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Editorial

Welcome to the latest edition of the BOAS journal: Ophthalmic Anaesthesia. This edition of the journal marks changes at the top in the BOAS. After years of devotion and selfless hard work Professor Chandra Kumar has handed the reins to Dr K-L Kong. Chandra won’t be leaving ophthalmic anaesthesia entirely and I hope to pin him down to tell us about the international lifestyle of a retired jet set ophthalmic anaesthetist. K-L brings years of experience in ophthalmic anaesthesia, training, examining and an in-depth knowledge of the working of the Royal College and anaesthesia nationally and internationally. The void left in the secretarial role has been filled by Dr Shashi Vohra. Shashi seems to have a limitless ability to soak up work. A brief look at her CV would show that she’s published extensively in ophthalmic anaesthesia, organised meetings and spoken nationally and internationally. In addition to these changes at the top, The Editorship of this journal has been passed from Dr Steve Mather to myself and Dr Jo Budd. Again, Steve has put in tremendous amounts of work over the years but felt it was time to hang up his keyboard and find fresh challenges.

This edition of the journal contains a variety of articles including a message from the new President, reviews of conferences and original articles. In order to keep producing a journal, it’s vital that the membership contribute. I would hope that the journal should act as a vehicle to promote good practise and introduce innovative ideas in clinical techniques and also in the way we organise our service. Our clinical work is safer than it has ever been, but we face huge pressures to maintain that safety and quality in the face of a reducing budget and ever increasing demands. If you do something different or something new and it works, or even better if it doesn’t work, then please let us know and the whole society can contribute. Details for submission of articles can be found on the website: www.boas.org.

I look forward to hearing from you all!

Hamish McLure
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Message from the President

As I take over the Presidency of BOAS from Professor Chandra Kumar, it gives me great pleasure to thank him for his outstanding leadership and vision in taking the Society forward with such success over the last few years.

I am pleased to report that our Society membership has remained stable and comprises both anaesthetists and ophthalmologists, in addition to other healthcare professionals who have an interest in ophthalmic anaesthesia. Our annual scientific meetings continue to be well supported by delegates despite various constraints on study leave and finances. Last year, we attracted some international delegates from Europe and Russia at a highly successful BOAS annual scientific meeting in Norwich, organised by Mr Tom Eke. The topics covered included complications in ophthalmic anaesthesia, recording and auditing, medico-legal aspects of ophthalmic anaesthesia and how to improve the patient experience. A wet-lab practical session on ophthalmic blocks was particularly popular.

Last year, BOAS instigated a Joint Royal College of Anaesthetists and Royal College of Ophthalmologists Working Party to review the Joint Royal Colleges’ Guidelines on Local Anaesthesia for Ophthalmic Surgery. All those representing the Royal College of Anaesthetists were selected from the membership of the British Ophthalmic Anaesthesia Society. I am pleased to report that these new guidelines have now been completed and await ratification by the respective Royal Colleges, prior to publication. These guidelines aim to set minimum standards of care and to promote safe and effective local anaesthesia for ophthalmic surgery in adults. They should prove valuable to ophthalmic teams in units across the country, as well as internationally.

BOAS continues to have a global involvement in ophthalmic anaesthesia. In December 2009, Professor Chris Dodds and Professor Chandra Kumar officiated at the inauguration of the Ophthalmic Forum of the Indian Society of Anaesthesiologists. In September 2011, we helped to launch the first conference of the Ophthalmic Forum of the Indian Society of Anaesthesiologists in Chennai, India. Several members of BOAS Council lectured and chaired the scientific sessions. We are proud to continue to support the development of Ophthalmic Anaesthesia and the provision of high quality eye care in India. This has the potential to make a huge difference to the quality of life of large numbers of patients, regardless of affordability.

Preparations are now in the final stages for the World Congress of Ophthalmic Anaesthesia to be held on 24th – 25th May 2012 in Ankara, Turkey. This 3rd World Congress is held under the auspices of BOAS and we have been working closely with the local Turkish organisers to ensure a highly successful and stimulating scientific meeting. An international Faculty from 16 countries worldwide has been confirmed, and an exciting social programme and pre-Congress tour arranged. Please visit the BOAS website (www.boas.org) for the latest information regarding the Congress.

Owing to the World Congress taking place in May, our national annual scientific meeting will be a one-day event to be held in Exeter on Friday 16th November 2012. I look forward to seeing as many of you as possible at both the World Congress and our annual scientific meeting.

Dr K-L Kong, MD, MB BS, FRCA
President, BOAS
Sub-Tenon’s Block Without Scissors or Sharp Needle

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2. Specialty Registrar in Anaesthesia, East Yorkshire School of Anaesthesia.

Introduction
Sub-Tenon’s block is the most commonly performed eye block by ophthalmic anaesthetists 1. It is a safe, quick, and effective method of local anaesthesia. Use of a 22 gauge Venflon has been described to avoid the need for scissors and to reduce the risk of bleeding and chemosis 2. The conjunctiva and Tenon’s fascia, when elevated, can be pierced easily by a blunt cannula, eliminating the need for a sharp needle. We describe sub-Tenon’s block with a blunt Visitec™ sub-Tenon’s anaesthesia cannula, which resulted in adequate surgical anaesthesia in all patients.

Methods
A sub-Tenon’s block was performed in 77 patients undergoing phacoemulsification. The conjunctiva was anaesthetised with topical proxymetacaine. A solution of 10ml of 0.5% bupivacaine was mixed with 1500 international units (IU) of hyaluronidase. One millilitre of this solution was mixed with four millilitres of 2% lidocaine, resulting in a hyaluronidase concentration of 30 iu/ml. An assistant retracted the lower lid to avoid the use of eyelid speculum. The patient was asked to look supero-laterally to expose the infero-medial quadrant, then the conjunctiva was lifted with forceps and pierced with Visitec™ sub-Tenon’s anaesthesia cannula about 5 mm away from the limbal margin. A volume of 4 ml of local anaesthetic mixture was injected as the needle was advanced, following the curvature of the globe. Digital ocular pressure was applied, with intermittent instillation of drops of residual local anaesthetic mixture from the syringe. Adequacy of block was assessed after 5 minutes. If adequate akinesia was not achieved a further 2 ml of 2% lidocaine was injected using the same sub-Tenon’s cannula through the existing hole in the conjunctiva.

Results
Adequate surgical anaesthesia was achieved in all patients. Complete bulbar akinesia was achieved in 75 (97.4%) patients. One of the two patients with incomplete akinesia had minimal movement in the horizontal axis. The nerve supply to the lateral rectus muscle was not blocked in the other patient, who had a history of chemotherapy and radiotherapy for lung carcinoma. A complete ptosis was achieved in 61 (79.2%) of the patients. A supplementary injection of 2% lidocaine was required in 2 cases.

Discussion
Sub-Tenon’s anaesthesia has gained popularity with both ophthalmic surgeons and anaesthetists due to reduced risks of complications 3. It is commonly performed using the eyelid speculum to retract the eyelids, Westcott scissors to make an incision and a blunt cannula to administer the local anaesthetic 4. Use of a standard 22 gauge Venflon has been described to reduce the risks of subconjunctival haemorrhage and chemosis, which are common. We have demonstrated that sub-Tenon’s block can also be performed without the use of sharp needle, cannula or scissors. Incomplete bulbar akinesia is not uncommon with sub-Tenon’s block 5. However, we have achieved bulbar akinesia in 97.4% of patients. The intermittent instillation of local anaesthetic mixture containing hyaluronidase left over in the syringe following the Sub-Tenon’s block may have contributed to the high incidence of bulbar akinesia in our practice.
Conclusion
Sub-Tenon’s block may be performed without the use of eyelid speculum, sharp needles and scissors. Use of the blunt Sub-Tenon’s cannula is a safe alternative technique. Intermittent instillation of the hyaluronidase containing local anaesthetic mixture following Sub-Tenon’s block, while waiting for the block to be fully effective, may improve the quality of the block.

References

Figure 1 – Sub-Tenon block without speculum or scissors

Figure 2 – A blunt sub-Tenon’s cannula
Comparative study of anaesthetic management of congenital cataract with acquired cataract for paediatric patients

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2. Professor
3. Resident, Dept of Anaesthesiology, JNMC, Aligarh Muslim University, Aligarh, UP 202002, India
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Introduction
Airway anomalies in children may remain unnoticed in presence of other congenital defects. Down’s syndrome which is a chromosomal anomaly may be associated with airway anomaly.¹ Subglotic stenosis is the narrowing of the lumen at the level of the cricoid cartilage less than 4 mm in full term infant. It is graded 1-4 according to the tube size it accommodates.² Among various associated anomalies is tracheomalacia (abnormal collapse of the tracheal wall) which sometimes confuses the clinician with allergic asthma.³ Airway malacia is difficult to be diagnosed and is known to be responsible for significant morbidity and mortality and may pose difficulties in the operation theatre ⁴ while airway management of these children.

Anaesthetic management becomes quite difficult in children in the presence of congenital anomalies of the the airway and might lead to catastrophic situations during the anaesthetic management. The pediatric airway itself and when associated with airway malacia/stenosis in a child with multiple congenital syndrome have higher incidence of difficult intubation as well as post extubation complications.⁵ In this study a comparison of the problems is made between the children posted for cataract surgery due to congenital reasons with those due to trauma respectively. The problems faced during the perianaesthetic period between group 1 and groups 2 were compared.

Method
After institutional approval and informed consent from the patient’s guardian, 40 children aged between 1-6 years of age posted for elective cataract surgery were divided into two groups of 20 patients each (n = 20). Patients with full stomach, with anticipated difficult intubation, with cardiac anomaly and with acute respiratory infection were excluded from the study. Group I consisted of patient who were suffering from congenital cataract and group II patients consisted of those who had an acquired cataract subsequent upon trauma to the eye which developed over a period of time (n = 20). After securing an intravenous line, patients were given identical premedication i.e. ondansetron, glycopyrrolate and midazolam on per kg weight basis. Basic standard monitoring was done in all the patients. After premedication patients were induced with injection thiopentone 5 mg/kg and relaxed with injection succinylcholine 1.5 mg/kg and were maintained on vecuronium, nitrous oxide, oxygen and sevoflurane. At the end of surgery the residual muscle paralysis was reversed with
neostigmine 0.05 mg/kg body weight and atropine 0.02 mg/kg body weight. After extubation and suctioning of the oral cavity, 100% oxygen was given postoperatively for 10 minutes and then the patients were moved to the postoperative recovery room.

During the course of anaesthesia following parameters were observed in the two groups:

- Time taken from insertion of laryngoscope blade between the incisors to confirmation of intubation.
- Visualization of the vocal cord.
- Ease of intubation.

After operation:

- Need for reintubation
- Post operative stridor and sore throat.
- Observed values were evaluated with Student's t test, Fischer's exact test and Z test as required. P<0.05 was considered statistically significant.

**Results**

Table 1 shows the demographic characteristics of the patients which were almost similar in both the groups (p>0.05). Table 2 shows different parameters considered for comparison between the two groups. Patients in Group I had other associated congenital anomaly also including Down’s Syndrome, Tracheomalacia, Sub glottis Stenosis, Syndactyly and Congenital Glaucoma (Table 3). However 50% of the patients had isolated congenital cataract only. None of the patients in Group II had associated congenital anomaly and were otherwise normal healthy children. In this study, patients posted for congenital cataract extraction posed more problems especially during intubation and after extubation than those posted for surgery in acquired cataract group. Patients posted for surgery with congenital cataract took longer to intubate than those posted with acquired cataract group for surgery (p<0.05, Table 2). Similarly a significant number of cataract patients with congenital anomalies required second attempt to intubate than those with acquired cataract group (Fisher's Exact Test) (p<0.05, Table 2). Moreover two patients in congenital cataract group (group I) required re-intubation after surgery compared to none in the acquired group (Fisher's Exact Test) (p>0.05) which is not statistically significant.

Problems of post-operative sore throat and stridor were significantly higher in patients of congenital cataract group than those with acquired cataract group (p<0.05, Table 2). Six patients required external manoeuvre to visualize the vocal cord and intubate in group I compared to two in group II (Table 2) which is not statistically significant.
**Table 1.** Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>Group I (n=20)</th>
<th>Group II (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) mean+SD</td>
<td>4 ± 2.12</td>
<td>4 ± 3.6</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>11/9</td>
<td>9/11</td>
</tr>
<tr>
<td>Weight (kg) mean+SD</td>
<td>12.6 ± 4.12</td>
<td>12.1 ± 3.12</td>
</tr>
</tbody>
</table>

**Table 2.** Measured outcomes

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>Statistical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average time taken to intubate (seconds) (mean±SD)</td>
<td>60 ± 14</td>
<td>45 ± 3.1</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>No. of patients who required 2 attempts to intubate</td>
<td>6</td>
<td>1</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>No. of patients who required manoeuver to visualize the vocal cord</td>
<td>6</td>
<td>2</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>No. of patients who required re-intubation after extubation</td>
<td>2</td>
<td>0</td>
<td>p&gt;0.05</td>
</tr>
<tr>
<td>No. of patients with post operative sore throat</td>
<td>8</td>
<td>3</td>
<td>p&lt;0.05</td>
</tr>
<tr>
<td>No. of patients with post-op stridor</td>
<td>6</td>
<td>1</td>
<td>p&lt;0.05</td>
</tr>
</tbody>
</table>

**Table 3.** Associated congenital abnormalities in group I

<table>
<thead>
<tr>
<th>Type of anomaly</th>
<th>Number of patients (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down’s Syndrome</td>
<td>3</td>
</tr>
<tr>
<td>Tracheomalacia</td>
<td>2</td>
</tr>
<tr>
<td>Sub glottis Stenosis</td>
<td>2</td>
</tr>
<tr>
<td>Syndactyly</td>
<td>1</td>
</tr>
<tr>
<td>Congenital glaucoma</td>
<td>2</td>
</tr>
<tr>
<td>Congenital cataract only</td>
<td>10</td>
</tr>
</tbody>
</table>
Discussion

Among the variety of unknown reasons for the difficult and sometimes unwanted peri-anaesthetic course of the patients with congenital anomalies there could be Down syndrome, tracheomalacia, subglottic stenosis and many other similar associated expected or unexpected airway problems in patients with any revealed or concealed congenital anomaly. The patients in the congenital cataract group (group I) who required re-intubation may be because of extremely soft tracheobronchial tree (tracheomalacia) which might have collapsed after extubation. Tracheomalacia is a structural abnormality of the tracheal cartilage allowing collapse of its walls and airway obstruction. In this anomaly a deficiency and/or malformation of the supporting cartilage exists, with a decrease in the cartilage-to-muscle ratio. However post-operative collapse of the trachea in this group of patients may be explained with the probable immaturity of the tracheobronchial cartilage or degeneration of previously healthy cartilage due to inflammatory processes or extrinsic compression with the endotracheal tube.

Most common associated anomaly in patients with Down’s syndrome are reported to be congenital heart disease and reactive airway disease. The anaesthesiologist should have a high degree of suspicion of airway anomaly in patients of Down’s syndrome with respiratory symptoms. Among many other anomalies may be laryngomalacia, bronchomalacia or tracheomalacia. This condition is getting an increasingly recognized clinical condition that often requires prolonged intubation and mechanical ventilation. Laryngomalacia is the commonest cause of stridor in children (60%) which is just next to post extubation stridor. Congenital subglottic stenosis presents with stridor and recurrent croup with dyspnoea. Tracheomalacia has also been associated with one of the causes of sudden infant death syndrome. Although problems like congenital cataract in children may be the “tip of the iceberg” yet there is little information available in anaesthetic literature regarding these associated anomalies and a clear cut guideline to deal with the situation. There are reports of use of Laryngeal Mask Airway (LMA) to avoid intubation and subsequent post-operative complications.

However, to counter these anticipated problems there is no specific plan of anaesthesia proposed so far; few recommendations can be made to at least partially prevent these unanticipated problems.

Sedation with topical anaesthesia, general anaesthesia (GA) with inhalational anaesthetics or GA with intravenous (iv) maintenance may be tried in patients posted for ophthalmic surgery with congenital anomaly. The use of LMA may decrease the post-operative cough and risk of airway collapse upon emergence from anaesthesia. Deep extubation may allow a smooth recovery.

Conclusion

Children who are posted for any type of surgery with a congenital anomaly should be suspected of having associated anomalies including airway anomaly. The difficult paediatric airway in combination with the associated airway anomaly may lead to catastrophic outcome in a child with congenital disease. Therefore in a child with a congenital problem and with a history of recurrent respiratory tract infections requiring surgical intervention, the possibility of
narrowing of the air passage and post extubation complications like stridor or respiratory distress must be kept in mind. Various preventive measures including GA with inhalational anaesthetic, i.v. sedation or use of paediatric laryngeal mask airway in such suspected cases may be tried to avoid any untoward unanticipated airway problem.

References
Retrospective audit of preoperative protocols for cataract surgery

T.K. Langcake, A. Prescott, H.E. Schulenburg
Department of Anaesthesia, Mid Yorkshire NHS Trust, Wakefield, UK

Introduction
The Royal Colleges of Anaesthesia and Ophthalmology produced a Joint Guideline to promote safe and effective local anaesthesia for intraocular surgery \(^1\). The Preoperative Assessment section states that all parameters should be well controlled, however, allows Trusts to set local thresholds. The Mid Yorkshire Trust Anaesthetic and Ophthalmic Departments agreed on the following protocols for cancellation of patients attending for cataract surgery: Blood Glucose >15mmol/l; Blood Pressure >180/110 mmHg; International Normalised Ratio (INR) >3.0 excluding patients with multiple pulmonary embolisms or metal heart valves. A retrospective audit was performed to determine whether local protocols were being followed.

Method
Patient data, including pre-assessment and pre-operative (day of surgery) blood pressure, blood glucose and INR, was collected retrospectively over a four month period. A list of patients was retrieved from the computerized theatre management system, including patients that were cancelled. Each case was located separately on the Medisoft Ophthalmology database and above parameters were recorded on purpose designed datasheets. This data was evaluated against the agreed protocols to assess adherence, using Excel software.

Results
Parameters were collected from 857 patients (326 male, 531 female) over a four month period. The Mean age (range) was 76 (27-96) years. Data recording on Medisoft Ophthalmology software during the pre-assessment visit was poor. Blood pressure was not recorded in 19% of patients, Blood glucose was not recorded in 89% of 172 patients with diabetes mellitus and INR was not recorded in 56% of 73 patients who were anticoagulated.

The recording of data was much improved in the preoperative period, but was still disappointing, especially blood glucose recordings, which were not recorded in 38% of patients with diabetes mellitus and INR was not recorded in 7% of anticoagulated patients. Blood pressure was not recorded in only 3% of patients.

In 10.8% of all cases, surgery went ahead although cancellation, based on preoperative measurements, was clearly indicated, (Table 1). Of those cases where there was an indication for cancellation, only 19 were cancelled. The indications were hypertension in 12, hyperglycaemia in 1 and high INR in 6 patients. In the 96 cases that should have been cancelled, the indication to cancel was hypertension in 83, hyperglycaemia in 10 and high INR in 5 patients. In the majority of patients, hypertension was the indication for cancellation. The average systolic blood pressure was 206mmHg and 187mmHg in the cancelled and not-cancelled groups respectively.

Cases were labeled as Not Known (8.5%) when the lack of recorded measurements prevented a decision being made on whether cancellation was indicated.
Table 1. Adherence to cancellation protocols

<table>
<thead>
<tr>
<th>Cancellation Indicated</th>
<th>Cancelled</th>
<th>Not Cancelled</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>19</td>
<td>96</td>
<td>115</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>660</td>
<td>669</td>
</tr>
<tr>
<td>Not Known</td>
<td>18</td>
<td>55</td>
<td>73</td>
</tr>
<tr>
<td>Totals</td>
<td>46</td>
<td>811</td>
<td>857</td>
</tr>
</tbody>
</table>

Discussion
The recording of data on Medisoft Ophthalmology software, especially during the pre-assessment visit was poor. It is probably acceptable not to measure blood glucose and INR unnecessarily during the pre-assessment visit, although this could have provided us with useful information on the level of blood glucose control in patients with diabetes mellitus. The lack of blood pressure recordings during the pre-assessment visit was a cause for concern, as patients with poor control could have been referred back to their General Practitioner for reassessment and treatment. This also prevented the auditors from establishing whether there might be a group of patients, who although quite hypertensive on the day of surgery, were otherwise well controlled.

Adherence to local protocols was unsatisfactory especially with regards to blood pressure thresholds. Blood pressure recordings above the 180/110mmHg threshold accounted for 86% of the patients that should have been cancelled. However, as there were no adverse incidents where surgery proceeded, should we consider altering the protocols?

Reference
Local Anaesthesia for Intraocular Surgery, The Royal College of Anaesthetists and The Royal College of Ophthalmologists, 2001, [http://www.rcoa.ac.uk/docs/rcarcoguidelines.pdf](http://www.rcoa.ac.uk/docs/rcarcoguidelines.pdf)
Do higher volumes of local anaesthetic mixtures mask the benefit of adding hyaluronidase to peribulbar blocks?

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Introduction
Hyaluronic acid is an integral component of the ground substance which bonds cells together, contributing to tissue integrity ¹. Hyaluronidase is an enzyme that cleaves the beta 1-4 glycosidic bond between the 2-acetamido-2-deoxy-D-glucose and D-glucaronic acid subunits of hyaluronic acid via a reversible process, the reaction being both pH and temperature dependent. Hyaluronidase is postulated to break down fibrous septa of the orbit, facilitating the distribution of the local anaesthetic mixture and improving the efficacy of the block ².

The benefits of supplementing local anaesthetic mixtures with hyaluronidase appear well established for retrobulbar and sub-Tenon block ³,⁴. However, the role of hyaluronidase in improving the efficacy of peribulbar blockade is less clear. Intuitively, one would expect the benefits of adding hyaluronidase to be more pronounced where the local anaesthetic is deposited further from the target neurones. A review of the literature on supplementation of peribulbar blockade with hyaluronidase showed that many different local anaesthetic solutions have been used, and a variety of factors have been investigated, including dose of hyaluronidase and pH of solution. However, none have looked at the role played by volume on the effectiveness of hyaluronidase. We reviewed the literature to see whether a pattern would emerge to indicate an effect of volume of injected solution with and without hyaluronidase.

Method & Results
A PubMed search was carried out. Studies were excluded if they allowed either concomitant retrobulbar or sub-Tenon’s blocks to be used. The results of the review are summarized in Table 1.
Table 1

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Study Size</th>
<th>Anaesthetic Mixture</th>
<th>Hyaluronidase Dose (iu/ml)</th>
<th>Outcome</th>
<th>Total Vol (ml)</th>
<th>Improved efficacy?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosser (1996)</td>
<td>50</td>
<td>Lidocaine 2% / Bupivicaine 0.5%</td>
<td>25</td>
<td>Onset of akinesia.</td>
<td>10-18</td>
<td>No</td>
</tr>
<tr>
<td>Bowman (1997)</td>
<td>92</td>
<td>Lidocaine 2% / Bupivicaine 0.5%</td>
<td>250</td>
<td>Onset of akinesia.</td>
<td>10</td>
<td>No</td>
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<tr>
<td>Soliveres Ripoll (2002)</td>
<td>100</td>
<td>Ropivicaine 1%</td>
<td>10</td>
<td>Onset of akinesia.</td>
<td>10</td>
<td>No</td>
</tr>
<tr>
<td>Mantovani (2001)</td>
<td>90</td>
<td>Lidocaine 2% / Ropivicaine 1%</td>
<td>15 / 150</td>
<td>Onset of akinesia.</td>
<td>7-10</td>
<td>No</td>
</tr>
<tr>
<td>Crawford (1994)</td>
<td>60</td>
<td>Lidocaine 2% / Bupivicaine 0.75%</td>
<td>50</td>
<td>Onset of akinesia.</td>
<td>8.9-9</td>
<td>No</td>
</tr>
<tr>
<td>Sarvela J, (1992)</td>
<td>70</td>
<td>Etidocaine 1.5%</td>
<td>7.5</td>
<td>Onset of akinesia.</td>
<td>6-8</td>
<td>Yes</td>
</tr>
<tr>
<td>Dempsey (1997)</td>
<td>200</td>
<td>Lidocaine 2% / Bupivicaine 0.5%</td>
<td>50 / 300</td>
<td>Onset of akinesia.</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>Morsman (1992)</td>
<td>91</td>
<td>Lidocaine 2% / Bupivicaine 0.5%</td>
<td>50</td>
<td>Onset of akinesia.</td>
<td>7.5</td>
<td>Yes</td>
</tr>
<tr>
<td>Bjornstrom (1994)</td>
<td>54</td>
<td>Lidocaine 1% / Bupivicaine 0.5%</td>
<td>375</td>
<td>Onset of akinesia</td>
<td>5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Discussion

Whilst the number of studies is too low for statistical analysis, there appears to be a relationship between the volume of injected solution and the effects of hyaluronidase. Those studies using higher volumes of local anaesthetic failed to demonstrate a difference in efficacy with the use of hyaluronidase, compared to studies where a lower volume was used. The mechanism is unknown but it a larger volume of local anaesthetic may allow sufficient local anaesthetic dispersal to reach the majority of the target nerves without having to add hyaluronidase. When the volume of local anaesthetic is reduced, the additional effect of hyaluronidase in improving the spread of local anaesthetic solution is demonstrable. This observation and theory is compatible with the studies of retrobulbar and sub-Tenon’s anaesthesia which use lower volumes of local anaesthetic solution, and which demonstrated a positive effect of hyaluronidase. Hyaluronidase would therefore appear to have a volume sparing effect, allowing similar blocks to develop but with a lower volume. This was demonstrated in a sequential
allocation study which showed that the use of hyaluronidase allowed a significant reduction in required volume of local anaesthetic. As a consequence, the advantage of hyaluronidase may not be in its ability to reduce onset time, but in its ability to reduce the volume of local anaesthetic which is needed, which in turn may improve the surgical field.

References
Audit of length of stay following major orbital surgery - is there a role for enhanced recovery?

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Background
Length of stay has been recognised as a key measure of efficiency of an NHS service. More importantly, reduced length of stay correlates with improved patient satisfaction, reduced risk of healthcare associated infections and is a good marker of quality of care. Enhanced recovery programmes (ERP) in use within other surgical specialties have demonstrated significant reductions in the length of stay and improvements in quality of care. They use a series of evidence based interventions to create a planned care pathway. The key components include comprehensive preoperative assessment and preparation, optimal surgical and anaesthetic techniques, using minimally invasive surgery in combination with, whenever possible, regional anaesthesia. Postoperatively, patients are mobilised early and managed proactively towards a planned discharge date. The potential application of these methods to other surgical specialties has been acknowledged, but little information exists as to their suitability. Major orbital surgery including for the purposes of this audit (orbital decompression, evisceration, enucleation and exenteration) combines complex surgery with additional medical, social and psychological factors that challenge this process. We performed an audit to assess the length of stay and factors affecting this in these groups of patients.

Evisceration is the removal of the contents of the globe, leaving the sclera, extraocular muscles and optic nerve intact. This may be indicated in cases of endophthalmitis unresponsive to antimicrobial therapy or for improvement of cosmesis in a blind eye. Enucleation is the removal of the eye from the orbit, while preserving all other orbital structures. It is indicated for a blind painful or unsightly eye, intraocular tumour or in severe ocular trauma, including those with the small risk of sympathetic ophthalmia in the second eye, when a penetrating wound involves uveal exposure. Other indications include phthisis bulbi, congenital anophthalmia or severe microphthalmia. Exenteration involves removal of the entire contents of the orbit, with or without the eyelids. It is indicated usually for the management of malignancies of the peri-orbital area, lacrimal gland tumours and sino-nasal tumours with orbital spread. Orbital decompression surgery is predominantly performed for thyroid eye disease. Indications for this include; loss of vision secondary to compressive optic neuropathy, cosmesis, recurrent globe subluxation, severe proptosis with exposure keratopathy or orbital pain uncontrolled with medical therapy.

Methods
We retrospectively identified all the patients having undergone exenteration, evisceration, enucleation or orbital decompression from 1st August 2009 to 1st August 2010. Data was retrieved from the hospital database regarding demographics, diagnosis, admission mode, procedures undertaken and length of stay from admission and procedure date. Notes were then retrieved for all of those patients with an inpatient stay longer than one day and a proforma completed regarding their inpatient pathway. Details recorded included timings of surgery in relation to
admission date, type of anaesthesia used, postoperative pain scores and incidence of nausea and vomiting determined by use of antiemetics or nursing documentation of symptoms. Medical and nursing notes were also reviewed for any reasons for increased length of stay.

**Results**

We identified 80 procedures which included 47 orbital decompressions, 6 exenterations, 10 enucleations and 17 eviscerations (Figure 1). There were 40 males and 40 females, with an age range of 10 to 91 years old (median 51 years). All but 6 patients were admitted electively for their procedure. Length of stay varied from 1 to 31 days (Figure 2 & 3). Excluding non elective cases it varied from 1 to 3 days. 2 patients were performed as a day case, 43 with an overnight stay, 28 with a 2 night stay and 7 with more than 2 nights.
34 patients stayed more than one night for their procedure; the notes of these patients were reviewed for reasons that may have contributed to a longer inpatient stay. Surgical categories of these patients were 19 orbital decompressions, 4 enucleations, 7 eviscerations and 4 exenterations. Two sets of notes were unavailable for review.

Factors contributing to longer inpatient stays included: travelling from out of region (10 patients). This usually involved patients having their surgery on morning lists being admitted the night before, then discharged the following day. Other factors contributing to a longer stay included high pain scores (11 patients) defined as scores of greater than 5 out of 10 in first 24 hours post operatively. Pain in all cases
but one was managed with simple analgesics; codeine, paracetamol, non-steroidal anti-inflammatories and, or tramadol. In most cases this did not appear to prolong the inpatient stay, but may have precluded discharge on same postoperative day. Postoperative nausea or vomiting necessitating therapy occurred in 11 of the 34 patients, and in 6 of these, persistent symptoms contributing to delay in discharge was recorded in the nursing notes. Social arrangements for discharge caused delay in 2 patients and medical reasons in 3 patients. Patients often had more than one indication for remaining in hospital.

Graphs 3 and 4 above demonstrate factors contributing to increased length of stay and the occurrence of postoperative nausea and vomiting related to type of surgery.

Of the 32 operations reviewed, all but five were performed under general anaesthesia (GA). The five under local with sedation were evisceration procedures. It was noted that 4 out of 5 of these patients had pain scores between 0 and 2 in the first 24 hours postoperatively, as compared to the two who had their procedure under GA who had pain scores greater than 5.
Conclusions
The short length of stay demonstrated in this audit may reflect the day case nature of much ophthalmic surgery. Indeed, the infrastructure and expertise already exists within the specialty to allow management of complex elderly patients on a short stay basis. There is little published data on length of stay for major orbital surgery. In 2006, a review of orbital decompression in this institution showed that 72% of patients were discharged on the first postoperative day. The remainder were discharged on the second postoperative day. In other institutions, length of stay varied from 3 to 6 days and patients were often admitted preoperatively for investigations. In one centre undertaking endoscopic orbital decompression, 54% were performed as a day case and 27% with an overnight stay.

Problems highlighted by the audit, included pain on the first postoperative day and a relatively high incidence of postoperative nausea and vomiting, particularly relating to surgery involving removal of the eye. It was interesting to note the low pain scores of those having local blocks and sedation compared to those who had had a general anaesthetic. A recent study by Yen compared local and sedation with general anaesthesia for ocular enucleation and demonstrated significantly lower pain scores and incidence of postoperative nausea and vomiting. Regional techniques are often reserved for patients with co morbidities to avoid the risks of general anaesthesia, but should be used in all patients undergoing suitable surgery.

This audit has highlighted the peri-operative issues of this specialist group. Many of the elements of ERP are already present within orbital surgery, including use of regional techniques, pre planned discharge dates and resulting short surgical stays. The adoption of additional components of ERP may further enhance the current good practice.

References
A modified technique of sub-Tenon’s anaesthesia for budget-restricted cataract surgery in Africa

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Introduction
We describe a modified technique of sub-Tenon’s anaesthesia, suitable for high volume cataract surgery in a rural African setting. Sub-Tenon’s anaesthesia is known to provide adequate akinesia and anaesthesia for extracapsular and phacoemulsification cataract surgery1,2.

Method
We use a 22 gauge intraocular cannula (Pricon Angular Cannula 22G, ref RAJ-2164, Iscon Surgicals Ltd, Jodhpur, India). This is a round-barrelled 22G cannula, angled like a Rycroft intraocular cannula, total length 23mm. These cannulae are cheap to obtain: our viscoelastic is Aurovisc (HydroxyPropylMethylCellulose, HPMC 2.0%) (Aurolab, Madurai, India), and each vial of viscoelastic is packaged with an RAJ-2164 cannula for a total cost of 1.30 Euros per unit. Used 22G viscoelastic cannulas are re-sterilised for use as sub-Tenon cannulae: re-use of cannulae is standard practice in Africa due to cost constraints.

We use a standard technique3: topical anaesthesia and povidone-iodine, infero-nasal snip about 5mm from limbus, cannula tip advanced to behind the equator, injection of 5ml of lidocaine/ adrenaline/ hyaluronidase mixture, 5 minutes compression. Cataract surgery is done using a modified Hennig ‘fish-hook’ sutureless extracapsular extraction with in-the-bag lens implant4.

Results
Ease of learning: The technique was easy for the two nurse anaesthetists to learn. All training took place during a one-week visit to the unit by a surgeon (TE) who is familiar with sub-Tenon’s local anaesthesia (LA). Within 1-2 days, the nurse anaesthetists were happy with the technique. Nkhoma Eye Hospital has now changed its default anaesthetic to sub-Tenon’s LA, and since implementation over 400 cataract surgeries have been performed.

Technique used: We did attempt to use Allman’s ‘no-snip’ LA technique, with TE’s standard sub-Tenon’s technique. African patients have thick Tenon’s capsule and it was judged unsafe to use ‘no-snip’ LA with this cannula in this population. Therefore we adopted a standard sub-Tenons technique, with small snip of conjunctiva/Tenon’s, as described above.
Quality of blocks: Surgeons reported good quality blocks with akinesia comparable to peribulbar anaesthesia. No patients reported discomfort during surgery. One patient was unable to proceed with sub-Tenon’s anaesthesia as she had very deep set eyes, could not co-operate with the speculum, and could not keep her eyes still. This represents a 99.76% (414/415) acceptability and success rate.

Safety: Sub-Tenon’s LA is generally agreed to have a much lower likelihood of life-threatening and sight-threatening complications, compared to our previous technique (peribulbar needle block)\(^5,6\). Knowledge of anatomy and a safer LA technique to reduce complications is important, especially in places where back-up facilities are limited.

Cost: The cannulas we use for sub-Tenon’s anaesthesia are effectively free of charge, as we are re-using the cannulae that are supplied with our viscoelastic. This compares well with around 3 Euros for a dedicated sub-Tenon’s cannula. In our unit, the TOTAL cost of non-reusables (viscoelastic, intraocular lens, antibiotics, etc) for each cataract operation is around 3.20 Euros.

Discussion
The first anaesthesia used in Central Africa was chloroform for a patient with a peri-orbital cystic tumour, in Cape Maclear on the shores of Lake Malawi in 1876, by Rev. Dr. R Laws\(^7\). The vast majority of ocular surgical procedures are currently performed using local anaesthesia. Cataract is the most common ophthalmic surgical procedure performed in developing countries.

Different anaesthetic techniques include: topical, intra-cameral, sub-Tenon’s, peribulbar and retrobulbar. There are fewer potentially sight or life-threatening complications with the first three techniques compared to peri and retrobulbar; however patients have reported a preference for combined peribulbar and retrobulbar compared to topical\(^6\), and surgeons have reported a preference for peribulbar anaesthesia\(^9\).

Conclusion
This technique is slightly cheaper than our previous method of peribulbar anaesthesia (no need to purchase disposable needle). Quality of anaesthesia was maintained. Sub-Tenon’s anaesthesia should greatly minimise the risk of sight-threatening or life-threatening complications of anaesthesia.

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Figure 1: Sub-Tenon’s block using the Pricon Angular Cannula 22G, ref RAJ-216, at Nkhoma Eye Hospital, Malawi.

Fig 2: Comparison with other sub-Tenon cannulae. Left: 19G flattened Stevens type, the ‘standard’ sub-Tenon’s cannula. Middle: 21G Tri-Port cannula (Eagle), which can also be used for ‘no-snip’ sub-Tenon’s anaesthesia. 3. Pricon Angular Cannula 22G, ref RAJ-216. We use this cannula for sub-Tenon’s anaesthesia.
References
BOAS Annual Meeting 2010 Report

The 2010 annual meeting was held on 23rd November at the Royal College of Anaesthetists in London. As usual it was a great opportunity to meet friends, drink coffee, nibble biscuits and engage in a bit of pre-Christmas CPD. The meeting was superbly organised by Drs Andy Presland, KL Kong, Chandra Kumar and Jonathan Lord. This was a proud moment for me as I knew Andy when he first started as an SHO at Barnet Hospital several years ago. I hadn’t seen him in over a decade, but we recognised each other immediately. Andy greeted me with a big smile and commented that the last 10 years must have been pretty tough for me as I looked considerably older. Well Andy, can I take this opportunity to say in print that you’re looking as young as ever, and your hair is as thick and luxuriant as it was when you were an SHO. I assume you’re still dyeing it or possibly wearing a wig. Revenge is sweet.

The meeting was very well attended with over 80 delegates, surgeons and anaesthetists from all over the country, who listened attentively and participated in lively discussion following each speaker. Several trade exhibitors were present and there was a generous supply of pens and trinkets for those who didn’t want to buy expensive Christmas presents. The day started with an excellent discussion of the evidence base for different anaesthetic techniques for cataract surgery by Vincenzo Maurino. I’m always relieved to hear that sub-Tenon blocks beat topical techniques in terms of analgesia. Gives me a reason to be in the ophthalmic theatres. As always Tom Eke’s surveillance studies get relentlessly quoted, and I’m constantly envious that I don’t have his capacity to generate top quality data.

After Vincenzo, Hein Ruschen described the complications of local anaesthetic techniques and their management. This is always useful revision, as serious complications are rare but require prompt recognition and treatment by knowledgeable clinicians. An interesting discussion followed about how we teach or maintain our skills in sharp techniques if the evidence base suggests these are significantly more dangerous than topical or sub-Tenon’s blocks.

The pre-lunch session was an excellent summary of the myotoxic effects of local anaesthetics. Keith is always an engaging lecturer and he held the audience’s attention despite the pangs of hunger (was that just me ?). After Keith, we had a brief AGM in which Tom Eke gave us a taster of the delights that lie ahead for us if we attend the 2011 BOAS annual meeting in Norwich on June 23rd and 24th. With images of village greens, thatched roofs, quaint hotels and cobble lined streets in mind we tottered upstairs to tuck into the fine catering laid on by the College.

The post-lunch session was a gripping description of the management of orbital trauma by Ashish Sinha from Boston. Why does he always give this talk and show those gruesome pictures immediately after lunch ?

After lunch Sashi Vohra gave us a detailed talk about the impact of the shape of the orbit on the incidence of complications. Michael Beaconsfield then took us through the different choices of anaesthesia for adenexal surgery. The pace kept up as Rutesh Mehta gave an excellent presentation on sedation for ophthalmic surgery. This is always a controversial topic as some clinicians use it routinely whereas others think it’s the work of the devil. Guaranteed to get a good discussion going.
Rutesh was followed by the double act of Matt Allen and David Charteris talked about the advantages of LA for VR surgery.

We had more coffee and nibbles. The ever youthful Andy Presland (and his luxuriant hair) described the evolution of the Moorfields technique from intramuscular to intravenous ketamine. He gave a wonderful description of the difficulties of auditing outcomes of anaesthesia, changing practice and closing the audit loop.

Andy was followed by Peng Khaw, an international expert on paediatric glaucoma, who enthused about his field. It's easy to see how his enthusiasm, intelligence and drive have helped to establish a world leading unit at Moorfields.

The standard of the talks was excellent and mirrored by some top quality posters, many of them put together by enthusiastic trainees who will be our ophthalmic anaesthesia colleagues in the Society in the future. The poster prize was won by Dr Rob Tuffin from Leeds who presented a poster entitled ‘Do Higher Volumes of Local Anaesthetic Mixtures Mask the Benefit of Adding Hyaluronidase to Peribulbar Blocks?’ As co-author I’m limited in how much praise I can lay upon it, but it really was very, very good, really quite excellent.

Overall, an excellent day. The College is a superb venue. The talks were polished and informative, and the meeting was well attended. Despite the global downturn, the society appears to be going strong and this bodes well for the future meetings.

Hamish McLure
The 2011 annual meeting was held on the 23rd and 24th June at the Assembly House in the centre of Norwich. This meeting included a hands-on interactive session, where delegates could practise different techniques of local anaesthetic blocks on both models and animal eyes, as well as stimulating sessions on complications of local anaesthetic techniques and recent innovations in ophthalmic anaesthesia. Professor Dodds presented a synopsis of the changes due in the awaited RCO/RCoA guidelines and there was also a thought provoking session on difficult cases. All delegates were rewarded for their attendance with a limited edition BOAS mug.

A flavour of the content of the meeting is now given with three of the presentations followed by a selection of abstracts.
In 1884 Knapp\(^1\) used 5\% cocaine eye drops for cataract extraction, however he recognized that this technique would not adequately anaesthetise the iris and that something else was needed.

In 1884 also, Turnbull\(^2\) described a technique for enucleation which involved topical 4\% cocaine applied to the conjunctiva followed by dissection of Tenon's fascia and further cocaine instilled into the space made by the dissection with curved scissors directed nasally.

It would be possible to deliver local anaesthetic solution into any quadrant by this method but care must be taken to avoid the vortex veins.

Sub-Tenon's block did not become an established technique for local anaesthesia of the eye until over 100 years later but attempts were made to revive it along the way, notably in the 1950s when Kirby moved from retrobulbar block to sub-Tenon's to try to avoid retrobulbar haemorrhage. Interestingly Kirby used a needle to enter the sub-Tenon's space.

Atkinson had suggested sub-Tenon’s as a supplemental technique to complement retrobulbar block in cases of pre-operative inflammation. Turz in Manhattan in the 1990s advocated sub-Tenon’s block to provide post-operative analgesia in GA cases.

In 1990 Mein and Woodcock\(^3\) described a 4-quadrant modification of Turnbull's technique and Hansen, Mein and Mazzoli a superior quadrant method\(^4\). In 1992 Greenbaum\(^5\) introduced an anterior approach using a blunt flexible polyethylene catheter inserted just 2mm from the limbus. This technique involved hydrodissection of the Tenon’s from the sclera which was facilitated by the tight fit of his purpose-made cannula in the incised hole. The conical D-shaped flat-bottomed cannula was designed to deliver local anaesthetic solution along the scleral surface and because of hydraulic pressure pass along the muscle sheaths and spread as far as the optic nerve sheath. The conical cannula snugly fits a 0.5 mm opening in the conjunctiva. Greenbaum described this as his parabulbar technique. Greenbaum also described the need to “fold over” the conjunctiva around the cannula to create a hydraulic seal, thus allowing the possibility of hydrodissection rather than the necessity for sharp dissection with scissors in an un-anaesthetised track.
At almost the same time as Greenbaum published his technique, Stevens\(^6\) (1992) described a more posterior approach (5mm from the limbus) in the inferonasal quadrant where a blunt metal Southampton cannula (a cannula with an angled tip and not the cannula we now call Stevens’ cannula) was used to raise a “bleb” subconjunctivally, the cannula was then further inserted until it passed the equator of the globe. The modern curved Stevens’-type cannula requires a 1mm hole and leak can occur if the incision is larger than this. It is not, however, intended to be a hydrodissection technique in the same way as Greenbaum’s but can be modified to be so. (The “conjunctival fold over” hydraulic seal can be used with the more posterior approach of Stevens, to enable a hydrodissection modification of his method, which I personally use).

The more posterior entry point requires dissection down to bare sclera through the separate layers of conjunctiva, Tenon’s capsule and the intermuscular septum, and to facilitate this, Stevens advocated raising the subconjunctival bleb. He also suggested the use of topical adrenaline 0.1% prior to making the incision under topical anaesthesia. One hardly ever sees this done nowadays!

The incision may bleed if made too near the muscle tendons and should ideally bisect the right angle between the inferior and medial rectus muscles. Stevens chose the inferonasal quadrant in order to avoid the inferior oblique tendon temporally and the more prominent vortex vein. A vortex vein is present inferonasally but this is quite posteriorly situated compared to the inferotemporal one, and is less likely to be damaged.

Stevens described delivery of the solution in 2 aliquots, firstly 1ml just posterior to the equator, the cannula then being advanced to a depth of 15 to 20mm where the remainder of the solution was given, the total volume injected being 3 - 3.5mls. Onset time was up to 15 minutes, much longer than with Greenbaum’s technique, and 50% of patients received a facial nerve block. How times change!

Note the technique described by Stevens was not to dissect posteriorly with scissors nor place the cannula deep posteriorly as is so often seen now. Such manoeuvres risk damaging the optic nerve sheath, and increase (theoretically at least) the possibility of subarachnoid spread and brain stem anaesthesia.
Furthermore, dissection of the track with scissors after only a topical anaesthetic is essentially a “no-anaesthesia” technique and is uncomfortable for the patient.

These days most manufacturers supply a curved metal cannula for sub-Tenon’s anaesthesia which has a continuous curve (rather than the angled shaft of the Southampton cannula) and many of which are flattened into an ovoid section rather than being circular in form.

Greenbaum claimed advantage for his technique in the rapid development of akinesia and almost instantaneous anaesthesia, due to the rapid spread of the local anaesthetic under hydraulic pressure. Experience with the technique has shown that conjunctival haemorrhage is common despite his claim to the contrary, although this is a minor nuisance in most cases. (He did, however, use cautery on the conjunctiva before incising it).

Hydrodissection forces the solution along the muscle sheaths as far as the optic nerve sheath, usually resulting in good akinesia and analgesia with 3 mls of solution. Greenbaum recommended an initial “squirt” of 1 ml or so under significant pressure to hydrodissect the potential sub-Tenon’s space, which itself accommodates less than 1ml. With subsequent experience, he reduced the volume of injectate to about 2 mls.

The Triport metal cannula (Eagle) allows flow both forward and backward in the track and has a pencil point. It can thus be used in a “no incision” technique where the conjunctiva is pierced by the cannula alone. Several modifications of a “no snip” technique have been described and this can even be done with a standard intravenous cannula by lifting up a tent of conjunctiva and carefully introducing the needle for 1-2 mm, then sliding the cannula beneath conjunctiva and Tenon’s. In my experience this leads to a greater proportion of subconjunctival injections with significant chemosis.

**Triport cannula**
Many people now use a plastic IV cannula (eg 32mm Abbocath) in a conventional incision. Being “floppy” the cannula often will not easily enter the sub-Tenon’s space unless dissection of the track with scissors or hydrodissection is used. The cannula is round in section and therefore does not tightly fit the diamond-shaped incision, again requiring folding over of conjunctiva to obtain a hydraulic seal.

Fukasaku and Marron\textsuperscript{7} in 1994 described 2 “Pinpoint Anaesthesia” methods which were both failures but a third, subsequent, technique was more successful. This involved placing a curved metal cannula through the 3 layers of conjunctiva, Tenon’s fascia and the intermuscular septum 8 to 12mm posterior to the limbus in the superotemporal quadrant, and advanced to 20mm where 1ml of lidocaine 2% was injected. This produced rapid onset of high quality analgesia but no akinesia. This lack of akinesia is probably due to the posterior injection missing the muscle bellies as they penetrate Tenon’s capsule just posterior to the equator, plus the small volume of injectate.

Ripart and colleagues (1996)\textsuperscript{8} popularised a needle approach to the sub-Tenon’s space via a medial injection under the caruncle, although when first studied it was not clear this was a sub-Tenon’s injection. Single injection at the medial canthus was performed with a 25-gauge short bevelled needle. The injected volume of local anesthetic solution was around 8 mls. The onset time of anesthesia in the original study was 6.9 +/- 3.0 min, with very good akinesia. Additional injections were necessary in 9.2% of study patients. There were no complications. Subsequent anatomical investigations using C-T scan and latex injection\textsuperscript{9} have confirmed that these injections are into the sub-Tenon’s space, rather than peribulbar.

I have found that combining this block with an anterior inferotemporal peribulbar injection at 16mm depth (5mls caruncular and 3 mls inferotemporal) produces excellent anaesthesia and akinesia, and is very suitable for surgery in cases where akinesia is required.

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A sound knowledge of the anatomical features of the orbit is essential for the safe passage of needles into the orbit without damage to vital structures. The orbit consists of a roof, lateral and medial walls, and floor. The eyeball occupies the anterior half of the orbit. Normal axial length is 22 – 24 mm; longer than 26 mm is usually myopic. Patients with axial myopia may have a greater risk of globe perforation during needle blocks (Duker et al 1991).

Orbital injections are traditionally intraconal or retrobulbar and extraconal or peribulbar. Increasing the depth of needle insertion increases both the risk of injecting local anaesthetic into the extraocular muscles and converting an extraconal into an intraconal injection. The inferolateral quadrant and medial canthal area are relatively avascular and preferred sites for local anaesthetic injections. The superomedial part of the orbit should be avoided as it is congested with blood vessels, nerves and muscles with little available space between the orbital roof and the globe.

Three groups of nerves supply the eye – the motor, sensory and autonomic innervations. The vascular and neural elements (optic nerve, ciliary ganglion, cranial nerves, central retinal and ophthalmic artery and vortex veins, superior and inferior ophthalmic veins) are packed into a very small volume in the orbital apex where there is the greatest risk for injury.

The length of the orbit and the relative location of other anatomical structures is highly variable between patients. Katsev et al (1989) measured the depth of the normal orbit and found it to be 42 to 54 mm. They advocated that needles less than 31 mm long are used for retrobulbar and peribulbar blocks.

No complete septa exists between the extraocular muscles behind the eyeball to physically separate the intraconal and extraconal spaces. Local anaesthetic solutions will therefore usually spread to block both sensory and motor nerves to structures within the orbit (Ripart et al 2001).

The Atkinson technique of classical retrobulbar block had patients looking upward and inward. A 22G 38 mm needle was inserted through the skin below the lower eye lid at the junction of the medial two-third and lateral one-third of the lower orbital margin. The needle is directed towards the apex of the orbit and local anaesthetic injected deep into the orbit, close to major structures behind the globe. Several problems are associated with this approach and it is no longer recommended.
In modern intraconal and extraconal blocks, much shorter needles are now used (25 mm or shorter are recommended). Unsold and colleagues (1981) used CT scanning to show that in the upward gaze position, the optic nerve, the orbital artery, and the posterior pole of the globe were all rotated into close proximity to the tip of the advancing needle. Liu et al (1992) confirmed this using magnetic resonance imaging. The primary gaze position is now considered much safer as the optic nerve is out of the way and the retrobulbar needle can be introduced more safely.

With the Atkinson’s technique, the insertion site of the needle at the medial 2/3rd, lateral 1/3rd position is close to the globe, the inferior rectus muscle, the inferior oblique muscle and its neurovascular bundle. These structures are at risk of needle damage. In modern needle blocks, the entry site is much further laterally, at the junction of the lateral and inferior orbital rims where there is more physical space for safe needle access.

A medial peribulbar block is often used to supplement inferolateral retrobulbar or peribulbar injections. The needle is directed backwards parallel to the medial orbital wall and local anaesthetic is injected in the peribulbar or extracanal space. However, a two-injection technique may double the risk of perforating the globe, particularly if the orbital anatomy has been altered by the first local anaesthetic injection. Brahma and colleagues (1994) have shown that a single peribulbar injection into the medial orbital compartment is as effective as the traditional two-injection technique in providing adequate analgesia and akinesia.

Axial myopia is a risk factor for globe injury during needle blocks from the inferolateral approach, especially when the needle is redirected upwards and inwards. There is evidence that the medial approach may be safer in myopic eyes as the increase in equatorial horizontal width is minimal with increasing axial length. The occurrence of staphylomas is confined to the posterior pole or inferior to the posterior pole with none at the equator (Vohra and Good 2000).

Orbital and globe dimensions vary in health and in disease, and careful observation to gain a three-dimensional picture of the individual’s orbital anatomy is required prior to every block.

As a minimum, the following should be checked:
Symmetry of the eyes and orbits
Lid features such as a narrow palpebral fissure.
Globe features such as nystagmus or a restrictive squint
Orbital features such as proptosis or enophthalmos
Pathological features that may make needle blocks hazardous such as trauma, chronic inflammatory disease (pemphigoid) and previous surgery (scleral buckling for retinal detachment)
The placement of a needle and injection of local anaesthetic into the orbit is not a procedure to be undertaken lightly or casually performed by the novice, as there is no substitute for knowledge and clinical experience.
References


POSITIONING OPTIONS FOR PATIENTS WHO CANNOT LIE FLAT

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Patient positioning for eye surgery
Positioning of the patient is important for several reasons. The patient wishes to be in a comfortable position during what may be a stressful procedure. It is important that the patient can remain immobile throughout the procedure (apart from agreed ‘wriggle breaks’). An uncomfortable patient may make surgery more difficult, because discomfort/stress/anxiety may cause involuntary squeezing of extraocular muscles, valsalva manoeuvre (causing positive vitreous pressure) or sudden/involuntary movement when a position becomes unbearable. A patient who is uncomfortable may pass on their stress and anxiety to the surgeon, further increasing the risk of a complication. Thus surgery is more likely to proceed smoothly if the patient is comfortable. The surgeon will also need to be reasonably comfortable, and certainly not so uncomfortable that surgery is unsafe. Therefore it is important to ensure that both patient and surgeon will be comfortable, before surgery commences.

Not all patients are happy with the traditional ‘flat supine’ position for cataract surgery: many cataract surgeons have abandoned the surgical trolley in favour of a reclining chair of the type used by dentists. Most patients prefer not to lie flat, if given the choice. In our survey, only 27% were happy to lie flat, and 62% preferred to have the chair-back elevated a little, at 10 to 25 degrees above horizontal. Adjustment of the head-rest, and use of pillows below the knees, will allow most patients to position comfortably, with the head horizontal and facing the overhead microscope.

Positioning strategies for non-standard cases
Many medical conditions will prevent a patient from lying flat and supine for surgery. Some patients may have a several minor problems, which combine to prevent normal positioning. Common examples include orthopnoea, stiff/bent neck, and obesity. For patients who have difficulty positioning, the following options can be considered:

- **Adjust the patient’s chair**
  - Sit patient more upright, recline head back, Trendelenburg (recline) position
  - Change the patient’s chair- different model may have different positions
  - Orthopaedic table, or bespoke adjustment of chair/table in extreme cases

- **Re-position the surgeon**
  - Surgeon may need to stand, or use a seat that is higher/lower/more mobile
  - Move around the patient: temporal, nasal or inferior approach

- **Move the position of the microscope**
  - Microscope follows surgeon. Rotate microscope away from vertical
• **Change the anaesthesia technique**
  General anaesthesia may be helpful in some cases
  Topical anaesthesia retains eye movement, keeps eye ‘on axis’

• **Change the operation**
  E.g. laser instead of trabeculectomy for glaucoma

**Extreme positioning strategies:**

1. **Patient cannot lie flat, but can extend neck**
   E.g. severe orthopnoea

   • **Standing temporal** approach for phacoemulsification, etc
     Operating chair more upright
     Head-rest horizontal (facing overhead microscope)
     Local anaesthesia
     Surgeon may have to stand instead of sit
     Temporal incision may be easier for phacoemulsification
   
   Raise fluid bottles, as eye is higher than usual

2. **Patient can lie flat, but has fixed neck flexion**
   E.g. ankylosing spondylitis, otherwise healthy

   • **Extreme Trendelenburg** positioning for phacoemulsification, etc
     Orthopaedic tilting table, multiple pillows or parachute-like harness
     Need to ensure patient is secure & will not fall
     Raise fluid bottles to counteract raised vitreous pressure

3. **Patient cannot lie flat, and cannot extend neck**
   E.g. severe orthopnoea with stiff neck

   • **Face to face** positioning for phacoemulsification, etc
     Patient seated, chair/head reclined as much as possible
     Surgeon faces patient (standing or sitting)
     Microscope rotated toward horizontal
     Inferior corneal incision for phacoemulsification
   
   Topical anaesthesia ensures eye is ‘on axis’ for phacoemulsification
   Raise fluid bottles, as eye is higher than usual
   Needs experienced surgeon
   Can be used for any patient, no additional equipment needed

For complex cases, both patient and surgeon must be happy with positioning before surgery commences. It is helpful to offer all patients ‘repositioning breaks’ to maintain comfort during any surgical procedure.
References:


Abstracts presented at BOAS Annual Meeting Norwich 2011

A Simple Homemade Model for Training in Sub-Tenon’s Anaesthesia

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Background

The Sub-Tenon’s block is now widely accepted as the technique of choice for many ophthalmic surgical procedures. Despite this, no models currently exist to facilitate its training. Often the first time a trainee uses a sub-Tenon’s set is on an awake patient undergoing ocular surgery. This can be quite a daunting experience, and many of our trainees recalled significantly increased anxiety whilst performing their first sub-Tenon’s block. We describe a method of constructing a simple, yet realistic model for training sub-Tenon’s anaesthesia using little more than a pair of surgical gloves. In addition, we also present the results of an evaluative questionnaire which was given to 4 experienced ophthalmic anaesthetists and 4 anaesthetic trainees.

Methods

To create the eyeball, a single sterile surgical glove (Size 6) is folded in upon itself numerous times until a small rubber ball is formed (Fig. 1). The remaining glove is cut at the base of the fingers to create a double layered tube (Fig. 2). The top layer will represent the conjunctiva and the lower layer the Tenon’s capsule. The ‘eyeball’ is then placed within the centre of the tube and secured into place by twisting the tube into a stalk which can then be taped (Fig. 3). Finally the model is wedged into a hole which has been created in two stacked cardboard trays (Fig. 4). It is important to note that the side containing the reflection of ‘conjunctiva’ and ‘Tenon’s’ will be the nasal side. A small recess needs to be created in the tray corresponding to the inferior nasal quadrant. This will allow the smooth passage of the sub-Tenon’s cannula. For added realism a laminated face is placed over the model and a pupil and iris can be drawn onto the eye (Fig. 5).

Results & Conclusions

Initial results of the evaluative questionnaire were very encouraging. This may indeed prove to be a very useful teaching tool for future trainees.

(1 = strongly disagree; 5 = strongly agree. Values are median [range])

Trainee Questionnaire

This model appears to be a reasonable substitute for practice. 4 [4]

The model is a useful training tool for learning the technique of sub-Tenon’s anaesthesia. 4 [4-5]

I would have been more confident with my first block had I used this model first. 4 [4-5]
Consultant Questionnaire

This model reasonably replicates the practice of performing sub-Tenon’s anaesthesia 4 [2-5]

This model would be a useful training aid for teaching inexperienced trainees 5 [3-5]

Trainees should use this model before “practicing” on patients 4 [3-5]

If available, I would use this model for teaching sub-Tenon’s anaesthesia 5 [3-5]
Anaesthetic backup of outpatient ophthalmological investigation, probing and irrigation of lacrimal pathways, laser treatment in small children

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Background

Employment of contact methods of diagnostics and treatment in small children cause the necessity of medical sedation and/or general anesthesia.

Aim.

To develop a method of anaesthetic backup for safe performing of diagnostic investigation, laser treatment, probing and irrigation of lacrimal pathways in children on outpatient basis.

Patients and Methods.

Children are taken for diagnostic investigation and treatment without meal, with the results of blood and urine tests, ECG, paediatrician’s consultation; in case of congenital pathology consultation of corresponding specialist is also required.

Premedication is prescribed by an anaesthesiologist individually, considering age and concomitant pathology, and, as a rule, includes cholinolitics, antihistaminic preparations and benzodiazepine. After intramuscular premedication, briefly acting mydriatic and anaesthetic are instilled in the eyes. During diagnostic investigation permanent monitoring of respiration and haemodynamics (pulse oximetry) is performed. In necessity to deepen anaesthesia a short-term inhalation with oxygen and sevoflurane (4-8%) mixture is performed through a face mask.

Employment of the suggested method provides a possibility to change child’s position and to carry out all the necessary investigations and laser interventions (capsulotomy, goniopuncture) comfortably for the ophthalmologist. Probing and irrigation of lacrimal pathways is performed in an operation room under general anaesthesia, with spontaneous breathing using a fixed laryngeal mask which gives a possibility to change child’s position. Induction and support of anaesthesia are performed with inhalation of oxygen and sevoflurane mixture with monitoring of respiration and haemodynamics. After observation in a post-op ward for 1 hour the child is sent home. Use of this method provides a possibility to adjust the deepness of narcosis and is an effective prophylactic measure for ophthalmologic and somatic complications.

Results.

Within 2007 – 2010, in our clinic 346 diagnostic investigations, 653 manipulations on lacrimal pathways, and 58 laser interventions have been performed in children on outpatient basis. No complications of anaesthetic backup were seen.
Conclusion.

Suggested methods of anaesthesia give a possibility to perform anaesthetic backup in small children safely and with good quality during diagnostic investigation, laser treatment, probing and irrigation of lacrimal pathways on outpatient basis.
Medical and ocular profile of patients undergoing cataract surgery

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Background:
Cataract surgery has changed greatly in recent decades, with a move to routine phacoemulsification and new indications for surgery such as angle closure glaucoma and following vitreo-retinal surgery. There have also been major changes in population health and medications. Therefore, we reviewed our cataract patients to provide a snapshot of the general health of cataract patients in 2011.

Methods:
We reviewed the files of patients who were assessed for cataract surgery at the Norfolk & Norwich University Hospital (NNUH). NNUH performs almost all the NHS cataract surgery for the local area: nearly all patients are of White British ethnicity. Local guidance restricts cataract surgery in the first eye to visual acuity of 6/12 or worse, unless there are mitigating factors. Previous audit has shown that over 98% of all NNUH cataract surgery is performed using local anaesthesia. All NNUH cataract patients undergo a pre-assessment of general health using the Medisoft(R) electronic patient record. We looked at data for 100 consecutive patients who were assessed for cataract surgery in their first eye, under Local Anaesthesia (LA) and also 10 patients who had General Anaesthesia (GA).

Results:
The findings showed that for 100 consecutive LA cataract patients, there were 43% males and 57% females. Mean age was 75 (SD 9.3 , range 49-90). Ocular co-morbidity: none 18%, diagnosis of glaucoma 18%, previous vitreo-retinal surgery 10%, previous glaucoma surgery 2%, other 74%. General health disorders: none 7%, hypertension 58%, angina 19%, diabetes 16%, asthma 14%, myocardial infarction 9%, stroke 8%, bleeding disorders 3%. On chronic systemic medications: none 11%, 1-3 medications 30%, 3-10 medications 47%, more than ten medications 12%. On anticoagulant medications: 58% none, 30% on aspirin, 6% on warfarin, 2% on clopidogrel and 4% on combination. Alpha-blockers: none 89%, tamsulosin (flomax) 3% (100% males), others 8% (37% females, 63% males). Hearing problems 27%, arthritis 27%, backache 20%, anxiety 11%, incapacity to lay completely flat 7%, tremor 3%, dementia 1%. In 98% of the patients the Axial Length (AL) was between 21mm and 26mm (range 21.26-25.56). 1% was below 21mm (minimum 20.34mm) and 1% was above 26mm (maximum 30.33).

For 10 GA cataract patients, there were 6 males and 4 females. Mean age was 70 (SD 11.8 , range 50-83). There were no significant differences from the LA patients, in terms of ophthalmic problems, medical history and regular medications. However, in patients with some medical disorders, the most common were anxiety (40%), dementia (30%), stroke (20%), arthritis (20%), epilepsy (20%), tremor (10%), and Parkinson’s disease (10%). Also, 60% of GA patients had brain pathology. None of them were on alpha-blockers and all of the patients who were on anticoagulants were on aspirin. The AL was between 21mm and 26mm in all of them (min 21.86 and max 24.97).

Conclusions:
The majority (approximately 90% for both groups) of patients presenting for cataract surgery have some co-morbidity, which may influence choice of anaesthesia, the risk of complications, or may otherwise influence peri-operative management. These data may be useful in planning a cataract service. Other ethnic groups presenting for cataract surgery may have different general health profiles.
Patient satisfaction & complication rate for phacoemulsification cataract surgery with ‘face to face’ upright seated positioning

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Background
Cataract surgery may be difficult in patients who cannot lie flat due to kyphosis, orthopnoea, and other problems. Depending on anatomy and general health, general anaesthesia may also be challenging in these patients. For these patients, we developed the “face to face” positioning approach for phacoemulsification using topical-intracameral anaesthesia. We present complication rates for our first 49 consecutive cases and patient satisfaction scores for 10 consecutive cases.

Methods
Data were collected prospectively for all patients who had ‘face to face’ upright positioning for cataract surgery, by a single surgeon (TE). All were unable to position in the standard ‘head horizontal, facing overhead microscope’ position. In this technique, the patient is seated in a standard surgical chair with the chair back reclined as much as the patient can tolerate and the head/neck in a comfortable position (usually 30 to 80 degrees above horizontal). The surgeon faces the seated patient either seated or standing. The position of the clear corneal incision is chosen for ease of surgery: inferior, inferotemporal, inferonasal, or temporal. Topical intracameral anaesthesia without sedation is used, and patients are advised to fixate on the microscope light during the procedure [1].

Data on general health, position adopted, surgical approach and complications were recorded for all patients. Patient satisfaction was assessed for our most recent patients: we asked patients immediately after surgery to rate their comfort during the procedure (where 0 = totally unacceptable and 10 = totally comfortable), and whether they would accept the same positioning/procedure if further eye surgery were required.

Results
49 procedures in 39 patients were performed. Patients were unable to lie flat because of a variety of problems, broadly categorized as mainly neurological (9 eyes), mainly orthopaedic (18 eyes), mainly cardiac/respiratory (20 eyes), or psychological (2 eyes). ASA grade was III or IV for all patients. In 21 eyes, additional ocular problems made the surgery more challenging. Surgery was completed as planned in 48 of 49 patients. One patient had a posterior capsule rupture with a dropped nucleus occurring during “face to face” surgery (posterior capsule rupture rate 1/49, or 2.1%). Another patient needed to be brought back to theatre for removal of residual soft lens matter.

Comfort score was given for 10 operations (8 patients). Mean comfort score was 9.2 out of 10 (range 5-10). All patients (100%) stated that they would be happy to have ‘face to face’ positioning again if required.

Conclusion
The “face to face” technique, in the hands of an experienced surgeon, is an acceptably safe approach for patients unable to adopt the traditional approach for cataract surgery. The technique avoids the risks of general anaesthesia, and appears to be highly acceptable to patients.

A systematic comparison of posterior capsule rupture rate between akinetic and kinetic block anaesthetic techniques.

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Background
Local anaesthesia for cataract surgery can be provided by a number of approaches that can be divided into (i) akinetic blocks, which reduce eye movement: peribulbar (PB), sub-tenons (ST) or retrobulbar (RB) techniques, or (ii) kinetic blocks which do not restrict eye movement: topical (TA) and topical with intra-cameral (IC) anaesthesia. Proponents of each technique may claim that theirs gives a lower rate of operative complications, but there has been no large prospective study to compare the risk of posterior capsule rupture between kinetic and akinetic blocks.

Objectives
To compare the risk of posterior capsule rupture between akinetic blocks (PB, ST and RB) and kinetic blocks (TA, IC) during cataract surgery.

Methods
We searched the Cochrane Register of Controlled Trials (CENTRAL); MEDLINE (1990 to July 2010); EMBASE (1990 to July 2010), ClinicalTrials.Gov, and the metaRegister of Controlled Trials. We included all randomized studies comparing any akinetic block (PB, ST or RB) with any kinetic block (TA, IC) for phacoemulsification surgery. We only included studies that stated the rate of posterior capsule rupture, or that stated without qualification that there were no intra-operative complications. One author independently assessed trial quality and extracted data.

Results
We identified 30 published studies that had prospectively compared akinetic block with kinetic block: most were done to assess patient satisfaction. Nine papers did not mention complication rate and were excluded. Of the 21 papers that met our inclusion criteria, the number of patients in each group ranged between 25 and 282 (mean 94.5), totalling 3929 eyes. Sixteen papers mentioned posterior capsule rupture specifically whereas five papers stated that no intra-operative complications occurred.

In the akinetic block group, 22 of 2030 eyes (1.21%) experienced posterior capsule rupture and/or vitreous loss, compared to 17 of 1899 eyes (1.01%) in the kinetic block group. Chi-squared test showed no significant difference between the two groups (p=0.45).

Conclusions
This analysis of published prospective randomised trials indicates that there appears to be no clinically significant (or statistically significant) difference in risk of posterior capsule rupture between akinetic and kinetic block anaesthetic techniques.
DCR under local anaesthesia: a comfortable alternative.

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Background
Dacrocystorhinostomy (DCR) is traditionally performed under general anaesthesia in the United Kingdom. Many patients presenting for DCR are elderly with significant co-morbidity, making it difficult to justify the risk of general anaesthesia. Local anaesthetic techniques are gaining in popularity, although they may involve multiple injections1. We have developed a simple, yet effective method.

Method
An infusion of remifentanil 0.05mcg/kg/min is commenced. A dental roll, soaked in 1ml 2% lidocaine, is placed under the upper lip on the operative side. The nasal airway, anterior nasal cavity and sub turbinate area are sprayed with lidocaine and phenylephrine. Infraorbital nerve block is then performed, with 1ml of 0.75% levobupivacaine, through the numb area of the gum. The nasal branches anaesthetise significant areas of septum and mucosa. A 4.5cm nasal tampon, lubricated with chloramphenicol ointment, is then placed in to the nasal airway. This is followed by ribbon gauze soaked in phenylephrine / lidocaine solution above the inferior turbinate. Infiltration of the skin incision (down to peristium), superior and inferior lacrimal canaliculi and medial canthus is then performed with up to 3ml of 1% lidocaine with epinephrine. Supplementary oxygen is provided via a nasal sponge in the non operative side.

Results
We audited 12 consecutive patients with a median age of 78 years (62 to 87). The table shows pain scores during patient preparation and operation.

<table>
<thead>
<tr>
<th></th>
<th>Mean VAS pain score (0-10cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local anaesthetic injections</td>
<td>1.4</td>
</tr>
<tr>
<td>Packing the nose</td>
<td>0.6</td>
</tr>
<tr>
<td>Operation</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Only 2 patients required supplemental local anaesthesia during the operation. All of the patients said they would choose the same form of anaesthesia if they required operation on the contraleteral side. Median blood loss was 40ml (Range 10 to 70).

Conclusion
Our technique is minimally invasive, well tolerated by patients and provides excellent operative conditions. We now consider it a routine alternative to general anaesthesia for this procedure.

1) www.boas.org/docs/OPHTHALMIC_ANAESTHESIA_1.pdf
Quantifying the patient experience by modular team audit

A simple and highly efficient method to audit your practice, ready for revalidation.

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Introduction
Audits in Anaesthesia are traditionally initiated by individual Consultants, the choice of topics is usually sporadic. A single consultant auditing a single aspect of clinical care will often find that inclusion of patients into the audit by other clinicians is incomplete and therefore the patient sample is not representative. Also the time needed to collect the audit data becomes very long. For these reasons, we completely redesigned the audit process in our department.

Methods
In a preparatory meeting all interested clinicians were asked to enlist into the project with their ideas for audits. From fifteen Consultants, nine distinct projects were proposed.

1) DVT prophylaxis
2) Peri-operative management of coronary stents
3) Airway complication after Ketamine
4) Postoperative pain control in recovery
5) WHO checklist use
6) Analgesia prescribing practice
7) Quality of preoperative visit
8) Satisfaction score for anaesthesia care.
9) Postoperative follow-up of paediatric patients.

Three of those projects had already proceeded too far to be included in the modular team audit. Two Consultants opted out. The remaining four project leaders were furnished with supporting literature, for example from the RCOA, and asked to produce a questionnaire for their chosen topic.

All consultants were given instructions on how to submit their projects to the local audit and effectiveness committee. All projects were subsequently approved. The questionnaires were amalgamated into a single questionnaire for use in the audit. Several meetings with all groups of clinical staff were held to publicise the audit project.

All patients that underwent surgery during the specified audit days (28th and 29th June 2010) agreed to take part and were consecutively enrolled into the audit. A questionnaire was attached to each patient’s notes. It was then filled in by any staff (Nurses or Doctors) as the patient progressed through the hospital.

Results
On the two audit days 116 patients went through the main theatres. Of those 91 questionnaires were recovered. Recall of 78%. A small number of questionnaire sections were not completed. Feedback from patients and staff about the conduct of the audit was mainly positive. It was felt that the added workload for the interviewers was manageable. Because all patients were asked the same questions, the audit system was easy to understand and follow.

Conclusion
We achieved the aim of the audit to improve the representativeness of the results by including a high proportion of patients into the audit. Also, the dataset of more than ninety patients was acquired in just two days. Previous audit projects would go on for months and a large proportion of projects would be abandoned because they simply ran out of steam. We estimate that the modular team audit reduces duplication of work. Because all patients are included consecutively the results are highly reproducible and representative.

Please refer to the separate publication for results of the audit projects.
Preoperative anaesthetic visit
Patients were asked five questions regarding their pre-op visit:

- Did you see the anaesthetist prior to your operation? (83% responded)
  Yes 67.1%; No 27.6%; Not sure 5.2%
- Did she have time to listen to your concerns? (66% responded)
  Yes 71.6%; No 18.3%; Not sure 8.3%
- Did you agree with the anaesthetic decision? (67% responded)
  Yes: 90.1%; No: 4.9%; Not sure: 3.27%
- Did you receive sufficient information? (67% responded)
  Yes: 80.3%; No: 13.1%; Not sure: 6.6%
- Were you satisfied overall with the anaesthetic visit? (62% responded)
  Yes: 85.7%; No: 8.9%; Not sure: 5.3%

Conclusion:
In order to increase the rate of agreement and satisfaction with the preoperative anaesthetic care:
We should attempt to see all of the patients pre-op including the local anaesthetics. We should to take more time to listen to their concerns and provide them with sufficient information.

Action taken:
A patient information leaflet and internet based information is being published.

Patient Satisfaction with anaesthesia care scoring.
We measured the Iowa Satisfaction with Anaesthesia Score (ISAS). We asked all patients to complete the form in recovery. The questionnaire asks 11 questions and allows 6 scaled answers.

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
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<tbody>
<tr>
<td>I felt relaxed</td>
<td>2.188406</td>
</tr>
<tr>
<td>I received pain</td>
<td>2.653333</td>
</tr>
<tr>
<td>I itched</td>
<td>2.378378</td>
</tr>
<tr>
<td>I felt sick</td>
<td>2.140845</td>
</tr>
<tr>
<td>I felt pain</td>
<td>2.571429</td>
</tr>
<tr>
<td>I felt safe</td>
<td>2.112676</td>
</tr>
<tr>
<td>I was too hot</td>
<td>2.140845</td>
</tr>
<tr>
<td>I was too cold</td>
<td>2.140845</td>
</tr>
<tr>
<td>I was satisfied with my anaesthetic care</td>
<td>2.653333</td>
</tr>
<tr>
<td>I hurt</td>
<td>1.457143</td>
</tr>
</tbody>
</table>

The six possible responses to each question are:
- Disagree very much
- Disagree moderately
- Disagree slightly
- Agree slightly
- Agree moderately
- Agree very much

Average score:
The score is calculated for every question. A totally satisfied patient would score +3 and a totally dissatisfied patient would score -3.

Conclusion:
The average scores for satisfaction are high, however it is interesting that the scores relating to the experience of pain (Question 5,9 and 11) are much lower than other scores, indicating that there is room for improvement in the provision of analgesia for ophthalmic surgery.

Action taken:
Patients in pain are not very satisfied. We will increase training and awareness of anaesthesia and recovery staff to measure and treat pain after surgery.

Reference:

DVT prophylaxis
The process of DVT risk assessment, patient information and application of prophylaxis was audited:

- Assessment of DVT risk
  68% of patients had a risk assessment form filled in.
- Patient information
  17.5% of patients had received information regarding the risk and prevention of DVT.
- Actual prophylaxis given
  30.7% of patients were given DVT prophylaxis (TED stockings)
- 16 patients received prophylaxis when they did not have any risk factors.
- One patient who was at risk for DVT did not receive any prophylaxis.

Conclusion:
All (100%) of patients should be risk assessed and receive information about DVT and PE at the same time. Everyone with risk factors should have DVT prophylaxis. No one without risk factors should have prophylaxis.

Action taken:
The DVT assessment sheet has been redesigned. The importance of the issue has been addressed with relevant staff.

Pain scores in recovery
Verbal analogue pain scores 0-10 were recorded in recovery.
The average score for eye pain was between 1 and 2 (1.743), but the range of scores went up to eight! We complied a list of operations causing pain scores of higher than 4.

- Evisceration (n1),
- Trabeculectomy (n1);
- Phaco (n1),
- Corneal graft (n1),
- Ectropion (n1),
- Squint repair (n5),
- Lamincotomy (n1),
- Orbital decompression (n1),
- Insertion of aqueous shunt.(n1).

In addition we measured the time it took to reduce pain scores to less than 5/10.
It took on average 14.5 minutes to reduce pain scores. The maximum was 25 minutes.

Conclusion:
Most ophthalmic surgery causes very little pain, but a number of procedures require potent analgesics.

Action taken:
All (100%) of patients should have their pain assessed. This will be implemented within a new computer system trust wide. Potent oral analgesia like oral Morphine will be made available in recovery for better control of high pain scores.
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