 727 454, the number  
106 of endophthalmitis cases after this surgery decreased from 719 in 2009 to 357 in 2018.  
107 For standalone vitreoretinal surgery, the third largest contributor of endophthalmitis  
108 cases, a slight decrease in incidence was observed during the study period. A  
109 fluctuation in the incidence of endophthalmitis over the years was observed for other  
110 types of procedures (see Figure 2B), related to lower numbers of surgeries where  
111 fluctuations in the number of cases of a rare event were more impactful, with, for  
112 example, a fluctuation of 0.2069% for the extreme values of the scleral and globe  
113 surgery group. Patients with acute endophthalmitis after IVTs were the oldest at 75.4  
114 (SD±12.0) years, while the 21 patients with endophthalmitis after scleral and globe  
115 surgery were the youngest at 52.0 (SD±19.0) years ( $P < 0.001$ ) and there were only  
116 males. Endophthalmitis following intravitreal procedures, i.e., after IVTs and vitreoretinal  
117 surgery, occurred earlier than after other procedures, at a median of (interquartile range  
118 [IQR]) 4.0 (3.0–7.0) days and 4.0 (2.0–8.0) days, respectively ( $P < 0.001$ ). Onset of  
119 acute endophthalmitis after standalone cataract surgery was 6.0 (4.0–11.0) days.

## 120 **Discussion**

121 The major finding of this study was the low incidence of endophthalmitis following  
122 intraocular procedures, 0.0521 per 100 procedures, i.e., one case of endophthalmitis per  
123 2000 procedures. This incidence of endophthalmitis was, however, dependent on the  
124 type of procedure. First, we observed a decrease in the number of endophthalmitis  
125 cases after cataract surgery, from 719 cases in 2009 to 469 in 2017, despite an increase  
126 in the number of surgeries, from 584 188 surgeries to 847 320, which led to a decreased  
127 incidence over the study period, particularly from 2008 to 2013. The increase in cataract  
128 surgeries has also been observed in several other countries<sup>13, 14</sup> and is expected to  
129 rise.<sup>15, 16</sup> Likewise, the decreased incidence of endophthalmitis has been observed in  
130 many countries, and was reported in our previous study based on hospitalization data  
131 only.<sup>9</sup> Behndig et al. observed a decrease in incidence during the period 1998–2009,  
132 using data from the Swedish National Cataract Register, although with a lower incidence  
133 in 2009 than in our study (0.02% vs. 0.1231% for cataract surgery alone, respectively).<sup>14</sup>  
134 However, the incidence observed in our study is in agreement with a Medicare study  
135 conducted from 2003 to 2004, in which the incidence in 2004 was 0.111%.<sup>17</sup> It is also in  
136 line with the findings of the meta-analysis by Cao et al..<sup>18</sup> The decrease in the incidence  
137 of endophthalmitis after cataract surgery could be related to improved microsurgical and  
138 asepsis techniques and the use of broad-spectrum intracameral antibiotics injected at  
139 the end of the procedure. The steep drop in incidence that began in 2012 is concomitant  
140 with the availability of a commercial preparation of cefuroxime, which has been  
141 associated with a lower risk of acute postoperative endophthalmitis.<sup>9, 19, 20</sup> The median

142 time to onset of endophthalmitis after cataract surgery of 6 days is consistent with a  
143 previous report.<sup>12</sup>

144 The number of IVTs has increased dramatically over the past 10 years, in line  
145 with an increase in indications and their effectiveness in maintaining visual acuity.<sup>21</sup>  
146 Indeed, on the basis of health insurance data, we observed a significant increase in the  
147 number of IVTs performed in France, from 188 330 in 2009 to 869 575 in 2017. In the  
148 United States, the number of IVTs performed is estimated to have increased from 4  
149 million in 2013 to almost 6 million in 2016.<sup>22</sup> In France, the technique of asepsis has  
150 remained virtually unchanged over the period under review, although recommendations  
151 have been made to avoid topical antibiotics.<sup>23</sup> This probably explains the stable  
152 incidence of endophthalmitis after IVTs during the study period. In fact, if the raw  
153 number of cases of endophthalmitis has increased over the period, it was  
154 proportionately less than the total number of injections performed. The emergence of  
155 indications for corticosteroid IVTs, starting after 2011 in France, may have led to an  
156 increased risk of endophthalmitis after IVTs, as previously described.<sup>3, 24</sup> However, the  
157 proportion of these indications is likely too small to observe an effect on the rate of  
158 endophthalmitis. The incidence of endophthalmitis after IVTs of 0.0238% in France is in  
159 agreement with the incidence reported in our previous study of the French health  
160 insurance database from 2012 to 2015, 0.0245%,<sup>3</sup> and with the incidence in England,  
161 0.025%.<sup>25</sup> The median delay from IVT to endophthalmitis of 4 days is in line with other  
162 published studies; Shah et al. found an average delay of 3.4 days,<sup>26</sup> Lyall et al., 5  
163 days,<sup>25</sup> and Van der Beek et al., 4.2 days;<sup>24</sup> our study of 25 French centers found an  
164 average delay of 4 days.<sup>27</sup>

165 Over the study period, we observed a shift in the causes of endophthalmitis; this  
166 was already observed in a tertiary center in Australia and in Israel, where the number of  
167 endophthalmitis cases after IVT increased while the number after cataract surgery  
168 decreased.

169 While there has been an increase in the number of vitreoretinal surgeries  
170 performed worldwide<sup>8, 28</sup> as well as in France—from 46 881 in 2009 to 64 500 in 2017 in  
171 our cohort—the incidence of acute postoperative endophthalmitis remained stable; in  
172 our study vitreoretinal surgery alone accounting for the third cause of endophthalmitis at  
173 0.1578%. The high incidence found after combined surgery with cataract surgery is also  
174 driven by vitreoretinal surgery. Despite a transition to sutureless vitreoretinal surgery, for  
175 which a higher risk of endophthalmitis had been assumed, related to wound leakage and  
176 migration of microorganisms from the ocular surface,<sup>6, 8, 29</sup> the evolution toward surgery  
177 with increasingly smaller gauge and tangential incisions<sup>30</sup> could explain the stable  
178 incidence.<sup>31</sup> Postoperative hypotony could also be responsible for leakage and expose  
179 patients to an increased risk of endophthalmitis.<sup>32</sup> Interestingly, the time to onset of  
180 endophthalmitis after intravitreal procedures, i.e., after IVTs or vitreoretinal surgeries,  
181 was similar, and the shortest, probably due to rapid bacterial penetration and the higher  
182 incidence of oral flora bacteria, which tend to be more virulent and proliferate more  
183 rapidly in the vitreous cavity.

184 We observed a small proportion of acute endophthalmitis after filtering surgery,  
185 0.0737%. Moreover, these endophthalmitis were of later onset than for other surgeries  
186 14.2 (SD±10.9) days. This low proportion and the longer delay remind us that there is a

187 significant proportion of delayed-onset endophthalmitis after 42 days.<sup>7</sup> Indeed, the  
188 average delay of endophthalmitis after filtering surgery is 4 years postoperatively.<sup>7, 33</sup>

189         After corneal surgery, the incidence of endophthalmitis was the lowest at  
190 0.0212% of procedures, and was stable over the study period. This incidence was lower  
191 than that reported in the UK population by Chen et al. between 1999 and 2006, at  
192 0.16%.<sup>34</sup> A possible explanation for this difference could be graft contamination in the  
193 UK study, related to an infection at the time of death, longer time to preservation, and  
194 lack of disinfection use, as discussed by the authors. In France, sepsis at the time of  
195 death is a contraindication to corneal donation as are positive blood cultures. This  
196 incidence was also lower than that reported in the United States, 0.2% for endothelial  
197 keratoplasty (EK) and 0.7% for penetrating keratoplasty (PK).<sup>35</sup> There was a change in  
198 the proportion of EK and PK during the period covered in our study, but this did not  
199 seem to influence the incidence of endophthalmitis. The difference in incidence found  
200 between the US study<sup>35</sup> and ours is most likely due to the fact that we only studied acute  
201 endophthalmitis, i.e., occurring within 42 days, as defined by the EVS. Indeed, the onset  
202 of endophthalmitis was more delayed than other procedures, 15.9 (SD±11.8) days.

203         Scleral and globe surgeries were responsible for a very low number of  
204 endophthalmitis cases (21 over the study period), but had the highest incidence at  
205 0.1827%. The fact that these procedures are often performed after trauma may explain  
206 why they have a higher incidence related to bacterial contamination and why only men  
207 were involved.<sup>36, 37</sup>

208 We acknowledge several limitations to this study. First, the diagnosis of  
209 postprocedural endophthalmitis was taken from the diagnostic codes of hospitalization,  
210 irrespective of the bacteriological test results. However, it should be noted that in the  
211 literature laboratory test confirmation is lacking in 40% of cases of post-IVT  
212 endophthalmitis, as reported by Lyall.<sup>25</sup> The risk of an erroneous diagnosis of a sterile  
213 inflammatory response cannot be fully excluded but it should be low, as the incidence of  
214 endophthalmitis after IVT found in the present study is very close to a previous report in  
215 France, considering 310,000 IVTs.<sup>27</sup> Globally this risk is low given the low incidence of  
216 sterile endophthalmitis (0.012% after IVT).<sup>38</sup> Indeed, patients discharged from hospital  
217 for sterile endophthalmitis are labeled with a code related to uveitis. Endophthalmitis  
218 cases identified were checked for the type of care they received – medical visits,  
219 procedures performed, hospitalizations for all causes, drug consumption – to limit the  
220 risk of error. Second, the impact of changes in technique in the absence of changes to  
221 the procedure code could not be studied and was only assumed for the periods of  
222 interest based on changes in practice, for example, for pars plana vitrectomy. Similarly,  
223 modifications in the antisepsis protocol could not be studied because they are not coded  
224 in our national database. However, there were no notable changes in the antisepsis  
225 protocols for IVTs and surgeries over the study period.<sup>9, 23</sup> Third, we limited our primary  
226 outcome measures to acute postoperative endophthalmitis, occurring 42 days after the  
227 procedure, as defined by the EVS.<sup>12</sup> Fourth, in some situations, several procedures  
228 were performed in the 42 days preceding the endophthalmitis and an algorithm was  
229 used, prioritizing the procedure most likely responsible, if the interval between  
230 procedures was less than 7 days. This decision rule was based on a review of the

231 literature on procedures with the highest to lowest incidence. This decision rule may  
232 have artificially increased the incidence of the most high-risk procedures, such as  
233 vitreoretinal and filtering surgeries, and decreased the incidence of the lowest-risk  
234 procedures, such as IVTs and anterior segment surgeries. However, since this situation  
235 is relatively rare regarding the number of endophthalmitis cases, and even more so  
236 regarding the number of procedures, it had a limited impact on our results. Fifth, in this  
237 report, due to some limitations of our current analysis tools, we could not include  
238 informations regarding the class of intravitreal agents injected. However, a study taking  
239 into account this granularity is ongoing. Sixth, conclusions drawn using big data should  
240 always be interpreted with caution because of their limitations, as already pointed out in  
241 the ophthalmology literature.<sup>39</sup>

242         Among the strengths of this study is the collection of data on all health-care  
243 consumption reimbursed by the French health insurance system, for which the quality  
244 and completeness of the coding of procedures are evaluated locally by the medical  
245 information departments of the institutions and at the national level by the paying  
246 organization, and are deemed robust.<sup>40, 41</sup> Moreover, this coding is a condition for the  
247 remuneration of practitioners and institutions. Thanks to the wide range of information  
248 provided by the database, patients' care pathways with endophthalmitis could be studied  
249 extensively to limit misclassification. The use of a national population database  
250 guarantees the exhaustive collection of data avoiding bias linked to selective centers.

251         In conclusion, endophthalmitis remains a rare event after intraocular procedures,  
252 as observed in this study at a national scale over a decade.

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## Tables and figures

**Table 1.** Demographics of Patients with Acute Endophthalmitis after Intraocular Procedures from 2009 to 2018 in France

**Table 2.** Incidence of Postoperative Acute Endophthalmitis after Intraocular Procedures from 2009 to 2018 in France

**Figure 1.** Endophthalmitis Cases by Year and by the Three Main Causes of Postoperative Acute Endophthalmitis in France

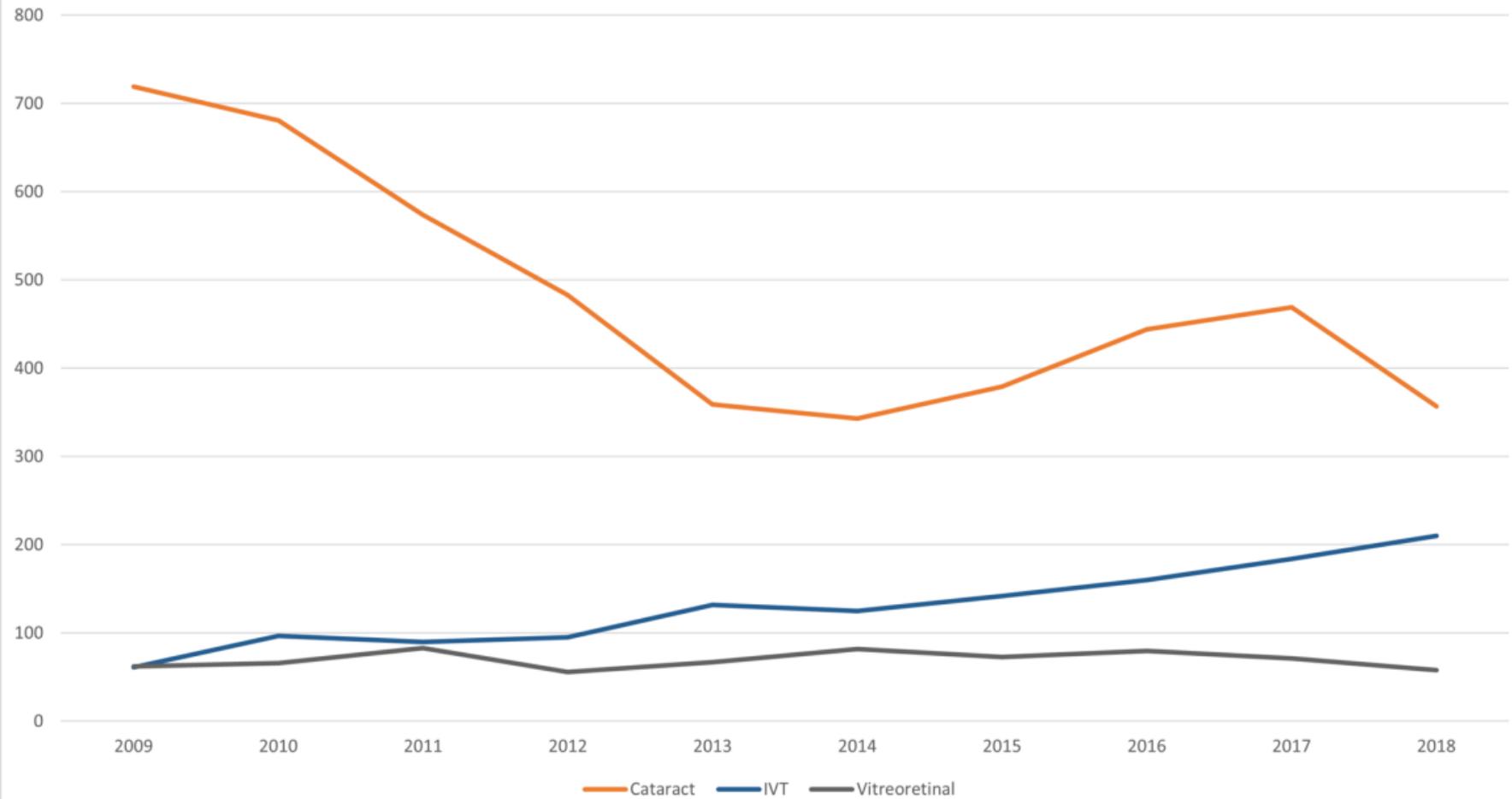
2018 is a truncated year, with the collection ending on October 31, 2018

**Figure 2A and 2B.** Postoperative Acute Endophthalmitis Incidence per Year per Procedure in France.

**2A.** Five Main Causes of Endophthalmitis.

**2B.** Four Other Causes of Endophthalmitis 2018 is a truncated year, with the collection ending on October 31, 2018

Endophthalmitis cases per year by causes



Endophthalmitis cases  
for 100 procedures

## 2A. Incidence per Year for the Five Main Causes of Postoperative Acute Endophthalmitis

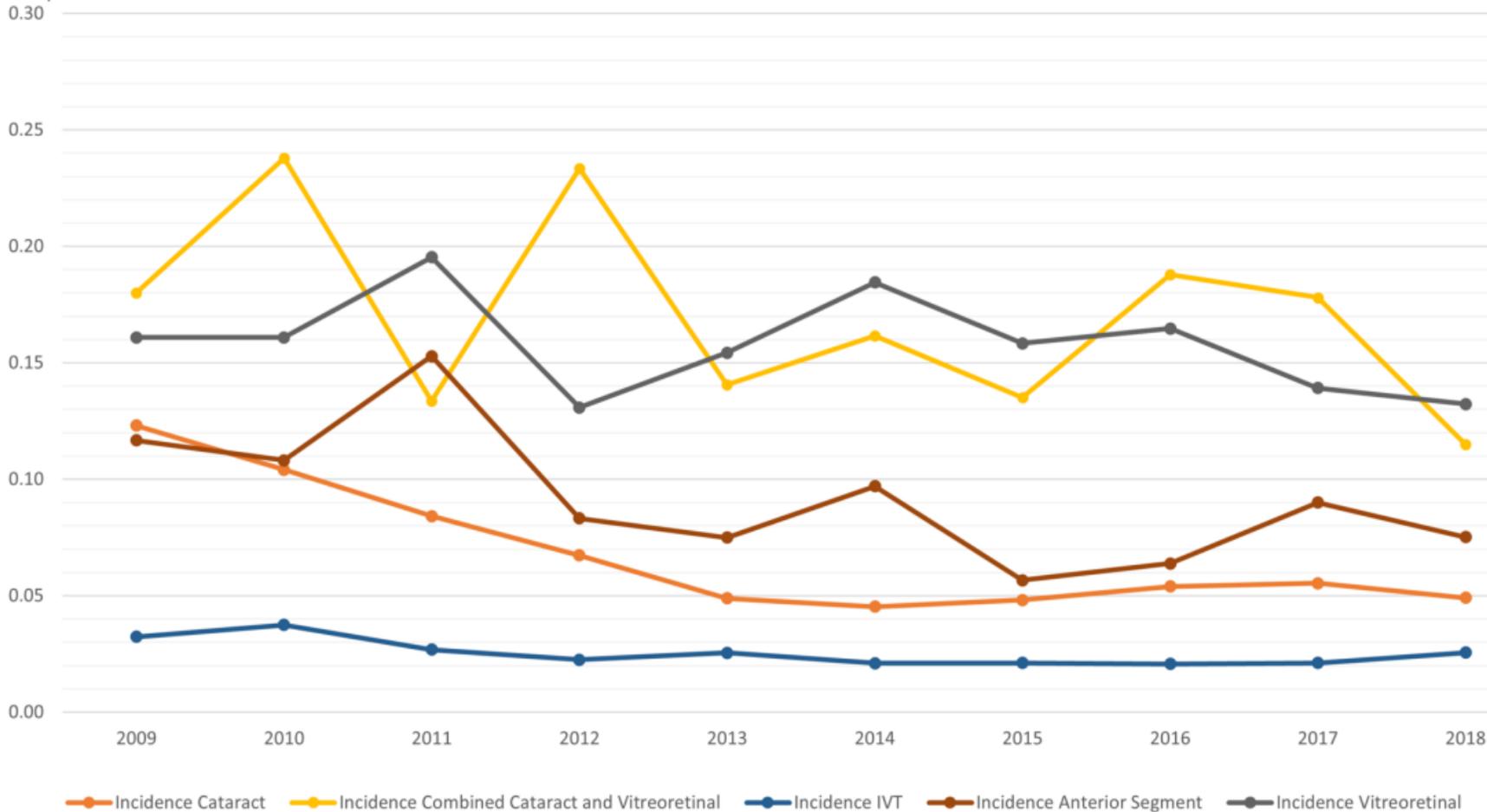


Table 1. Demographics of Patients with Acute Endophthalmitis after Intraocular Procedures from 2009 to 2018 in France

Procedures	Age, yrs (SD)	Sex, female (%)	Endophthalmitis onset, days		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 <sup>a</sup>	Total
			Mean (SD)	Median (IQR)											
Cataract surgery	72.6 (11.4)	50.2%	9.3 (8.7)	6.0 (4.0-11.0)	719	681	574	483	359	343	379	444	469	357	<b>4 808</b>
Intravitreal Injection	75.4 (12.0)	61.4%	6.8 (7.6)	4.0 (3.0-7.0)	61	97	90	95	132	125	142	160	184	210	<b>1 296</b>
Vitreoretinal surgery	66.0 (14.5)	47.6%	7.3 (8.4)	4.0 (2.0-8.0)	62	66	83	56	67	82	73	80	71	58	<b>698</b>
Anterior segment surgery	64.0 (18.7)	49.0%	12.9 (11.5)	8.0 (4.0-20.0)	23	25	37	18	19	29	18	22	32	22	<b>245</b>
Combined cataract and vitreoretinal surgery	67.2 (15.8)	38.2%	9.8 (10.0)	5.0 (3.0-13.0)	15	22	14	26	16	19	17	24	24	14	<b>191</b>
Corneal surgery	61.2 (19.5)	41.6%	15.9 (11.8)	14.0 (5.0-25.0)	14	8	26	12	7	14	14	18	22	7	<b>142</b>
Filtering surgery	64.4 (16.3)	43.8%	14.2 (10.9)	11.5 (5.0-22.5)	7	6	7	6	12	11	9	2	8	12	<b>80</b>
Combined cataract and filtering surgery	70.4 (10.5)	43.9%	10.8 (9.5)	7.0 (4.0-12.0)	6	5	4	8	5	2	2	4	4	1	<b>41</b>
Scleral and globe surgery	52.0 (19.9)	0%	16.4 (13.5)	13.0 (6.0-24.0)	1	2	4	2	1	2	3	3	1	2	<b>21</b>
<b>Total</b>	<b>71.7 (13.0)</b>	<b>51.1%</b>	<b>9.0 (8.9)</b>	<b>6.0 (3.0-10.0)</b>	<b>908</b>	<b>912</b>	<b>839</b>	<b>706</b>	<b>618</b>	<b>627</b>	<b>657</b>	<b>757</b>	<b>815</b>	<b>683<sup>a</sup></b>	<b>7 522<sup>b</sup></b>

a. 2018 is a truncated year, with the data collection ending on October 31, 2018

b. Number of total procedures

Continuous variables are displayed as mean (SD, standard deviation) and median (IQR, interquartile range). Categorical variables are displayed as number and percentage

Table 2. Incidence of Postoperative Acute Endophthalmitis after Intraocular Procedures from 2009 to 2018 in France

Procedures	Number of endophthalmitis	Proportion	Number of procedures	Endophthalmitis per procedure (/ procedure)	Endophthalmitis incidence (95%CI)
Cataract surgery	4 808	63.92%	7 316 077	1/1 522	0.0657 (0.0655–0.0659)
Intravitreal injection	1 296	17.23%	5 455 631	1/4 210	0.0238 (0.0236–0.0239)
Vitreoretinal surgery	698	9.28%	442 263	1/634	0.1578 (0.1568–0.1589)
Anterior segment surgery	245	3.26%	274 995	1/1 122	0.0891 (0.0880–0.0902)
Combined cataract and vitreoretinal surgery	191	2.54%	113 380	1/594	0.1685 (0.1663–0.1706)
Corneal surgery	142	1.89%	669 998	1/4 718	0.0212 (0.0208–0.0215)
Filtering surgery	80	1.06%	108 556	1/1 357	0.0737 (0.0721–0.0752)
Combined cataract and filtering surgery	41	0.54%	46 462	1/1 133	0.0882 (0.0857–0.0908)
Scleral and globe surgery	21	0.28%	11 492	1/547	0.1827 (0.1757–0.1898)
<b>Total</b>	<b>7 522</b>	<b>100%</b>	<b>14 438 854</b>	<b>1/1 920</b>	<b>0.0521 (0.0520–0.0522)</b>

Endophthalmitis cases  
for 100 procedures

## 2B. Incidence per Year for the Four Other Causes of Postoperative Acute Endophthalmitis

