BOAS
BRITISH OPHTHALMIC ANAESTHESIA SOCIETY
www.boas.org

Ophthalmic Anaesthesia

The Journal of
The British Ophthalmic Anaesthesia Society

Volume 12 • Number 1 • 2023
ISSN 2055-0693

The British Ophthalmic Anaesthesia Society (BOAS)

COUNCIL

AWARDS

Lifetime Achievement Award

Prof Chris Dodds
Prof Chandra Kumar
Prof Jaques Ripart
Dr K-L Kong

Lifetime Membership Award

Dr Robert Hamilton
Dr Tony Rubin
Dr Robert Johnson
Dr Gary Fanning
Dr Steve Mather
Dr Sean Tighe
Dr Shashi Vohra

Ophthalmic Anaesthesia © 2023 The British Ophthalmic Anaesthesia Society. ISSN 2055-0693.

Any correspondence or editorial enquiries should be addressed to: editorOA@boas.org

Ophthalmic Anaesthesia © 2023 Vol 12 No 1.

Ophthalmic Anaesthesia

The Journal of
The British Ophthalmic Anaesthesia Society

Volume 12 • Number 1 • 2023

Contents

Editorial

Santhana Kannan

Consultant Anaesthetist
Sandwell & West Birmingham Hospitals
Birmingham, UK

Welcome to another edition of **'Ophthalmic Anaesthesia'!**

The practice of Anaesthesia needs regular review to ensure that it reflects current evidence. Advances in surgical techniques have led to shorter duration procedures and improvement in safety. These provide scope to optimise our monitoring techniques and operating protocols. Until a few years ago, fasting was mandatory even for ophthalmic procedures done under local anaesthesia (LA). Removing this criterion has helped numerous patients and especially those with diabetes. It has allowed flexibility in theatre scheduling and improved efficiency. This issue explores the need for selective usage of intravenous access and ECG monitoring in patients undergoing LA blocks. Mixing of LA agents is still a common practice. Dr. Arora analyses the pharmacological basis and makes recommendations, which may change your practice.

'Immediate sequential bilateral cataract surgery' is a concept which is slowly catching on. There is still a degree of anxiety about risk of infection, but Dr. Sidhu provides data about its utility and safety. Dr. Hewton and Clarke review the literature on use of 'Dexmedetomidine' as an additive to LA with some interesting findings. Audit data is presented about safety of LA blocks at the hands of Physician Associates.

This edition will be my final one as 'Editor' of the journal. My journey started with Autumn 2020 issue and has been a fascinating one to date. It highlighted the challenges of getting quality content in a non-indexed journal. Despite that, we had some excellent contributions addressing practical issues as also new knowledge. The mantle is being passed on to the capable hands of Dr. Jon Clarke, who has vast experience in clinical practice, teaching, research and authorship. I am sure that with your continuing support, he will steer the journal to greater heights.

I would like to extend my thanks to all the contributors for their time and efforts to share their expertise. I also like to thank members of the BOAS Council for their support and encouragement to date. Wish you all a great year ahead.

Santhana Kannan

Dec 2023

President's Message

Tom Eke

Norwich, UK

Hi everyone, I hope you're doing OK. This is my last President's Message, as the excellent Andy Presland will be taking over from now on. My term of three years has, in some ways, 'flown by', but in other ways it feels like 2020 was a very long time ago. When I took over as President, we were in the throes of the Covid-19 pandemic with repeated lockdowns and uncertainty; most BOAS members were doing little or no eye surgery, and instead were helping out in intensive care and the wards. It was a stressful time for all of us, and in many ways 'things will never be the same again'. Along with pretty much everybody else, I'd like to sincerely thank my anaesthesiology colleagues once again for all their hard work and sacrifice during that very difficult time.

The world has changed since 2020 and so has BOAS. Organising an on-line conference for BOAS 2020 was, at the time, a novel and somewhat surreal experience, but now these on-line meetings are definitely 'the new normal'. In 2020, BOAS became a charitable incorporated organisation (CIO), thus ensuring that the society's governance is sound. Now that we have adequately recovered from the pandemic, work has finally started on the much-delayed revision of the 2012 national Guideline on Local Anaesthesia for Eye Surgery, with several BOAS members on the panel. This time, in contrast to the preparation of the 2012 guideline, the committee meetings are all on-line (though we hope for at least one face-to-face meeting to help maintain old friendships, and probably start some new ones!). Guidelines always take a long time to produce, but we expect publication in late 2024 or early 2025.

I'd like to thank the entire BOAS council for all your continuing work on behalf of the society, and I would encourage all members of BOAS to consider joining the council when vacancies occur- our society needs its members! BOAS continues on its mission to work for safer, kinder anaesthesia for all eye patients. Thank you to all BOAS members all for being so caring.

Tom Eke

Ophthalmic Anaesthesia 2023; 12(1): 3-6

Review

Immediate sequential bilateral cataract surgery: embracing an old idea in the new normal

Navdeep Sidhu

Consultant Anaesthesiologist
Department of Anaesthesia and Perioperative Medicine, North Shore Hospital (Te Whatu Ora – Waitemata), Auckland, New Zealand.
Department of Anaesthesiology, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand.

Correspondence to: nsid001@aucklanduni.ac.nz, Twitter: @DrNavSidhu

The conventional approach of treating bilateral cataracts is **delayed sequential bilateral cataract surgery (DSBCS)**, where the operation is performed on each eye on different days to allow assessment of outcome for the first eye before operating on the second. An alternative approach is **immediate sequential bilateral cataract surgery (ISBCS)**, with both eyes operated on in the same session and each eye treated as a separate operation (rescrubbing, new gloves and gown, new instruments, etc).[1] Despite having been established for many years and included in NICE guidelines since 2017,[2] ISBCS is not prevalent in the UK.[3] However, a worldwide healthcare resource crisis exacerbated by the Covid-19 pandemic has prompted calls for wider adoption of ISBCS.[4–8] This editorial aims to explore more recent evidence and shed light on the controversy surrounding ISBCS.

ISBCS offers undeniable efficiency and convenience for both patients and healthcare systems. By addressing cataracts in both eyes within a short timeframe, patients can benefit from reduced overall surgical and recovery periods. It eliminates the need for multiple hospital visits, easing the burden on patients, particularly those living in remote areas or with limited mobility. Indeed, a large proportion of patients want the option of ISBCS for these reasons.[9,10] From a healthcare system perspective, ISBCS optimises resource utilisation, reduces surgical waitlists, halves the number of patient visits and contact exposures, and minimises the strain on medical facilities. A recent economic modelling study set in the National Health Service (NHS) showed a 54% increase in number of cases performed when switching from DSBCS to ISBCS.[11]

In the Canadian (socialised public healthcare) setting, performing ISBCS instead of DSBCS resulted in a 32.4% reduction of overall cost to the healthcare system, with over half the cost savings attributed to the reduction in pre- and post-operative visits.[12] A recent Dutch study demonstrated 23.8% reduction in overall healthcare costs with ISBCS.[13] A Finnish study showed an 18.6% reduction in healthcare costs and a 48.1% reduction in non-healthcare costs with ISBCS, the latter taking into account patient travel, home care, and time costs.[14]

For many patients, cataracts significantly impair visual function and quality of life. ISBCS presents an opportunity for rapid restoration of visual acuity, enhancing the overall patient experience.[15] Immediate vision improvement with no visual imbalance between first and second eye surgery can positively impact daily activities, occupational performance, and psychological well-being. Moreover, the convenience of a single procedure and recovery period may be preferable to some patients, especially those with limited social support or transportation options. Patient experience surveys support the use of ISBCS.[7,16]

Critics of ISBCS often cite the increased risk of clinical complications as a primary concern.[3,17–19] These include bilateral postoperative endophthalmitis and toxic anterior segment syndrome. Upon closer examination, these fears are unfounded. There are no reported cases of bilateral endophthalmitis (when proper aseptic technique had been followed), or bilateral toxic anterior segment syndrome after ISBCS.[5,20]

An analysis of almost 100,000 ISCBS surgeries revealed no cases of bilateral endophthalmitis and an overall infection rate of 0.006% with the use of intracameral antibiotics.[20] A more recent study of 2,000 patients showed no cases of endophthalmitis or toxic anterior segment syndrome.[21] The theoretical risk of bilateral postoperative endophthalmitis after ISBCS with proper aseptic technique is estimated to be less than 1 in 100 million.[5]

Refractive surprise, the failure to achieve the intended postoperative refractive target, is a concern for some ophthalmologists when considering ISBCS.[3,17,18] Some practitioners consider it necessary to adjust the intraocular lens power for the second eye after checking the operative result of the first eye. However, the availability of more sophisticated intraocular lens options allows for better customisation and optimal refractive outcomes. One large study found no difference in best-corrected visual acuity or refractive error between ISBCS and DSBCS patients after accounting for surgeon differences and patient baseline characteristics.[22] Smaller studies have shown similar results.[13–15,21,23–25] Conversely, a large retrospective analysis of post-operative visual outcomes showed a small but statistically significant difference in favour of DSBCS, though stating that the small observed difference may not be of clinical relevance.[26]

There may be financial disincentives for clinicians when considering ISBCS.[4,27,28] Depending on the system of remuneration or reimbursement, a potential loss of revenue may result in resistance to adopting ISBCS as a standard of care, impacting both ophthalmologists and anaesthesiologists.[29] Unsurprisingly, ISBCS is more prevalent in countries that do not impose financially disincentivises.[4,30] However, the availability of additional clinic appointments when switching from DSBCS to ISBCS may partially offset potential loss in surgical revenue.[27]

While ISBCS offers numerous advantages, it is crucial to acknowledge that not all patients are suitable candidates. The decision to proceed with ISBCS should be based on thorough preoperative evaluation and shared decision-making between the surgeon and the patient.

Individual patient factors, such as general health status, ocular condition, and risk profile, should guide the decision-making process. The anaesthetic technique – general anaesthesia, eye block, or local anaesthesia – may also influence decision-making. For example, the risk of two exposures to a general anaesthetic may outweigh any potential concerns with ISBCS. Adhering to rigorous patient selection criteria and optimizing surgical techniques will help mitigate potential risks and ensure positive outcomes. A UK stakeholder analysis concluded that ISBCS was an ethical approach provided that patient autonomy was maintained.[31]

In my practice setting, I work with ophthalmologists who use both approaches. For anaesthesia and analgesia, ISBCS patients receive diclofenac eye drops for 24 hr prior, oral paracetamol, and two drops of proxymetacaine followed by approximately 0.5 to 1 mL of lignocaine 2% gel in each eye. Occasionally, the second eye is 'topped up' with lignocaine gel depending on the time since first application. Minimal sedation is required, typically 0.5 to 1 mg IV midazolam (some receive none). Guided by the ophthalmologist, I use a sub-Tenon block on rare occasions if factors that may complicate the surgery are present, omitting the local anaesthetic gel. Post-operative analgesia consists of oral paracetamol and diclofenac eye drops. Anaesthetic presence facilitates a quick turnover, with as little as 2-3 min between patients (time from when one patient leaves and the next enters the operating room).

The Covid-19 pandemic and ensuing healthcare resource crisis requires us to rethink healthcare delivery. ISBCS offers efficiency, convenience, and improved patient experience. Advances in technology and surgical technique have made ISBCS a low-risk and cost-effective procedure. Anaesthesiologists play a role by working closely with the ophthalmologist and nursing staff to synchronize the timing of surgeries, ensuring efficient patient flow and optimal resource utilisation.

By prioritising patient selection, surgical expertise, and continued research, we can optimise the benefits of ISBCS and pave the way for enhanced cataract treatment in the future.

References

1.Arshinoff, S. A., Strube, Y. N. J. & Yagev, R. Simultaneous bilateral cataract surgery. J. Cataract Refract. Surg. 29, 1281–1291 (2003).

2.National Institute for Health and Care Excellence,. Cataracts in adults: management (NG77). (2017).

3.Lee, E., Balasingam, B., Mills, E. C., Zarei-Ghanavati, M. & Liu, C. A survey exploring ophthalmologists' attitudes and beliefs in performing Immediately Sequential Bilateral Cataract Surgery in the United Kingdom. BMC Ophthalmol. 20, 210 (2020).

4.Singh, G. & Grzybowski, A. Evolution of and developments in simultaneous bilateral cataract surgery. Update 2020. Ann. Transl. Med. 8, 1554–1554 (2020).

5.Ahmed, I. I. K., Hill, W. E. & Arshinoff, S. A. Bilateral Same-Day Cataract Surgery: An Idea Whose Time Has Come #COVID-19. Ophthalmology 128, 13–14 (2021).

6.Srinivasan, S. Immediate sequential bilateral cataract surgery: time for wider adoption. J. Cataract Refract. Surg. 48, 1231–1232 (2022).

7.Wang, H., Ramjiani, V., Raynor, M. & Tan, J. Practice of immediate sequential bilateral cataract surgery (ISBCS) since COVID-19: a patient and surgeon survey. Eye 36, 888–890 (2022).

8.Sandhu, S. et al. Immediately sequential bilateral cataract surgery (ISBCS) adapted protocol during COVID-19. Can. J. Ophthalmol. 58, 171–178 (2023).

9.Shah, V. et al. Acceptability of immediate sequential bilateral cataract surgery (ISBCS) in a public health care setting before and after COVID-19: a prospective patient questionnaire survey. BMJ Open Ophthalmol. 5, e000554 (2020).

10. Malcolm, J., Leak, C., Day, A. C., Baker, H. & Buchan, J. C. Immediate sequential bilateral cataract surgery: patient perceptions and preferences. Eye 37, 1509–1514 (2023).

11. O'Brart, D. P., Roberts, H., Naderi, K. & Gormley, J. Economic modelling of immediately sequential bilateral cataract surgery (ISBCS) in the National Health Service based on possible improvements in surgical efficiency. BMJ Open Ophthalmol. 5, e000426 (2020).

12. O'Brien, J. J., Gonder, J., Botz, C., Chow, K. Y. & Arshinoff, S. A. Immediately sequential bilateral cataract surgery versus delayed sequential bilateral cataract surgery: potential hospital cost savings. Can. J. Ophthalmol. 45, 596–601 (2010).

13. Spekreijse, L. et al. Safety, effectiveness, and cost-effectiveness of immediate versus delayed sequential bilateral cataract surgery in the Netherlands (BICAT-NL study): a multicentre, non-inferiority, randomised controlled trial. The Lancet S0140673623005251 (2023) doi:10.1016/S0140-6736(23)00525-1.

14. Leivo, T. et al. Simultaneous bilateral cataract surgery: Economic analysis; Helsinki Simultaneous Bilateral Cataract Surgery Study Report 2. J. Cataract Refract. Surg. 37, 1003–1008 (2011).

15. Lundström, M., Albrecht, S., Nilsson, M. & Åström, B. Benefit to patients of bilateral same-day cataract extraction: Randomized clinical study. J. Cataract Refract. Surg. 32, 826–830 (2006).

16. Campbell, C. G., La, C. J., Chan, K. L. & Turnbull, A. M. J. Patient satisfaction and attitudes towards immediate sequential bilateral cataract surgery. Eur. J. Ophthalmol. 112067212311577 (2023) doi:10.1177/11206721231157789.

17. Amsden, L. B. et al. Immediate sequential bilateral cataract surgery: surgeon preferences and concerns. Can. J. Ophthalmol. 53, 337–341 (2018).

18. Mills, E. C., Zarei-Ghanavati, M. & Liu, C. S. C. Immediate sequential bilateral cataract surgery: The rationale, implementation, and beliefs of ophthalmic surgeons across Europe: J. Cataract Refract. Surg. 45, 1725–1731 (2019).

19. Spekreijse, L. S. et al. Ophthalmologists' attitudes toward immediate sequential bilateral cataract surgery: Dutch national survey. J. Cataract Refract. Surg. 48, 1044–1049 (2022).

20. Arshinoff, S. A. & Bastianelli, P. A. Incidence of postoperative endophthalmitis after immediate sequential bilateral cataract surgery. J. Cataract Refract. Surg. 37, 2105–2114 (2011).

21. Qi, S. R. et al. Immediately sequential bilateral cataract surgery: an academic teaching center's experience. J. Cataract Refract. Surg. 48, 310–316 (2022).

22. Herrinton, L. J., Liu, L., Alexeeff, S., Carolan, J. & Shorstein, N. H. Immediate Sequential vs. Delayed Sequential Bilateral Cataract Surgery. Ophthalmology 124, 1126–1135 (2017).

23. Sarikkola, A.-U. et al. Simultaneous bilateral versus sequential bilateral cataract surgery: Helsinki Simultaneous Bilateral Cataract Surgery Study Report 1. J. Cataract Refract. Surg. 37, 992–1002 (2011).

24. Serrano-Aguilar, P. et al. Immediately sequential versus delayed sequential bilateral cataract surgery: Safety and effectiveness. J. Cataract Refract. Surg. 38, 1734–1742 (2012).

25. Hong, S., Park, W., Eom, Y., Kim, H. M. & Song, J. S. Comparisons of outcomes and complications of immediate sequential bilateral cataract surgery and unilateral cataract surgery in a tertiary hospital in South Korea. Sci. Rep. 12, 22382 (2022).

26. Owen, J. P. et al. Refractive Outcomes After Immediate Sequential vs Delayed Sequential Bilateral Cataract Surgery. JAMA Ophthalmol. 139, 876 (2021).

27. Neel, S. T. A Cost and Policy Analysis Comparing Immediate Sequential Cataract Surgery and Delayed Sequential Cataract Surgery From the Physician Perspective in the United States. JAMA Ophthalmol. 132, 1359 (2014).

28. Lansingh, V. C., Eckert, K. A. & Strauss, G. Benefits and risks of immediately sequential bilateral cataract surgery: a literature review: ISBCS review. Clin. Experiment. Ophthalmol. 43, 666–672 (2015).

29. Arshinoff, S. A. & Chen, S. H. Simultaneous bilateral cataract surgery: Financial differences among nations and jurisdictions. J. Cataract Refract. Surg. 32, 1355 (2006).

30. Masket, S. Same Day Bilateral Cataract Surgery—Who Benefits? Ophthalmology 128, 11–12 (2021).

31. Quinn, M. et al. A stakeholder meeting exploring the ethical perspectives of immediately sequential bilateral cataract surgery. J. Med. Ethics 47, e44–e44 (2021).

Ophthalmic Anaesthesia 2023; 12(1): 7-12

Dexmedetomidine as an additive to eye blocks: A review of the literature

Lewis Hewton[1], Jon Clarke[2]

1. Dr Lewis Hewton
The Queen Elizabeth Hospital
Adelaide
Australia
lewis.hewton@sa.gov.au

2. Dr Jon Clarke
Private practice
Adelaide
Australia
jclarke5152@gmail.com

Correspondence to: jclarke5152@gmail.com

When considering regional anaesthetic techniques for ophthalmic surgery, delayed onset and a need for block supplementation are potential drawbacks to regional techniques for which additives such as hyaluronidase are used to overcome.[1,2] Other additives including muscle relaxants, sodium bicarbonate, opioids and clonidine have also been investigated to regional eye blocks in attempts to prolong block duration, improve speed of onset and improve operating conditions.[3-6]

Dexmedetomidine is a potent, selective α 2-adrenoreceptor agonist.[7] It can provide dose-dependent sedation, analgesia, anxiolysis and sympatholysis – properties for which its use in peripheral nerve blocks has previously been investigated.[7-9] Addition of dexmedetomidine to eye blocks is a relatively new technique, and while not as extensively studied as additives such as hyaluronidase, there exist a number of primary studies evaluating the addition of dexmedetomidine to **sub-Tenon (STB), retrobulbar (RBB)** and **peribulbar (PBB)** blocks . This review aims to summarise the current available evidence.

Review of literature

Sub-Tenon block (STB)

Of the three techniques, STB had the least available evidence, with only two studies identified. El-Sherbiny et al.[10] studied the addition of dexmedetomidine to bupivacaine in STB for paediatric strabismus surgery under sevoflurane anaesthesia.

They found addition of 0.5 µg/kg-1 dexmedetomidine to STB with bupivacaine led to significantly lower emergence delirium with nil difference in emergence time, decreased pain scores in the first 6 hours post operatively, longer time to first analgesic, less paracetamol requirement and less incidence of **post operative nausea and vomiting (PONV)** compared to bupivacaine alone.[10]

Ghali, Shabana & El Btarny[11] evaluated addition of 20 µg dexmedetomidine to STB with levobupivacaine & hyaluronidase in elective adult **vitreoretinal (VR)** surgery. Similarly, they found improved post-operative analgesia, greater intraoperative and postoperative sedation, as well as both prolonged motor and sensory block duration and improved sleep quality the first post-operative night, compared to levobupivacaine & hyaluronidase alone.[11]

Retrobulbar Block (RBB)

Four studies were identified evaluating use of dexmedetomidine in RBB. In paediatric populations, Ye et al.[12] demonstrated decreased propofol consumption and need for rescue analgesia when dexmedetomidine was added to ropivacaine RBB for VR surgery when compared to ropivacaine alone or general anaesthesia alone. A further study from the same centre demonstrated in paediatric patients undergoing RBB for VR surgery, addition of dexmedetomidine to the block reduced minimum **local anaesthetic (LA)** concentration and improved postoperative analgesia without neurological side effects.[13]

Moving to adult studies; Ye et al.[14] compared patients undergoing lidocaine-bupivacaine RBB with 1 µg/kg dexmedetomidine versus LA alone for orbital ball implant after enucleation surgery, finding prolonged duration of analgesia, decreased postoperative analgesia request & requirement, and both improved patient and surgeon satisfaction in the dexmedetomidine group. Nagy et al.[15] investigated optimum dosing of dexmedetomidine when added to RBB for phacoemulsification cataract surgery. Their study found significantly increased length of block when 0.5 µg/kg dexmedetomidine was added versus 0.25 µg/kg, with improved surgeon satisfaction in the latter group.[15]

Peribulbar block (PBB)

The majority of available literature pertains to PBB with twelve studies identified, all in adult patients, which are further divided into surgery type here.

VR surgery

Six of these studies involved PBB in VR surgery. In a study by Gujral et al.,[1] PBB for patients undergoing VR surgery with lignocaine-bupivacaine block vs lignocaine-bupivacaine plus 20 µg dexmedetomidine block was investigated, resulting in higher sedation scores and improved surgeon satisfaction in the dexmedetomidine group.

A unique study by Alzeftawy & El Morad[16] in 2018 evaluated 25 µg dexmedetomidine versus 4mg dexamethasone as an additive to lidocaine-bupivacaine PBB for VR surgery. They found both dexamethasone and dexmedetomidine groups had prolonged duration of block, prolonged time to first analgesia and less consumption of rescue analgesia but no difference between the two groups for these metrics. Onset of anaesthesia and akinesia was improved and intraocular pressure decreased in the dexmedetomidine group.[16]

Two studies were identified from the same centre in Egypt, the first by El-Ozairy & Tharwat[17] which compared two different doses of dexmedetomidine, 25 or 50 µg, added to PBB with levobupivacaine and hyaluronidase against a control.

They found faster onset of sensory and motor block with the 50 µg dose compared to control, and increased duration of anaesthesia, time to rescue analgesia, and decreased intraocular pressure for both dexmedetomidine groups.[17] Comparing to another α2-agonist, El Kabarity & Kashaba[18] evaluated adding 1 µg/kg dexmedetomidine versus 1 µg/kg clonidine to bupivacaine-lidocaine PBB for VR surgery. They found prolonged duration of lid and globe akinesia, prolonged globe anaesthesia as well as increased time to first analgesic and decreased total analgesic requirement in the dexmedetomidine group versus clonidine.[18] They also found less side effects of dryness of the mouth and dizziness in the dexmedetomidine group.[18]

Hafez et al.[19] evaluated dexmedetomidine at three different doses, 15, 20 and 25 µg in addition to lidocaine-bupivacaine in PBB for VR surgery, finding shorter onset of sensory and motor block, extended analgesic period and block duration, decreased intraocular pressure and better operating conditions in the dexmedetomidine groups. Notably they found 25 µg dose to have the best outcomes.[19]

Contrasting to the above, Subramanian et al.[20] found no advantage to addition of dexmedetomidine in ropivacaine PBB for VR surgery at both 25 µg and 50 µg doses although the study did not include parameters for duration of akinesia. They did however note that patients in the 50 µg dose group were significantly more sedated.[20]

Cataract surgery

Four studies involved PBB in cataract surgery. Abelhamid et al.[4] undertook a unique study in which a control of bupivacaine-lidocaine PBB with hyaluronidase was compared to block with 50 µg dexmedetomidine additive, or block without dexmedetomidine additive but IV dexmedetomidine infusion. They found faster onset of block in the dexmedetomidine additive group, as well as decreased intraocular pressure in both dexmedetomidine additive and IV dexmedetomidine groups. IV dexmedetomidine had the benefit of increased sedation scores and decreased heart rate, however two patients of the thirty that received this treatment developed bradycardia.[4]

A recent study by Moolagani et al.[21] in 2022 compared ropivacaine PBB without additive, and with 10, 15 or 20 µg of dexmedetomidine. They found addition of dexmedetomidine led to increased duration of sensory block, greatest at 20 µg dose, although comparable total analgesic requirements, sedation scores and surgeon satisfaction between groups.[21]

Channabasappa et al.[22] compared lidocaine-bupivacaine PBB for cataract surgery with 25µg or 50µg dexmedetomidine additive to LA only control. Onset of corneal anaesthesia was found to be faster in both dexmedetomidine groups and onset of globe akinesia was found to be shorter in the 50µg group. Duration of anaesthesia was longer, and intraocular pressure was decreased in both dexmedetomidine groups.[22]

Comparing muscle relaxant to dexmedetomidine, Bakr & Abdelaziz[23] evaluated lidocaine-bupivacaine PBB for cataract surgery with a LA only control, 0.06 mg/kg rocuronium additive group and a 50 µg dexmedetomidine additive group. This study found onset of both corneal anaesthesia and globe akinesia was faster in both rocuronium and dexmedetomidine groups than control, although rocuronium was faster than dexmedetomidine. Surgeon satisfaction was also higher in both treatment groups. Dexmedetomidine group had decreased intraocular pressure than the other groups, in addition to providing sedation.[23]

Glaucoma surgery

Two studies involved PBB for glaucoma surgery. Pegu et al.[24] in their 2021 study compared lignocaine-bupivacaine plus hyaluronidase PBB for trabeculectomy or phacotrabeculectomy with 0.4 µg/kg dexmedetomidine additive versus LA plus hyaluronidase only control. The dexmedetomidine group had significantly decreased intraocular pressure, increased surgeon satisfaction, although decreased blood pressures. They however did not find a significant difference for block onset or adverse effects, and this study did not evaluate duration of block.

Contrastingly, Ali et al.[25] in their 2020 study on lidocaine-bupivacaine PBB for subscleral trabeculectomy compared dexmedetomidine additive at doses of 25µg and 50µg to LA only control, and found no significant difference in intraocular pressure. They did however find significantly faster onset of block, and increased duration of block in both dexmedetomidine groups, without sedative effect. Notably they also detected a decrease in heart rate in both dexmedetomidine groups, but not blood pressures.

Discussion

On review of the nineteen available studies, several overarching beneficial themes of dexmedetomidine as an additive to eye blocks emerge. Faster onset of both motor and sensory block was demonstrated with the addition of dexmedetomidine to eye block in a total of seven of the studies reviewed[16, 17, 19, 21-23, 25], with only one study failing to find a significant difference between dexmedetomidine additive and control groups.[24] Increased duration of block was demonstrated in eight of the studies reviewed[11, 14-16, 18, 21, 22, 25], with none of the literature that evaluated this outcome opposing this finding. Analgesia provided by blocks was recorded and evaluated using several metrics. These include time to first analgesia, rescue analgesia requirement, total analgesia requirement and pain scores – with a total of nine studies demonstrating improved analgesia when dexmedetomidine was added to eye block.[10-14, 16-19] Only one study by Moolagani et al.[21] did not find any significant difference in analgesia, however dosage of dexmedetomidine was 20 µg at maximum in this study, the relatively lower dose perhaps contributing to the anomaly.

Given dexmedetomidine's use in achieving dose-dependent sedation when used intravenously, whether this effect is achieved with local blocks is not as clear.7 Four of the studies reviewed demonstrated increased sedation with dexmedetomidine additive to eye blocks, however two found no significant difference between dexmedetomidine additive groups and control.

The study by Moolagani et al.[21] was again one such that did not find any significant difference with the lower dose of dexmedetomidine, however the second paper to refute this by Ali et al.[25] had used doses up to 50µg and not demonstrated an increase in sedation.

Intraocular pressure was another commonly reported outcome from studies evaluating dexmedetomidine in eye blocks. Of those reviewed, a total of six studies demonstrated decreased intraocular pressure when dexmedetomidine was used as an additive to eye block.[4, 16, 17, 19, 23, 24] Only one study by Ali et al.[25] on glaucomatous eyes did not find a significant decrease in intraocular pressure. It should be noted here that a number of the studies reviewed haemodynamic parameters such as blood pressure and heart rate were recorded and in some cases decreased with dexmedetomidine addition to eye block[1, 24], however in none of the reviewed studies was it found to be clinically significant.

Regarding dosage of dexmedetomidine for eye blocks, two broad approaches were taken – either weight-based dosing or a fixed dose. These ranged from 0.25 µg/kg – 1 µg/kg (17.5µg – 70 µg for a 70kg adult) for weight-based, and from 10 µg to 50 µg for static doses. There was no clear consensus between studies on the optimal dose; Nagy et al.15 suggested 0.25 µg/kg as the optimal dose for surgeon satisfaction, however also noted longer duration of block at 0.5 µg/kg. Both El-Ozairy et al.17 and Channabasappa et al.22 found faster onset of both sensory and motor block only with 50 µg dose compared to 25 µg. The study by Hafez et al.19 found best outcomes in their 25 µg group, however this was also the maximum dose tested in their study. Similarly, Moolagani et al.21 also found increased duration of block in their 20 µg group, but this was also their maximum tested dose. The evidence suggests that the larger doses provide greater effect, however it could be argued that this would also increase unwanted side effects. Although none of the studies demonstrated clinically significant hypotension or bradycardia with dexmedetomidine added to the block, they were largely performed on relatively health ASA 1-3 patients, and as such a clinical decision given the patient's circumstances should still be made by the anaesthetising physician.

Clinically, the benefit of weight-based dosing is that of a more individualised dose for the patient (and thus less unwanted side-effect), however in a busy modern day ophthalmic theatre the convenience of a fixed-dose may be preferrable to some anaesthetists and ophthalmic surgeons.

From the available evidence the question of which additive is best cannot be answered. A total of three papers compared dexmedetomidine to other additives. These were dexamethasone[16], clonidine[18] and rocuronium[23]. While the latter showed rocuronium to have faster onset of block[23], dexmedetomidine had modest benefits over clonidine[18] and dexamethasone[16]; however given these are only single studies on relatively small numbers of patients, more evidence on comparison between additives would be required to state which is superior. The authors of this review are unaware of any published case studies pertaining to major complication from dexmedetomidine use in regional eye blocks, however larger studies with sufficient power would also be required to quantify the risk of major complications.

Conclusion

In closing, addition of dexmedetomidine to eye blocks has been demonstrated to provide faster onset of block, increased duration of block, improved analgesia, and reduced intraocular pressure. The optimal dosage is unclear and requires further study, and as such a decision on dosage should be made by the anaesthetising physician accounting for the patient and their comorbidities.

References

1.Gujral GS, Agarwal M, Gautam P, Shrivastav A, Singh S. Evaluation of the effect and safety of dexmedetomidine as an additive to local anesthesia in peribulbar block for vitreoretinal surgery. Indian journal of ophthalmology. 2019; 67: 636-40.

2.Zahl K, Jordan A, McGroarty J, Gotta AW. pH-adjusted bupivacaine and hyaluronidase for peribulbar block. Anesthesiology. 1990; 72: 230-2.

3.Bharti NDNB, Madan RMD, Kaul HLMD, Khokhar SKMD, Mishra SMD. Effect of Addition of Clonidine to Local Anaesthetic Mixture for Peribulbar Block. Anaesthesia and Intensive Care. 2002; 30: 438-41.

4.Abdelhamid AM, Mahmoud A, Abdelhaq MM, Yasin HM, Bayoumi A. Dexmedetomidine as an additive to local anesthetics compared with intravenous dexmedetomidine in peribulbar block for cataract surgery. Saudi journal of anaesthesia. 2016;10: 50-4.

5.Zahl K, Jordan A, McGroarty J, Gotta AW. pH-Adjusted Bupivacaine and Hyaluronidase for Peribulbar Block. Anesthesiology. 1990;72: 230-2.

6.Abdellatif AA, El Shahawy MA, Ahmed AI, Almarakbi WA, Alhashemi JA. Effects of local low-dose rocuronium on the quality of peribulbar anesthesia for cataract surgery. Saudi journal of anaesthesia. 2011; 5: 360-4.

7.Hoy SM, Keating GM. Dexmedetomidine. Drugs. 2011;71: 1481-501.

8.Esmaoglu A, Yegenoglu F, Akin A, Turk CY. Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. Anesthesia and analgesia. 2010;111: 1548-51.

9.Brummett CM, Padda AK, Amodeo FS, Welch KB, Lydic R. Perineural dexmedetomidine added to ropivacaine causes a dose-dependent increase in the duration of thermal antinociception in sciatic nerve block in rat. Anesthesiology. 2009;111: 1111-9.

10. El-Sherbiny SM, Kamal RA, Sadik N, Elshahat A. Effect of Dexmedetomidine in Sub-Tenon's Block on Emergence Agitation in Pediatric Strabismus Surgery under Sevoflurane Anesthesia. Anesthesia, essays and researches. 2022;16:160-6.

11. Ghali AM, Shabana AM, El Btarny AM. The Effect of Low-Dose Dexmedetomidine as an Adjuvant to Levobupivacaine in Patients Undergoing Vitreoretinal Surgery Under Sub-Tenon's Block Anesthesia. Anesthesia and analgesia. 2015;121:1378-82.

12. Ye W, Hu Y, Wu Y, Zhu Z, Jin X, Hu Z. Retrobulbar dexmedetomidine in pediatric vitreoretinal surgery eliminates the need for intraoperative fentanyl and postoperative analgesia: A randomized controlled study. Indian journal of ophthalmology. 2019;67:922-7.

13. Ye W, Hu Z, Jin X. Retrobulbar dexmedetomidine decreases the MLAC of ropivacaine in vitreoretinal surgery in children. European journal of ophthalmology. 2015;25:352-6.

14. Ye W, Hu Z, Jin X, Wang P. Effects of dexmedetomidine for retrobulbar anesthesia in orbital ball implants after enucleation surgery. Indian journal of ophthalmology. 2015;63:704-9.

15. Nagy AA, El-Sayd SH, Ahmed AA, Rajab GZ. Optimal Dose of Dexmedetomidine Retrobulbar Anesthesia during Phacoemulsification Cataract Surgery. Anesthesia, essays and researches. 2017;11:1046-50.

16. Alzeftawy AE, El Morad MB. Dexamethasone Compared to Dexmedetomidine as an Adjuvant to Local Anesthetic Mixture in Peribulbar Block for Vitreoretinal Surgery. A Prospective Randomized Study. Anesthesia, essays and researches. 2018;12:359-65.

17. El-Ozairy H, Tharwat A. Comparative study of the effect of adding two different doses of dexmedetomidine to levobupivacaine/hyaluronidase mixture on the peribulbar block in vitreoretinal surgery. 2014;7:393-9.

18. El Kabarity RK, M. Dexmedetomidine versus clonidine as an adjuvant to peribulbar block in vitreoretinal surgery. Ains Shams Journal of Anesthesiology. 2012;5:288-94.

19. Hafez M, Fahim MR, Abdelhamid MHE, Youssef MMI, Salem AS. The effect of adding dexmedetomidine to local anesthetic mixture for peribulbar block in vitreoretinal surgeries. Egyptian Journal of Anaesthesia. 2016;32:573-9.

20. Subramanian S, Bapat M, Braganza S, Thirumalesh MB. Effect of adding dexmedetomidine to 0.75% ropivacaine in peribulbar block for vitreoretinal surgery. Journal of anaesthesiology, clinical pharmacology. 2022;38:458-63.

21. Moolagani RV, Prathi S, Bandaru S, Arepalli NR, Neethipudi BR. A prospective, randomized, triple-blind comparative study of ropivacaine-dexmedetomidine versus ropivacaine alone in peribulbar blocks. Journal of anaesthesiology, clinical pharmacology. 2023;39:106-12.

22. Channabasappa SM, Shetty VR, Dharmappa SK, Sarma J. Efficacy and safety of dexmedetomidine as an additive to local anesthetics in peribulbar block for cataract surgery. Anesthesia, essays and researches. 2013;7:39-43.

23. Bakr RH, Abdelaziz HMM. Rocuronium versus dexmedetomidine as an adjuvant to local anesthetics in peribulbar block: A double blind randomized placebo controlled study. Egyptian Journal of Anaesthesia. 2017;33:221-6.

24. Pegu J, Purang AK, Dubey S, Gautam P, Garg R, Gandhi M, et al. Effect of dexmedetomidine on intraocular pressure as an additive in peribulbar block during glaucoma surgery. Indian journal of ophthalmology. 2021;69:612-6.

25. Ali H, Eissa S, Magdy H, Khashba M. Dexmedetomidine as an Additive to Local Anesthesia for Decreasing Intraocular Pressure in Glaucoma Surgery: A Randomized Trial. Anesthesiology and pain medicine. 2020;10:e100673.

Ophthalmic Anaesthesia 2023; 12(1): 13-16

Is intravenous access essential for routine cataract surgery under local anaesthesia?

Junia Rahman[1], Santhana Kannan[2]

1. Department of Anaesthesia Moorfields Eye Hospital, London, UK.
2. Department of Anaesthesia Birmingham and Midland Eye Centre, City Hospital, Birmingham, UK.

Correspondence to: Junia.rahman1.nhs.net

Every year, an estimated 20 million cataract operations are carried out worldwide, making it the most prevalent surgical procedure of all surgical specialties. Of these, 3.7 million are carried out in the US and 7 million in Europe, and 1.9 million in China.[2] In the UK, the number is roughly around 470000 procedures per year i.e. about 2.5% of procedures done worldwide. For many years now cataract operations have been increasingly carried out under **local anaesthesia (LA)** and often without the presence of an anaesthesiologist.[1] A recent worldwide survey reported a dedicated anaesthesiologist present in only 30% of cases. In the UK National dataset of 55 567 cataract operations over a five-year period, 95.5% were carried out under LA with 42.1% administered by an anaesthetist. Sharp needle blocks for cataract surgery is still widely practiced in many countries. The worldwide survey reported that **intravenous access (IVA)** is routinely placed in only 60% of centres and this occurred more frequently in public hospitals (76%) compared to academic or private centres.[1] With the advancement of operating techniques leading to shorter operating times for cataract and minimal discomfort for the patient, is there a role for routine placement of IVA for cataract operations under LA?[4]

Indications for IVA

The Joint guidelines from the Royal college of ophthalmologists and the royal college of anaesthetists state that IV cannulation is essential for patients having **peribulbar (PBB)** and **retrobulbar (RBB)** blocks and when intraoperative sedation is used. It is recommended for "long complicated cases under **sub-Tenon block (STB)** and for patients with poor general health". The guideline authors acknowledged that for many issues, the literature evidence was inadequate and recommended best practice was based on "the clinical experience of members of guideline development group". The recommendation of IVA being essential for sharp needle blocks is likely to have been based on assumption of increased risk of major complications requiring urgent intervention. LA effectively eliminates the chances of oculo-cardiac reflex bradycardia, and hence prophylactic IVA is not required for that reason. IVA may be required in some patients (e.g. vitreo-retinal surgery) where there is need to administer medications such as acetazolamide intraoperatively. The question is whether IVA is routinely required for sharp needle blocks in patients who would not need it for any other reason.

The last UK survey estimated that about 9% of LA blocks were done using sharp needle technique without the use of sedation in patients undergoing cataract surgery.[6] This equates to roughly 42000 patients per year. Extrapolating the figures to include worldwide yields a figure of 1.6 million patients getting sharp needle block every year. Although the use of sharp needle blocks is higher in many countries, there is also higher use of sedation. Despite this, the figure is likely to be an underestimate. Avoiding routine cannulation for sharp needle blocks in cataract surgery will lead to significant cost savings and reduced adverse environmental impact of the consumables. However, we need to ensure that patient safety is not compromised by this change.

Evidence in relation to sharp needle blocks

Sharp needle blocks have been shown to be associated with higher incidence of certain complications when compared to STB. However, the question is whether routine IVA in such patients improves patient safety.

The most common serious complication after a sharp needle block is globe perforation with an incidence of 2.23 per 10000.[6] The incidence is much lower in more recent studies in the region of 1 in 20000.[7] In any case, the majority of globe perforations are recognised in the postoperative period and do not need IVA to manage. Other serious complications in a study included profound vasovagal episode (1 in 31000 incidence) and supraventricular tachycardia (1 in 4500 incidence). The incidence of brainstem anaesthesia is around 1 in 4500 or less.[8] None of these were such where immediate IVA could not have been obtained. Allergic reaction to medications and myocardial infarction is rare but have been reported with STB as well where routine IVA is not mandated. Hence, administration of sharp needle blocks without routine IVA should be at least as safe as STB. A conservative estimate will translate to avoiding 1.6 million intravenous cannulas per year worldwide with its associated benefits in terms of environment, patient satisfaction and reduced complications.

Sedation.

The administration of sedation for cataract procedures varies widely between countries and even institutions within a country.6 This is due in part to resources, patient expectations, surgical expectations, and availability of anaesthetist. Many patients report anxiety relating to ophthalmic surgery particularly, fear of pain during the procedure , a squeamishness about the eye and fear of moving that may lead to loss of vision. . Sedation will alleviate much of the anxiety and provide a still subject for optimum surgical conditions, however many patients are not offered the option of IV sedation either due to lack of availability of skilled practitioner or anaesthesiologist or due to the culture of local practice. The author's anecdotal experience found that in urban major cities of Australia, the majority of patients undergoing cataract surgery received intravenous sedation.

In these cases, there was usually an anaesthesiologist present. A survey of UK cataract surgery practice in 2016 found 4.1% of patients received LA with sedation.[6] Tommaso Rossi et al found in their survey across 38 countries that 69% of responders used no sedation in over 90% of their patients, yet 15% used sedation in over 90% of their patients. [1] The use of sedation was heavily influenced by the presence of an anaesthesiologist and one might speculate that larger ophthalmic centres with higher volumes of cataract operations are likely to have regular anaesthesiologist presence for most if not all cataract lists. A survey of Singaporean ophthalmologists in 2016 found that all but one of the 84 respondents (99%) performed cataract operations with the help of an anaesthesiologist and 70% of respondents reported that most of their patients undergoing cataract surgery received sedation.[10] Regular use of IV sedation during cataract surgery is most prevalent in Singapore and the US.[11] This is connected to the availability of qualified medical personal available to administer IV drugs. One might speculate that a fee paying medical system might have more defensive practices and incorporate sedation as routine practice.

A growing movement towards oral preoperative sedation is being seen across many institutions, and this has been shown to be both cost and time efficient.[12, 13, 14] The oral medication can be administered by a nurse preoperatively on the ward removing the need for an IV cannula. Oral medications are, on the whole, cheaper than IV medication and environmentally friendly saving on plastic wastage and use of individual drug vials, drawing up syringes and needles. Patients taking oral medication report similar if not higher rates of satisfaction compared to IV sedation. 12 These patients can then be safely directly monitored in the operating theatre by a nurse or associate practitioner.

Complications of IV cannulation

The insertion of a cannular can be time consuming particularly with more elderly or frail patients. With a greater demand for high flow cataract lists, cannula insertion can lead to delays and list inefficiencies. It requires a skilled practitioner, which may be a nurse, associate practitioner or doctor, who may not be available. Avoiding an IV cannulation removes the patient anxiety towards needles and patient discomfort on insertion. Patient satisfaction and safety is improved by avoiding potential infection, tissue damage and bruising by wrong site insertion and extravasation of drugs, bruising and infection.

Conclusions

Pre-operative routine IVA is not necessary in patients undergoing sharp needle blocks or routine cataract surgery with pre-operative oral sedation. Discontinuation of routine IVA may improve patient satisfaction, decrease health care costs, improve theatre flow efficiency without compromising patient safety and have environmental benefits. Relevant resuscitation equipment must be available for emergency IVA to treat rare complications. Future guidelines should consider including these aspects to aid clarity for practitioners.

References

1. Rossi T, Romano MR, Iannetta D et al. Cataract surgery practice patterns worldwide: a survey. BMJ Open Ophthalmol. 2021; 13; 6:e000464. doi: 10.1136/bmjophth-2020-000464. PMID: 33501377.

2. Zhuang M, Fan W, Xie P, Yuan ST, Liu QH, Zhao C. Evaluation of the safety and quality of day-case cataract surgery based on 4151 cases. Int J Ophthalmol. 2019; 12: 291-295. doi: 10.18240/ijo.2019.02.17. PMID: 30809487.

3. El-Hindy N, Johnston RL, Jaycock P et al. UK EPR user group. The Cataract National Dataset Electronic Multi-centre Audit of 55,567 operations: anaesthetic techniques and complications. Eye (Lond). 2009;23: 50-5. doi: 10.1038/sj.eye.6703031. Epub 2008 Mar 14. PMID: 18344970.

4. Anker R. Kaur, N. Regional anaesthesia for ophthalmic surgery. BJA Education. 2017; 17. 221-227. 10.1093/bjaed/mkw078.

5. https://www.rcophth.ac.uk/wp-content/uploads/2021/08/2012-SCI-247-Local-Anaesthesia-in-Ophthalmic-Surgery-2012.pdf

6. Lee RM, Thompson JR, Eke T. Severe adverse events associated with local anaesthesia in cataract surgery: 1 year national survey of practice and complications in the UK. Br J Ophthalmol. 2016;100:772-6. doi: 10.1136/bjophthalmol-2015-307060. Epub 2015 Sep 24. PMID: 26405103.

7. Babu N, Kumar J, Kohli P, Ahuja A, Shah P, Ramasamy K. Clinical Presentation and Management of Eyes with Globe Perforation during Peribulbar and Retrobulbar Anesthesia: A Retrospective Case Series. Korean J Ophthalmol. 2022; 36: 16-25. doi: 10.3341/kjo.2021.0090. Epub 2021 Nov 8. PMID: 34743491; PMCID: PMC8849991.

8. Hamilton RC, Gimbel HV, Strunin L. Regional anaesthesia for 12,000 cataract extraction and intraocular lens implantation procedures. Can J Anaesth. 1988; 35: 615-23. doi: 10.1007/BF03020350. PMID: 3203455.

9. Akkaya S, Özkurt YB, Aksoy S, Kökçen HK. Differences in pain experience and cooperation between consecutive surgeries in patients undergoing phacoemulsification. Int Ophthalmol. 2017;37: 545-552. doi: 10.1007/s10792-016-0295-3. Epub 2016 Jul 23. PMID: 27450789.

10. Tam YS, Kumar CM, Au Eong KG, Yip CC, Cheng J. Trends in Cataract Surgery Technique and Anaesthesia Preferences in Singapore: A 2016 Survey. Ann Acad Med Singap. 2018; 47: 390-393. PMID: 30324968.

11. Eichel R, Goldberg I. Anaesthesia techniques for cataract surgery: a survey of delegates to the Congress of the International Council of Ophthalmology, 2002. Clin Exp Ophthalmol. 2005 Oct;33(5):469-72. doi: 10.1111/j.1442-9071.2005.01063.x. PMID: 16181270.

12. Hock LE, Kennedy S, Wilson CW et al. Oral anxiolytics prior to routine resident cataract surgery eliminate need for intravenous sedation at a Veterans Affairs Hospital. Am J Ophthalmol Case Rep. 2022 ; 8: 25:101379. doi: 10.1016/j.ajoc.2022.101379. PMID: 35198808; PMCID: PMC8842029.

13. Chen M., Hill G.M., Patrianakos T.D., Ku E.S., Chen M.L. Oral diazepam versus intravenous midazolam for conscious sedation during cataract surgery performed using topical anesthesia. J Cataract Refract Surg. 2015;41: 415–421

14. Peeler C.E., Villani C.M., Fiorello M.G., Lee H.J., Subramanian M.L. Oral versus intravenous sedation study G. Patient satisfaction with oral versus intravenous sedation for cataract surgery: a randomized clinical trial. Ophthalmology. 2019;126: 1212–1218.

Ophthalmic Anaesthesia 2023; 12(1): 17-18

Audit of the safety and efficacy of Sub-Tenon block administered by Ophthalmic Anaesthetic Practitioners

Bryher Francis[1], Indy Sian[2], Mohanad Moustafa[2]

1. Royal United Hospital Bath, UK
2. Musgrove Park Hospital Somerset Foundation Trust Taunton, UK

Correspondence to: Bryher.francis@hotmail.co.uk

The number of cataract surgeries performed in the NHS has been dramatically increasing over the last 15 years. In England, the number of cataract procedures has doubled from around 200,000 procedures per year in 1999 to around 400,000 procedures in 2015.[1] Given our ageing population, the number of patients with age related disease is going to continue to grow. Historically, Consultant Anaesthetists have given ophthalmic regional blocks including **retrobulbar (RBB) , peribulbar (PBB)** and **sub-Tenon (STB)**. However, given the limited availability of anaesthetists to cover this rising demand of cataract lists, non-medical practitioners have been trained to perform local anaesthesia blocks for cataract surgery.

The Royal College of Ophthalmologists in conjunction with the Royal College of Anaesthetists produced guidelines on Local Anaesthetic in Ophthalmic surgery.[2] These stated that appropriately trained, professionally regulated and indemnified non-medical staff can administer subconjunctival or STB for selected, ambulatory cataract surgery patients. STB are considered much safer than PBB or RBB.[2,3] Minor complications such as subconjunctival haemorrhage and chemosis are common with STB. However, major sight and life-threatening complications such as orbital haemorrhage, globe perforation, brainstem anaesthesia, optic nerve injury and oculo-cardiac reflex are rare.[3]

We performed an audit to evaluate the safety and efficacy of STB administered by **Ophthalmic Anaesthetic Practitioners (OAPs)** at Musgrove Park Hospital, Taunton.

Methods

We performed a retrospective audit collecting data from Medisight. It was analysed using Medisight audit suite. We analysed all cataract procedures between 01 August 2021 - 31 January 2022. We analysed STB performed by OAPs. STB was administered using a mixture of lidocaine 2% and hyalase 150 IU/ml. The volume was titrated to the individual patient. Complications relating to the STB performed by OAPs were also audited. Data was collected to analyse whether the complications impacted on visual acuity, ability of surgeon to perform the surgery, revisit rates to clinic or patient satisfaction. Any patient factors contributing to the complications were also looked at.

Results

During the six-month period, 1410 cataract operations were performed. 1069 patients had STB (75%). Of these, 838 STB were performed by the OAPs (70%). Only 5 patients had incomplete akinesia. The overall complication rate was low at 5.5% (Table 1). The complications were all in the minor category. Of the 39 patients with sub conjunctival haemorrhage, 38% were on anti-platelet or anticoagulant medication.

Table 1.

Complications following STB	Number of patients
Conjunctival Chemosis	2
Conjunctival Chemosis and Sub-conjunctival haemorrhage	6
Tense Orbit	1
Sub-conjunctival haemorrhage	31
Sub-conjunctival haemorrhage and incomplete akinesia	1
Incomplete akinesia	5

Of the patients that had a complication related to their anaesthetic, post-operative visual acuity could be obtained for 74% of the patients. 85% of these had a post-operative visual acuity of 6 / 7.5 or better. Other ocular co-morbidities which might have limited post-operative visual acuity were not considered. It was not documented that their anaesthetic complications had any impact on their post-operative visual acuity. No surgeons commented that the complications made the surgery more challenging. No patient had to return to the eye clinic following an anaesthetic complication.

The satisfaction questionnaire was completed by 31 of the patients who had an anaesthetic complication. Of these, 90% of patients agreed or strongly agreed that they were satisfied with their visual outcome following surgery.

Conclusion

STB done by OAPs for patients undergoing cataract surgery at Musgrove Park Hospital had a low incidence of complications, all of which were in the minor category. The vast majority of the STB provided good akinesia. These results support the provision of safe and effective STB service by OAPs and could be expanded to other centres in NHS.

References

1.The Way Forward: Cataract. 2015. Royal College of Ophthalmology

2.Local Anaesthesia for Ophthalmic Surgery. February 2012. Joint Guidelines from Royal College of Anaesthetists and Royal College of Ophthalmologists

3.Kumar CM, Eid H, Dodds C. Sub-Tenon's anaesthesia: complications and their prevention. Eye (London). 2011; 25: 694-703.

Ophthalmic Anaesthesia 2023; 12(1): 19-21

Monitoring requirements for routine cataract surgery under local anaesthesia alone - can we reduce the number of dots?

Junia Rahman

1. Department of Anaesthesia
Moorfields Eye Hospital,
London, UK.

Correspondence to: Junia.rahman1.nhs.net

Advancing techniques in cataract extraction involving phacoemulsification and intraocular lens implant have made it possible for the procedures to be performed in the vast majority with ultra short incision, vastly reduced time duration and local anaesthesia. Cataract surgery is now considered as low risk intervention with very low incidence of serious complications.[1]

Monitoring standards for cataract surgery

Minimum monitoring standards in the UK and many other countries requires ECG and **Pulse Oximetry (SpO_2)** for **Local anaesthesia (LA)** only procedures[1], and addition of blood pressure if sedation is used. The blood pressure needs to be measured for a minimum of the first 30 minutes post sedation.

The Association of Anaesthetists of Great Britain & Ireland recommends the same minimum standards of monitoring as for **general anaesthesia (GA)** regardless of the anaesthetic technique used.[1] This includes non-invasive blood pressure, pulse oximetry and ECG. Capnography is recommended where there is loss of normal response to verbal contact or when deep sedation is used. A minimal period of monitoring of 30 minutes should be considered where LA alone is used as LA systemic toxicity can have a delayed manifestation.[2] This is less of an issue with eye regional blocks. An anaesthetist does not need to be present during the case where LA or LA plus conscious sedation is used but there must be an appropriately trained person to monitor the patient. The recommendations of European Board of Anaesthesiology and the American Society of Anaesthesiologists are similar to The Joint guidelines from the Royal College of Ophthalmologists and the Royal College of Anaesthetists recommend clinical observation and pulse oximetry as a bare minimum for all patients.[4] *"ECG and blood pressure are required for patients having sedation and those who are at risk of cardiovascular complications (e.g., hypertensives, patients with pacemaker, diabetics)".* Only about a quarter of patients undergoing cataract surgery do not have any co-existing illness.[5] About 15 – 25% of patients undergoing cataract surgery have diabetes and up to 50% of patients have hypertension.[6] Hence these patients do form a large group. The vast majority of these patients have good systemic reserve. ECG monitoring is useful to pick acute atrial and ventricular arrhythmias, and potentially myocardial ischaemia. If the incidence of these events is very low, then is it justified to use ECG monitoring by default in all patients with hypertension or diabetes who undergo cataract surgery under LA, and will it improve patient safety? Should the ECG monitoring be restricted to patients with a history of heart failure, myocardial infarction, or angina alone?

Adverse incidents

Previous studies have shown that up to 37 .4% of cataract cases performed under LA require the intervention or presence of an anaesthesiologist.[7, 8] Arrhythmia was a reason for intervention in 0.2% of patients. More recent study in patients undergoing cataract surgery under topical anaesthesia found that bradycardia happened in 1.2% of patients. None of these patients had ECG monitoring and there were no sequelae.

A review of reports from the Australian incidents Monitoring study found that of 197 reports 5 pertained to ophthalmology and that these were likely related to inadequacies in the preoperative assessment process.[10] However, the details of the surgery and type of anaesthetic were not clarified, nor the level of harm detailed. Another study in Massachusetts collecting data over a 5-year period of adverse events in cataract surgery reported 37 adverse events, 15 of which were anaesthesia related including 5 wrong eye blocks, 3 cases of haemodynamic instability, 2 retrobulbar haematoma/haemorrhage, 5 globe perforations.[11] The incidence of intraoperative adverse events is about 19 per 1000 operations (1.9%) but only 1 in 2500 patients needed unplanned hospitalisation.1 All patients in this study had LA under sedation. The incidence of all form of adverse events for patients with hypertension and diabetes was 27 per 1000 and 33 per 1000 procedures respectively. Arrhythmia occurred in 6.5 per 1000 procedures. However, only 1 patient had ventricular tachycardia (roughly 1 per 20000). In another study, the incidence of arrhythmia after STB was 1 in 1200.[12] One case of cardiac arrest was reported out of 160000 STB in a previous survey.[13] The same study also reported other arrythmias such as atrial fibrillation, but their incidence was less than 1 in 10000. Complications with local eye blocks are rare and rarer still with non-sharp needle techniques.[14] General under-reporting of incidents is recognised, therefore relying on data collection may be an underestimation of the actual reality of adverse events.

Can we reduce the indications for ECG monitoring in cataract surgery under LA?

Severe adverse events during cataract surgery under LA will happen. Thankfully, they are rare, even in patients with diabetes and hypertension. The vast majority of patients have reasonable systemic reserve and combined with the short duration of surgical procedure and safety of LA, are unlikely to experience any significant events. Pulse oximetry will also pick up changes in rhythm and heart rate. In the event of a significant event, the ECG monitor can be attached quickly. Access to appropriately skilled person and relevant resuscitative equipment will aid safety. With an estimated 20 million cataract procedures done annually worldwide, a conservative estimate will put the number of patients with diabetes and hypertension at around 10 million. Even if half of these do not have routine ECG monitoring intraoperatively, that will be 30 million ECG dots saved per year! This will lead to cost savings and environmental benefits without compromising patient safety.

The list of high-risk patients in whom routine ECG monitoring may be beneficial during cataract surgery can be trimmed down to those with history of angina, myocardial infarction, heart failure and pacemaker.

Conclusion

Cataract surgery under LA as an ambulatory day procedure is safe and quick. A significant proportion of these patients have diabetes and hypertension but have good systemic reserve. The incidence of serious systemic adverse events where ECG monitoring would have helped in diagnosis and treatment is low. Reducing the indications for routine ECG monitoring in cataract surgery under LA will lead to cost savings and environmental benefits. Addressing this issue in future guidelines will aid clarity.

References

1. Klein AA, Meek T, Allcock E et al. Recommendations for standards of monitoring during anaesthesia and recovery 2021: Guideline from the Association of Anaesthetists. Anaesthesia. 2021; 76: 1212-1223. doi: 10.1111/anae.15501.

2. Macfarlane AJR, Gitman M, Bornstein KJ, El-Boghdadly K, Weinberg G. Updates in our understanding of local anaesthetic systemic toxicity: a narrative review. Anaesthesia. 2021; 76 Suppl 1: 27-39. doi: 10.1111/anae.15282.

3. European Board of Anaesthesiology. EBA recommendations for minimal monitoring during anaesthesia and recovery. 2012. http://www.eba-uems.eu/resources/PDFS/safety-guidelines/EBA-Minimal-monitor.pdf

4. https://www.rcophth.ac.uk/wp-content/uploads/2021/08/2012-SCI-247-Local-Anaesthesia-in-Ophthalmic-Surgery-2012.pdf

5. Schein OD, Katz J, Bass EB, Tielsch JM, Lubomski LH, Feldman MA, Petty BG, Steinberg EP. The value of routine preoperative medical testing before cataract surgery. Study of Medical Testing for Cataract Surgery. N Engl J Med. 2000; 20: 342:168-75. doi: 10.1056/NEJM200001203420304.

6. Panozzo G, Staurenghi G, Dalla Mura G, et al. Prevalence of diabetes and diabetic macular edema in patients undergoing senile cataract surgery in Italy: The DIabetes and CATaract study. European Journal of Ophthalmology. 2020; 30: 315-320. doi:10.1177/1120672119830578

7. Gemma M, Gioia L, Dedola E, et al. Anesthesiologist Intervention during Cataract Surgery under Topical or Peribulbar Anesthesia: A Propensity Model Comparison. European Journal of Ophthalmology. 2010; 20: 687-693. doi:10.1177/112067211002000408

8. Rosenfeld S. Litinsky SM, Snyder DA et al. Effectiveness of monitored anesthesia care in cataract surgery – Ophthalmology 1999;106:1256 - 61. https://www.aaojournal.org/article/S0161-6420(99)00705-8/fulltext.

9. Duroi, Q., Baudet, JM., Bigoteau, M. et al. Ambulatory cataract surgery centre without perioperative anaesthesia care: a prospective cohort study. Sci Rep 2021; 11, 8311 https://doi.org/10.1038/s41598-021-87926-0

10. Runciman WB, Sellen A, Webb RK et al. The Australian Incident Monitoring Study. Errors, incidents and accidents in anaesthetic practice. Anaesth Intensive Care. 1993 ; 21: 506-19. doi: 10.1177/0310057X9302100506..

11. Roberto SA, Bayes J, Karner PE, Morley MG, Nanji KC. Patient Harm in Cataract Surgery: A Series of Adverse Events in Massachusetts. Anesth Analg. 2018; 126: 1548-1550. doi: 10.1213/ANE.0000000000002526.

12. Guise PA. Sub-Tenon anesthesia: a prospective study of 6,000 blocks. Anesthesiology. 2003; 98: 964 - 8. doi: 10.1097/00000542-200304000-00025.

13. Eke T, Thompson JR. Serious complications of local anaesthesia for cataract surgery: a 1 year national survey in the United Kingdom. Br J Ophthalmol. 2007; 91: 470 - 5. doi: 10.1136/bjo.2006.106005. Epub 2006 Nov 23..

14. Lee RM, Thompson JR, Eke T. Severe adverse events associated with local anaesthesia in cataract surgery: 1 year national survey of practice and complications in the UK. Br J Ophthalmol. 2016; 100: 772-6. doi: 10.1136/bjophthalmol-2015-307060.

Ophthalmic Anaesthesia 2023; 12(1): 22-24

Local anaesthetic agents for eye blocks – to mix or not to mix?

Anand Arora

1. Department of Anaesthesia
Birmingham and Midland Eye Centre,
SWBH Trust, Birmingham, UK

Correspondence to: Dranandarora@gmail.com

To be, or not to be, that is the question :(William Shakespeare's play Hamlet, Act 3, Scene 1)

Mixing of short and long-acting **Local Anaesthetics (LA)** appears to be a common clinical practice (e.g., lidocaine and bupivacaine) for various reasons. In this article, we will summarise the relevant LA pharmacology and analyse the literature available to determine if the current evidence supports this practice.

Mechanism of action of LA

The characteristics of a regional block depend on

1. The concentration gradient of the LA across the neuronal cell membrane
2. The proportion of the drug in the un-ionised form (un-ionised form is able to enter the neuron and block the fast Na+ channels. The amount of un-ionised form depends on the pH of the milieu and pKa of the LA) and
3. Protein binding of the LA.

LA	Onset of action	Duration of action
Lidocaine	Fast (2-4 minutes)	Moderate (30-60 minutes)
Ropivacaine	Medium (5-10 minutes)	Long (120-240 minutes)
Bupivacaine	Slow (15-30 minutes)	Very long (240-480 minutes)

Why would clinicians use mixture of LA?

In theory, mixing of LA with similar effects but different properties will allow the clinician to use the agents to their advantage. Therefore, mixing of lidocaine and bupivacaine might allow early onset of action (due to lidocaine) but prolonged effect (due to bupivacaine). The resultant reduced waiting time for effect might help with theatre efficiency.

What happens to LA solution when two of them are mixed?

A) Concentration of each LA in mixture decreases

When two LAs are combined, the concentration of solute in the total solution is correspondingly decreased. For example, mixing 1 ml of lidocaine 2% (20 mg lidocaine) with 1 ml of bupivacaine 0.5%(5 mg) becomes a 2 ml solution containing lidocaine 1%(20 mg Lidocaine in 2 ml total volume)and bupivacaine 0.25% (5 mg Bupivacaine in 2 ml total volume). This lower concentration may mean that less of each drug penetrates the nerve to bind to the sodium channels (as the concentration gradient across the neuronal membrane will be reduced).

B) Changes to the characteristics of the mixed LA solution

Mixing drugs of varying pH can alter their ionised and unionised proportions. The higher the pH (more alkaline), the greater the proportion of un-ionised LA; conversely, the lower the pH, the lower the proportion of un-ionised LA available to go across the nerve membrane.

Lidocaine has a pH of 6 and is the least acidic of the commonly mixed agents. Therefore, combining lidocaine (fast onset) with other agents such as bupivacaine or levo-bupivacaine (slower onset) decreases the pH of the resultant solution (compared to Lidocaine alone), resulting in a lower proportion of un-ionised lidocaine. This is why adding sodium bicarbonate to LA hastens onset of action.

What does the evidence show?

There are limited number of studies assessing the effectiveness of mixing LA for regional blocks. There is some conflicting evidence as also variance in findings of mixing LA for regional blocks in non-ophthalmic vs ophthalmic settings.

In a study involving femoral and sciatic nerve blocks, Cuvillion et al found that mixing short and long acting LA (0.5% bupivacaine or 0.75% ropivacaine mixed with 2% lidocaine) resulted in quicker onset time but reduced duration of action when compared to using longer acting LA alone.[1] A recent double blind randomised control trial in brachial plexus blocks had similar findings.[2] The block was administered with 20 ml volume of LA and compared three groups: 2% lidocaine with 5 microgram per ml adrenaline, 0.5% bupivacaine, and equal volume mixture of lidocaine 2% with adrenaline 5 mcg/ml and 0.5% bupivacaine. The mixture provided significantly faster onset of brachial plexus block compared with bupivacaine alone and longer duration of postoperative analgesia compared with lidocaine alone (but shorter duration of analgesia than bupivacaine alone). Other studies found that the onset time was not hastened by mixing LA.[3] Pongraweewan et al found that the mixing of 2% lidocaine with 0.5% bupivacaine did not shorten the onset time for anaesthesia compared to the group randomised to receiving just 0.5% Bupivacaine.[4]

Jaichandran et al found no significant difference in onset of motor blockade between the three groups when lidocaine , mixture of lidocaine & bupivacaine, and bupivacaine alone were used to perform peribulbar blocks for vitrectomy.[5] The mean onset times (± SD) of motor blockade for the lidocaine, bupivacaine, and combination groups were 3.04 ± 1.81, 4.04 ± 2.68, and 3.38 ± 2.48 min respectively ($p = 0.255$). Mean time of onset of intra-operative pain (if used as a surrogate for duration of anaesthesia) was significantly prolonged for the bupivacaine group (149 min) compared with that of the combination group (115 min), and that of the lidocaine group (94 min) ($p < 0.001$).

A recent narrative review addressed the potential benefits and risks of LA mixtures.[6] It considered mixing of two LA agents "flawed on pharmacokinetic principles". There is no evidence-based method of calculating total maximum dose of the two agents used in the mixture to avoid toxicity. The volumes used for eye regional blocks are quite small and this may be a less important consideration in ophthalmic anaesthesia.

Conclusion

The pharmacokinetic principles of LA solutions suggest that mixing the LA is neither a good idea nor necessary for ophthalmic blocks. Mixing of LA will shorten the duration of block and potentially reduce the advantage of longer duration of postoperative analgesia. If longer duration of anaesthesia is required, it would be best to use longer acting agents on their own instead of mixing different LA agents.

References

1. Cuvillon P, Nouvellon E, Ripart J et al. A comparison of the pharmacodynamics and pharmacokinetics of bupivacaine, ropivacaine (with epinephrine) and their equal volume mixtures with lidocaine used for femoral and sciatic nerve blocks: a double-blind randomized study. Anesth Analg. 2009;108: 641-9. doi: 10.1213/ane.0b013e31819237f8.

2. Sripriya R, Sivashanmugam T, Rajadurai D, Parthasarathy S. Equal mixture of 2% lidocaine with adrenaline and 0.5% bupivacaine 20 mL provided faster onset of complete conduction blockade during ultrasound-guided supraclavicular brachial plexus block than 20 mL of 0.5% bupivacaine alone: a randomized double-blinded clinical trial. Reg Anesth Pain Med. 2023; 9: rapm-2023-104542. doi: 10.1136/rapm-2023-104542.

3. Almasi R, Rezman B, Kriszta Z, Patczai B, Wiegand N, Bogar L. Onset times and duration of analgesic effect of various concentrations of local anesthetic solutions in standardized volume used for brachial plexus blocks. Heliyon. 2020; 2; 6 e04718. doi: 10.1016/j.heliyon.2020.e04718.

4. Pongraweewan O, Inchua N, Kitsiripant C, Kongmuang B, Tiwirach W. Onset Time of 2% Lidocaine and 0.5% Bupivacaine Mixture versus 0.5% Bupivacaine Alone using Ultrasound and Double Nerve Stimulation for Infraclavicular Brachial Plexus Anesthesia in ESRD Patients Undergoing Arteriovenous Fistula Creation. J Med Assoc Thai. 2016; 99: 589-95..

5. Jaichandran VV, Raman R, Gella L, Sharma T. Local anaesthetic agents for vitreoretinal surgery: no advantage to mixing solutions. Ophthalmology. 2015; 122: 1030-3. doi: 10.1016/j.ophtha.2014.11.026.

6. Nestor CC, Ng C, Sepulveda P, Irwin MG. Pharmacological and clinical implications of local anaesthetic mixtures: a narrative review. Anaesthesia. 2022; 77: 339-350. doi: 10.1111/anae.15641. Epub 2021 Dec 14.

What is new in Ophthalmic Anaesthesia?

Prakash Vadukul

Specalist Trainee in Anaesthesia,
University Hospitals Birmingham NHS Trust,
Birmingham, UK

Correspondence to be addressed to - prakash.vadukul@nhs.net

Keep an eye out

Bright MR, White LD, Concha Blamey SI, Endlich Y, Culwick MD. Perioperative corneal abrasions: A report of 42 cases from the webAIRS database. Anaesthesia and Intensive Care. 2023;51:63-71. doi:10.1177/0310057X221099032

Eye protection is an essential part of patient care during any form of anaesthesia. Although not strictly related to the practice of ophthalmic anaesthesia this interesting review article from the Antipodes highlights an innovative approach to reporting of anaesthesia complications. The authors reviewed data from webAIRS (web-based anaesthesia incident report system) and discovered that corneal abrasions were reported on 43 occasions. Patients presented with a painful eye and there were risk factors including advanced age and more prolonged surgical interventions. Reassuringly there were no reports of lasting harm with cases being treated with simple measures such as lubricating eye drops and topical antimicrobial therapy. As ever it is essential to remember eye protection; this author has taken to immediate eye coverage after induction of anaesthesia so as to avoid inadvertent eye injury during airway management for example.

Updated Education in Ophthalmic Anaesthesia

Kumar CM. Updates in ophthalmic anaesthesia in adults. BJA Education. 2023; 23: 153-159

The BJA Education series is always likely to have something for practitioners with all manner of interests. This important article from Kumar and colleagues covers a lot of ground and has a particularly noteworthy segment covering some of the advances in Ophthalmic surgery and how these might impact upon anaesthesia strategy. It is always impressive to appreciate the advances in surgical scope and technique with increasing numbers of technologically assisted procedures or strategies such as minimally invasive strabismus surgery. It is a privilege therefore to appreciate the nuance of these procedures and how our skills can deliver a smoother process for our surgical colleagues who may be undertaking a challenging learning curve and help our patients' experiences.

Additional highlights include the discussions of how to approach patients' pre-existing illnesses when preparing for ophthalmic surgery with useful discussions regarding hypertension, diabetes and dementia. There are also useful points acknowledging that fasting produces unpleasant side effects for patients and that the prevalence of aspiration following sedation for ophthalmic procedures is negligible if not non-existent. Finally a summary of where we are with anaesthetic technique; there has been a shift toward regional techniques but the humble GA remains an integral part of the ophthalmic anaesthesia practice. The authors highlight the utility of TIVA, supraglottic airways and sugammadex for the reversal of deep neuromuscular blockade as important elements of GA practice in the field.

Going to a GALA

Putri CA, Tan JH. Ophthalmology service recovery with 'general anaesthesia to local anaesthesia conversion' or GALA initiative: a new surgical service pilot. BMJ Open Quality. 2023;12:e002083. doi: 10.1136/bmjoq-2022-002083

The authors' work must be congratulated for the efforts undertaken to determine the efficacy of measures to reduce waiting times and also explore other alternatives to general anaesthesia in a complex cohort of patients. They note the still present spectre of the COVID19 pandemic and its effect on British healthcare with waiting times for cataract surgery under general anaesthesia ballooning with the cessation of elective activities.

Certain barriers to LA eye surgery will always remain; the patient unable to lie flat or those patients with severe dementia or severe learning difficulty. It was however interesting to note the individualised efforts to alleviate and mitigate fear and even trial periods of supine positioning prior to surgery. This individualised approach had clear benefits with a large reduction in waiting time and 71% of 21 patients consenting to proceed to LA surgery after a discussion in the "GALA" clinic set-up by the authors.

This work is surely generalisable and there could be wide reaching benefits with frail patients potentially being able to access a GA-sparing approach to which there may have previously been personal and/or systems barriers.

Getting with the times

Asodaria P, Ng JY, Lascaratos G. Changing trends in anaesthesia for trabeculectomy: a clinical effectiveness and safety analysis. Eye. (2023). https://doi.org/10.1038/s41433-023-02441-y

This interesting piece of work covers a huge period of chronological time. It is widely appreciated that regional techniques increasingly form the mainstay of anaesthesia for ophthalmic surgery. This article highlights a change in practice in a single institution over a 16 year period. For trabeculectomy surgery the use of regional anaesthesia increased from 57% to 92% by the end of the study period. Importantly there were little differences in rates of surgical complications and a low incidence of anaesthesia related complications. Although not a formal randomised control trial comparing the two techniques, this further highlights the efficacy and safety of regional anaesthesia in ophthalmology practice.

Propofol to plant the (peri)bulbs

Ahmed M, Krishna Y, Popova P, Herbert R, Sidaras G, Choudhary A, Kaye, SB. Low-Dose Propofol with Peribulbar Anaesthesia for Cataract Surgery. J Clin Med. 2023;12:2742. https://doi.org/ 10.3390/jcm12072742

This prospective, randomised study assessed patient reported outcomes following the administration of low dose propofol sedation prior to administration of a peribulbar blockade for cataract surgery. There were clear improvements in favour of the sedation group across metrics such as pain during block, needle recall, anxiety and patient satisfaction. Although there are clear cost implications and risk with the administration of sedation, patient satisfaction is a powerful and important way of measuring the efficacy of a service. The authors' highlight the impressive track record of propofol sedation and the fact that few respiratory complications have been demonstrated with this approach, in addition to the non-requirement to be fully fasted. This was further borne out by this work where no complications following low-dose propofol adminstration. This work is likely applicable to the use of sub-Tenon block for the same purpose.

Under pressure

Awwad MA, Masoud M, Elhadad MA. Quantitative OCT Angiography Assessment of the Effect of Peribulbar Anesthesia on Retinal Microvasculature in Primary Open-Angle Glaucoma Patients Undergoing Cataract Surgery. Clinical Ophthalmology. 2022;16:2011-2024. https://doi.org/ 10.2147/OPTH.S369969

Peribulbar blockade has long been understood to increase intra-ocular pressure. What effects this might have on retinal perfusion have not been fully elucidated. The use of optical coherence tomography angiography in this study enabled non-invasive assessment of retinal blood flow. Glaucoma patients have reduced ocular blood flow and impaired retinal autoregulation thus increasing their vulnerability to alterations in blood flow. There was evidence to suggest that patients undergoing cataract surgery with a previous history of POAG had more pronounced alterations in retinal blood flow. The authors note further investigation is required in this area but highlighted the potential benefits of a Sub-Tenon's approach in such patients. The long-term effect on vision following these haemodynamic alterations is uncertain.

Cooling off

Chandrasekaran PR, Aziz AA, Khan H, Kanani AM. Cooling Anesthesia for Intravitreal Injections – A Review. Clinical Ophthalmology. 2023;17:197-207. https://doi.org/10.2147/opth.S388327

The efficacy of cryoanalgesia strategies is well appreciated however less is understood about the effects of these strategies for ocular procedures. Intravitreal injections form a significant part of the work in retinal clinics forming a key part of the vision preserving treatment for a number of conditions. Discomfort at injection is reported to be a troublesome part of these encounters leading to missed future appointments. The team studied the impact of a re-usable thermoelectric cooling device with a single-use tip. The article highlights some of the interesting physiology of cooling analgesia with the induction of a reversible conduction block with the application of cold to peripheral nerves. Ongoing studies are being undertaken with some promising results from catchily named COOL-1 and COOL-2 trials which look at efficacy and longterm outcomes following use of the device. The device may be a means of effective, rapid acting analgesia for these procedures and it will be interesting to see if these results filter into daily practice.

Less Gas (GAs)

O'Connell A, Stephenson KAJ, Flitcroft I. Risk of Neurotoxicity with Multiple General Anaesthetics for Examination Under Anaesthesia in Paediatric Ophthalmology – A Cause for Concern? Clinical Ophthalmology. 2023;17:291–302

There were some recent concerns about the potential for neurotoxicity or neurodevelopment problems in paediatric patients undergoing general anaesthesia. Joint guidelines from big players have suggested we do not change our practice with large scale studies assessing outcomes following longer or multiple exposures to general anaesthesia being difficult to interpret. This Irish team however undertook some thoughtful and thought provoking work looking at the adoption of an active minimisation of EUA in the department. Thinking in patient centred terms with a "technology, training and patience" mantra in mind, there was focus on using minimally invasive approaches and considering methods to reduce pain or anxiety. Patients might need more time, and serial reviews in clinic to encourage cooperation. There were some good results notably a reduction in the total number of EUAs conducted before and after the intervention. There were ongoing requirements for multiple procedures under general anaesthesia in sight threatening situations. Overall however there were some encouraging results from this impressive work carried out over several years.

Who has the LAST laugh?

Subramaniam J, Lin Teh B, Smith Q. Knowledge of local anaesthetic systemic toxicity and lipid emulsion therapy amongst healthcare providers in a stand-alone eye unit British Journal of Anaesthesia. 2023

This is a useful article highlighting potential patient safety issues and knowledge gaps in the management of local anaesthetic systemic toxicity (LAST). Although rare in its own right and rarer so in ophthalmic settings with an unknown incidence, there is a risk of central spread of local anaesthesia. The Guidelines for Provision of Anaesthesia Services maintain that eye surgical units be familiar with and have the tools to manage LAST. Using a survey based approach the team were able to glean that there are gaps in understanding how to manage LAST with limited knowledge of lipid emulsions and the approach to identifying and then managing the problem. The authors note that central spread of local anaesthesia may require purely supportive management rather than Intralipid. All in all there is some food for thought; would education and refresher sessions on the management of LAST be useful? Does central spread of LA as opposed to LAST require the use of Intralipid for its management?

Ophthalmic Anaesthesia 2023; 12(1): 25-29

Practice makes perfect

Jaichandran V V. A mannequin based training system for pracKcing subTenon block. Ind ian J Ophthal Anaesth. 2023;3(2):27-3

The model described here has been discussed in a previous edi*on of Horizon where our trepida*ons of star*ng in Ophthalmics were re-visited with a wish for some accurate ways of prac*cing a simulated eye block. Here the authors discuss the fascina*ng development of their model with a great deal of insight into the technology and technical nous used during their process. There is a clear degree of ingenuity here and the work undertaken is highly impressive. One has to hope that the schematic of the electrical circuitry used in the model does not find its way into any postgraduate anaesthesia examinations. Moving forward the authors hope to conduct more work with the development of models to simulate more challenging anatomical situations.

Ophthalmic Anaesthesia 2023; 12(1): 30-31

Tenon capsule anatomy refresher

Santhana Kannan

Birmingham and Midland Eye Centre,
City Hospital,
Birmingham, UK.

Correspondence to: s.kannan@nhs.net

Sub-Tenon block is a common procedure with an expectation that every individual undertaking ophthalmic anaesthesia practice is well-versed with the anatomy and the technique.

What is the Tenon capsule?
The Tenon capsule (fascia bulbi) is an envelope of elastic connective tissue that fuses posteriorly with the optic nerve sheath and anteriorly with a thin layer of tissue, the intermuscular septum, located 3 mm posterior to the limbus. The Tenon capsule is the cavity within which the globe moves.[1] It is composed of compactly arranged collagen fibers and a few fibroblasts.

Jacque René Tenon was born in 1724 in France. He described his discovery of the capsule in 1805 but the findings were only published in 1816.[2] The translations were published in 2003.[3]

Tenon described it as a 'membranous capsule'. In his own words "…*The membrane runs from the globe to the conjunctiva, joins the latter in the eyelids and accompanies it to the tarsus, where it passes over the convex side of these cartilaginous structures while the conjunctiva, in turn, passes over the concave side. In its tissue and color, this membrane resembles the conjunctiva; it is not very thick, but strong, is attached to the optic nerve at the site where the nerve enters the eye, adheres somewhat to the sclera posteriorly, but is attached to it anteriorly only by a very fine cellular tissue. It provides a passageway for the tendons of the rectus and oblique muscles and a sheath for the tendon of the large oblique muscle. After reaching the insertions of the adductor and abductor muscles in the globe, i.e. close to the conjunctiva and before becoming attached to it, this membrane forms a kind of ligamentous wing on both sides that attaches the globe to the orbit at both a large and a small angle*…."

Tenon capsule is composed of two independent components with different dimensions: an *anterior thick fibrous tissue* with smooth muscle fibres, and a *posterior thin fibrous capsule* of the orbital fat.[4] It has been stated that the anterior Tenon capsule was already present in the embryo and the posterior Tenon capsule was formed at a later evolutional stage than the anterior part suggesting that both structures may have had different origin.[5] Loss of Tenon capsule with age can also lead to conjunctivo-chalasis (redundant folds of conjunctiva between the globe and the eyelid margin).[6,7]

Previous study in cadavers which examined the spread of the contrast media or coloured latex dye in sub-Tenon space, did not show any posterior diffusion of these agents.[8] It was postulated that akinesia in sub-Tenon anaesthesia is achieved by the spread of the local anaesthetic solution from the episcleral space to the rectus muscle sheaths. However, intraoperative studies in patients showed that when anaesthetic fluid was injected to sub-Tenon space, it accumulated behind the globe (the classic T-Sign).[9,10]. It was suggested that the higher stiffness of tissues in cadavers at ambient temperature meant that fluid is probably more able to diffuse behind the globe in vivo.[9,10, 11]

In 1884, Turnbull described instillation of cocaine drops in sub-Tenon space and hence technically sub-Tenon anaesthesia.[12] Superior quadrant sub-Tenon block was described in 1990 in which a conjunctival bleb was first raised with a sharp needle before dissection.[13] Inferonasal sub-Tenon block using a blunt cannula was first described in 1992 from Moorfields Eye Hospital in London.[14]

References

1.https://www.aao.org/education/bcscsnippetdetail.aspx?id=812b3961-da7a-43d8-8d39-928ce8ea289a

2. H.J. Simonsz. First description of eye muscle 'poulies' by Tenon in 1805, Strabismus, 2003; 11:1, 59-62, DOI: 10.1076/stra.11.1.59.14092

3. Jacque-René Tenon. Anatomical observations on some parts of the eye and eyelids, Strabismus, 2003; 11:1, 63-68, DOI: 10.1076/stra.11.1.63.14089

4. Kakizaki H, Takahashi Y, Nakano T et al. Anatomy of Tenons capsule. Clin Exp Ophthalmol. 2012; 40: 611-6. doi: 10.1111/j.1442-9071.2011.02745.x..

5. Jones LT. A new concept of the orbital fascia and rectus muscle sheaths and its surgical implications. Trans Am Acad Ophthalmol Otolaryngol 1968; 72: 755–64.

6. Demer JL. Mechanics of the orbita. Dev Ophthalmol. 2007;40:132–157.

7. Rutar T, Demer JL. "Heavy eye" syndrome in the absence of high myopia: a connective tissue degeneration in elderly strabismic patients. J AAPOS. 2009;13: 36–44.

8. Ripart J, Metge L, Prat-Pradal D, Lopez FM, Eledjam JJ. Medial canthus single injection episcleral (subtenon anesthesia): computed tomography imaging. Anesth Analg 1998; 87: 42–5.

9. Kumar CM, McNeela BJ. Ultrasonic localization of anaesthetic fluid using sub-Tenon cannulae of three different lengths. Eye (Lond) 2003;17:1003–7.

10. Niemi-Murola L, Krootila K, Kivisaari R, Kangasmaki A, Kivisaari L, Maunuksela EL. Localization of local anesthetic solution by magnetic resonance imaging. Ophthalmology 2004; 111: 342–7.

11. Ripart J, Prat-Pradal D, Vivien B, Charvel P, Eledjam JJ. Medial canthus episcleral (sub-Tenon) anesthesia imaging.Clin Anat 1998; 11:390–5.

12. Turnbull CS. Editorial. Med Surg Rep 1884;Nov 29: 628.

13. Hansen EA, Mein CE, Mazzoli R. Ocular anesthesia for cataract surgery: a direct sub-Tenon's approach. Ophthalmic Surg. 1990; 21: 696-9.

14. Stevens JD. A new local anesthesia technique for cataract extraction by one quadrant sub-Tenon's infiltration. Br J Ophthalmol. 1992; 76: 670-4. doi: 10.1136/bjo.76.11.670.

Ophthalmic Anaesthesia
The Journal of
The British Ophthalmic Anaesthesia Society

Instructions to Authors

Email submissions to **editorOA@boas.org**

Manuscript requirements

The manuscript should be in MS Word (Arial Font 11) with UK English spelling and single line spacing. Pages must be numbered, except for the title page.
• Research: up to 3000 words 30 references
• Review articles: up to 4000 words 40 references
• Case report: up to 1500 words 10 references
• Letter: up to 1000 words 5 references
Word count excludes title page, summary, and references.

Confirmation statements

By submitting, authors confirm that:
• Manuscript has not been published before and is not under consideration for publication elsewhere
• All authors meet the requirements of authorship as per ICMJE guidelines
• Relevant consent and approvals from patients / next of kin / authorities has been obtained and is available for verification
• Permission(s) obtained for all copyrighted content in the manuscript (if applicable)
• Conflict of interests and funding source declared

Title page

• Type of manuscript (Research, Case report, Letter)
• Title (up to 20 words)
• Authors: First Author1, Second Author2
Primary institution, city, country, email for each author. (Do not include author qualifications.)
Corresponding author's e-mail address.
• Presentation at any meeting, location and date.
• Acknowledgement (e.g. Individuals who helped towards the project but do not qualify to be an author).
• Author confirmation (see above)

Summary (Fresh page)
• Up to 250 words. Not required for Letters.

Main Text (Fresh page)

• Research Studies Headings: **INTRODUCTION, METHODS, RESULTS, DISCUSSION.**
Subheadings in bold lowercase.
• Case reports headings: include **INTRODUCTION, DESCRIPTION, DISCUSSION.**
• Avoid abbreviations except for measurements in International System of Units [SI].

http://www.icmje.org/recommendations/browse/manuscript-preparation/preparing-for-submission.html#k

Figure(s) and Table(s) (Fresh page)
• **Tables** should be produced either as Word documents or Excel spreadsheets. Do not send tables as photographs (jpeg, gif or tiff) as these cannot then be edited.
• **Colour photographs** are preferred. Patients must not be identifiable from the images. Figures should be provided with a minimum of 300 dpi resolution.

References (Fresh page)
• Number using superscripts in the text. List up to six authors, and the remainder as et al. Follow ICMJE Guidelines. (http://www.nlm.nih.gov/bsd/uniform_requirements.html).
• Abbreviate journal titles as per MEDLINE. (https://www.ncbi.nlm.nih.gov/nlmcatalog/journals).
• **Examples:**
• Journal: Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002;347:284-7.
• Chapter in book: Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumours. In: Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York: McGraw-Hill; 2002. p. 93-113.
• Internet article: Zhang M, Holman CD, Price SD, Sanfilippo FM, Preen DB, Bulsara MK. Comorbidity and repeat admission to hospital for adverse drug reactions in older adults: retrospective cohort study. BMJ. 2009 Jan 7;338:a2752. doi: 10.1136/bmj.a2752.

Appendices (Fresh page)
• Additional information (e.g. survey questionnaire).

www.boas.org