The Royal College of Ophthalmologists' National Ophthalmology Database: Techniques and Complications of Local Anaesthesia for Cataract Surgery

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Aim:

To describe variation in local anaesthesia techniques and complications over a 10-year period and between centres undertaking cataract surgery in the United Kingdom.

Methods:

The analysis was conducted using data submitted to the Royal College of Ophthalmologists National Ophthalmology Database (NOD). Eligible cataract operations were performed between 01/04/2010 and 31/03/2020 in centres with at least 50 eligible operations that supplied data for anaesthesia (type, needle, medication and complication). Excluded were operations without details of anaesthesia, use of general anaesthesia and data from centres with <1% of patients taking anticoagulants which suggests a problem with data capture. Anaesthetic complications are for 'one or more'.

Results:

Eligible for analysis were 1,195,882 operations performed on 814,826 patients in 80 centres by 3,001 surgeons. Topical anaesthesia alone was used in 152,321 (12.7%) operations (NHS year 2010 to 2019 range; 11.2% - 13.0%), combined topical and intracameral anaesthesia in 522,849 (43.7%) operations (NHS year range; 31.7% - 50.9%), sub-Tenon's anaesthesia in 461,175 (38.6%) operations (NHS year range; 45.5% - 34.0%), and peribulbar/retrobulbar anaesthesia in 59,537 (5.0%) operations (NHS year range; 11.6% - 2.1%), **Figures 1 and 2**.

Figure 1: *Anaesthesia technique per NHS year*

(2010 N = 59 678; 2011 N = 71 629; 2012 N= 79 671; 2013 N = 91 302; 2014 N = 103 314; 2015 N = 125 185; 2016 N = 153 499; 2017 N = 162 190; 2018 N = 175 406; 2019 N = 174 008)

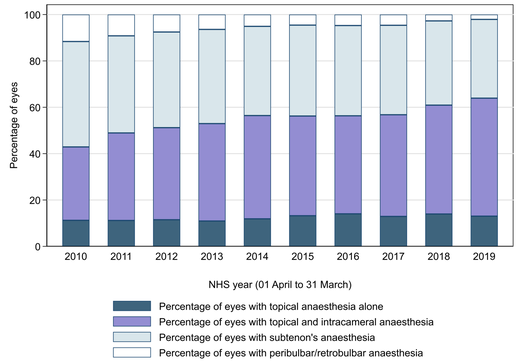
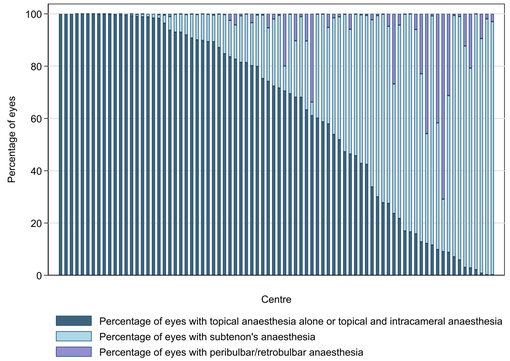


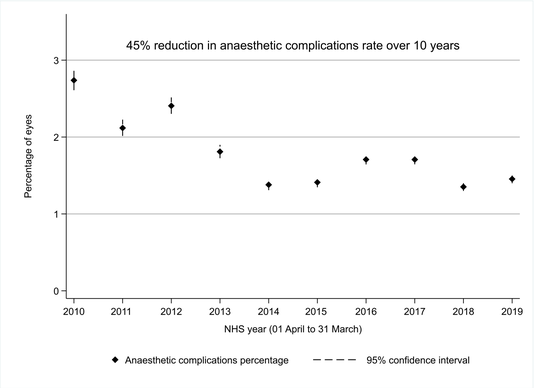
Figure 2: *Anaesthesia technique for each contributing centre*



Overall, an anaesthetic complication occurred in 20,204 (1.7%) operations and the rate decreased across the study period from 2.7% in the 2010 NHS year to 1.5% in the 2019 NHS year, **Figure 3**. The anaesthetic complication rates were 0.3%, 0.3%, 3.5% and 3.1% for topical anaesthesia alone, combined topical and intracameral, sub-Tenon's and peribulbar/retrobulbar respectively, and varied considerably between contributing centres, ranging from <0.1% to 11.0% with 7 (8.8%) centres anaesthetic complication rate higher than 5%, **Figure 4**.

Figure 3: *Anaesthetic complication percentages per NHS year*

(2010 N = 59 678; 2011 N = 71 629; 2012 N= 79 671; 2013 N = 91 302; 2014 N = 103 314; 2015 N = 125 185; 2016 N = 153 499; 2017 N = 162 190; 2018 N = 175 406; 2019 N = 174 008)



The anaesthetic complication rates were 1.9% in patients taking aspirin, 2.3% in patients taking anti-platelet medication, 2.3% in patients taking warfarin, 2.2% in patients taking direct oral anticoagulants (DOACs), and 1.5% in patients taking none of these, **Table 1**.

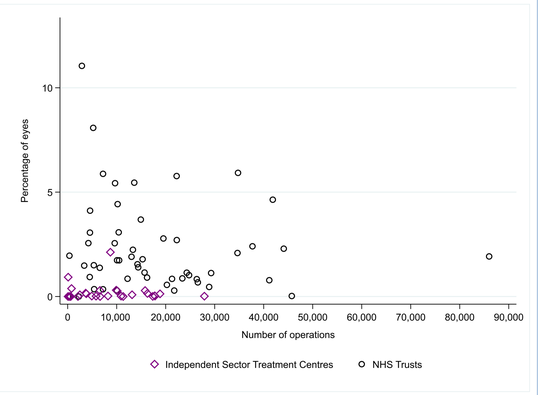
Table 1: *Anaesthetic complications by anaesthesia technique, organization structure and medication for 1,195,882 cataract operations performed in 80 centres*

N (column %)	Topical	Topical + Intracameral	Subtenon	Peribulbar /Retrobulbar	Total
Number of operations	152,321	522,849	461,175	59,537	1,195,882
NHS Trusts:					
Number of operations (row %)	125,516 (13.2)	335,098 (35.1)	437,868 (45.9)	55,377 (5.8)	953,859 (79.8)
NHS - no anaesthetic complications	125,171 (99.7)	333,608 (99.6)	421,750 (96.3)	53,529 (96.7)	934,058 (97.9)
NHS - anaesthetic complications	345 (0.3)	1,490 (0.4)	16,118 (3.7)	1,848 (3.3)	19,801 (2.1)
ISTC:					
Number of operations (row %)	26,805 (11.1)	187,751 (77.6)	23,307 (9.6)	4,160 (1.7)	242,023 (20.2)
ISTC - no anaesthetic complications	26,766 (99.1)	187,514 (99.9)	23,203 (99.6)	4,137 (99.4)	241,620 (99.8)
ISTC - anaesthetic complications	39 (0.1)	237 (0.1)	104 (0.4)	23 (0.6)	403 (0.2)
Number of anaesthetic complications:					
None	151,937 (99.7)	521,122 (99.7)	444,953 (96.5)	57,666 (96.9)	1,175,678 (98.3)
1	374 (0.2)	1,655 (0.3)	14,600 (3.3)	1,687 (2.9)	18,316 (1.6)
2	10 (<0.1)	63 (<0.1)	1,475(0.3)	169 (0.3)	1,717 (0.1)
≥ 3	0	9 (<0.1)	147 (<0.1)	15 (<0.1)	171 (<0.1)
Anaesthetic complications by medication:					
No medication	320 (0.2)	1,160 (0.2)	10,713 (2.3)	1,300 (2.2)	13,493 (1.1)
Aspirin	36 (<0.1)	305 (<0.1)	2,765 (0.6)	331 (0.6)	3,437 (0.3)
Anticoagulants	14 (<0.1)	94 (<0.1)	1,058 (0.2)	96 (0.2)	1,262 (0.1)
Warfarin	8 (<0.1)	120 (<0.1)	1,106 (0.2)	108 (0.2)	1,342 (0.1)
DOACs	6 (<0.1)	48 (<0.1)	580 (0.1)	36 (<0.1)	670 (<0.1)
Total	384 (0.3)	1,727 (0.3)	16,222 (3.5)	1,871 (3.1)	20,204 (1.7)
Recorded anaesthetic complications:					
Sub-conjunctival haemorrhage	51 (<0.1)	600 (0.1)	7,524 (1.6)	557 (0.9)	8,732 (0.7)
Conjunctival chemosis	36 (<0.1)	196 (<0.1)	6,802 (1.5)	843 (1.4)	7,877 (0.7)
Excessive eye movement / Uncontrolled eye	228 (0.1)	872 (0.2)	2,116 (0.5)	251 (0.4)	3,467 (0.3)
Eyelid haemorrhage / bruising	25 (<0.1)	20 (<0.1)	500 (0.1)	219 (0.4)	764 (<0.1)
Retrobulbar / peribulbar haemorrhage	12 (<0.1)	2 (<0.1)	140 (<0.1)	27 (<0.1)	181 (<0.1)
Operation cancelled due to complication	3 (<0.1)	25 (<0.1)	26 (<0.1)	9 (<0.1)	63 (<0.1)
Other	39 (<0.1)	94 (<0.1)	893 (0.2)	165 (0.3)	1,191 (0.1)

Between patients taking warfarin or DOAC, no statistical differences were found in the anaesthetic complication rates for topical anaesthesia alone (0.1% vs. 0.2%; p = 0.576), combined topical and intracameral anaesthesia (0.5% vs. 0.4%; p = 0.097), or sub-Tenon's anaesthesia (5.1% vs. 4.9%; p = 0.460).

In contrast, the anaesthetic complication rates were higher in patients taking warfarin than DOAC amongst those who underwent peribulbar/retrobulbar anaesthesia (4.8% vs. 3.1%; p = 0.024).

Figure 4. *Anaesthetic complication rates for each contributing centre for 1,195,882 cataract operations performed in 80 centres*



Conclusions:

What was known before:

- There has been a shift away from sharp-needle local anaesthesia for cataract surgery in the United Kingdom in recent years.
- Needle based anaesthesia including sub-Tenon's (blunt needle) and peribulbar/retrobulbar (sharp needle) can have sight threatening complications such as globe perforation and/or retrobulbar/peribulbar haemorrhage.

What this study adds:

- Combined topical and intracameral is the commonest choice of anaesthesia for cataract surgery in the United Kingdom and has an excellent safety profile.
- Sight threatening complications associated with sharp-needle local anaesthesia techniques are very infrequent over the past decade.
- Patients taking warfarin who undergo peribulbar/retrobulbar anaesthesia are at a higher risk of non-sight threatening complication compared to those taking direct anticoagulants. There is no additional risk with Warfarin / DOAC for sub-Tenon's or topical/intracameral anaesthesia.