



BOAS

Ophthalmic Anaesthesia News

The Official Newsletter of the British Ophthalmic Anaesthesia Society
Issue 8, May 2003

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Ophthalmic Anaesthesia News

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One-year national survey of severe complications of local anaesthesia in cataract surgery Tom Eke, Consultant Ophthalmologist, Norwich, and BOAS Council member

During the past decade, there have been several important developments in anaesthesia for cataract surgery. No-needle anaesthesia, small-incision surgery, safety guidelines from the Royal Colleges, new books and courses on ophthalmic anaesthesia, clinical governance, and the formation of BOAS itself have all contributed to improved safety, and improved safety-awareness.

Safety aspects of local anaesthesia (LA) were audited on a national scale in 1996. The United Kingdom National Survey of Local Anaesthesia for Ocular Surgery looked at around 65,000 intraocular operations performed using LA, during a three-month period. At the time, the great majority of LA's were performed using sharp needle techniques (retrobulbar or peribulbar). Numerous 'sight-threatening' and 'life-threatening' complications were reported. The number of 'no-needle' LA's (topical, topical-intracameral or sub-Tenon's) was too small to assess the safety of these techniques with any degree of certainty. Since 1996, there has been a major swing towards the use of these 'no-needle' LA techniques. From our knowledge of anatomy and physiology, we would expect these techniques to have a better safety profile than sharp needle techniques. Published series of several thousand cases appear to confirm this, but should be interpreted with caution for two reasons. Firstly, because serious complications are so rare, a case series should be very large indeed (tens of thousands of cases) in order to confirm a good safety profile. Secondly, such case-series are usually produced by centres that have a particular interest in LA safety, and their results may not be replicated in the 'real world'. It is important to be certain that, for these newer LA techniques, safety profiles in routine practice are at least as good as those of their predecessors. For these reasons, a second national survey of LA safety was designed.

The 2003 survey of LA safety is being carried out by the same investigators as in 1996. This time, the survey takes place through BOSU, the British Ophthalmic Surveillance Unit. BOSU was set up in 1997 to help with case ascertainment for studies of rare conditions in ophthalmology. Each month, BOSU mails a self-addressed postcard to all ophthalmologists of consultant or associate specialist grade in the UK and Eire. The card asks whether they have seen any (or none) of four or five specified conditions in the preceding month. The monthly response rate is almost 80%, and positive responses are passed on to the appropriate investigators for follow-up questionnaires. The new Survey, which has appeared on BOSU postcards since November 2002, asks for reports of 'sight-threatening or life-threatening complications of LA for cataract surgery'. All cases identified by BOSU will engender a single questionnaire for the reporting ophthalmologist, enquiring about LA technique, the nature of the complication, and the outcome. Case ascertainment continues for 12 months. At the mid-point of the Survey year, a further questionnaire will be mailed to all ophthalmologists on the BOSU list, asking about cataract workload and LA techniques used. This survey will therefore look at tens of thousands of topical, sub-Tenon's and peribulbar anaesthetics in routine practice, and should give a good idea of the relative incidence of serious complications. Results will be available in time for the 2004 BOAS conference, and should be of interest to cataract surgeons and ophthalmic anaesthetists everywhere.

Anticoagulation and intra-ocular surgery under local anaesthesia

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Introduction

With an increasingly ageing population, the number of patients undergoing anticoagulation therapy is on the rise. The most common indications for anticoagulation include atrial fibrillation, valvular heart disease, pulmonary embolus, deep vein thrombosis and transient ischaemic attacks. Prophylactic measures are aimed at reducing the risk of thrombosis, although the main complication from anticoagulation therapy is haemorrhage.

In 2001, The Royal College of Ophthalmologists and The Royal College of Anaesthetists produced joint guidelines on local anaesthesia for intraocular surgery⁽¹⁾. The recommendations stated that *'in procedures involving sharp needles or sub-Tenon's block, it is important that the international normalised ratio (INR) is known. The level should be within the recommended therapeutic range, which is determined by the condition for which the patient is being anticoagulated.* The therapeutic ranges for oral anticoagulant control are those proposed by the British Society for Haematology and are as follows:- atrial fibrillation (AF) - INR 2.5 (2.0 – 3.0), valvular heart disease - INR 3.8 (3.0 – 4.5) and pulmonary embolus (PE) or deep vein thrombosis (DVT) - INR 2.5 (2.0 – 3.0).

Aims

The aims of this study were to determine whether the unit in Worcester was practising within the joint College Guidelines, and also to ascertain the rate of complications as a direct result of patients being on anticoagulation.

Methods

A retrospective case notes analysis was undertaken over a three year period, between 1999 and 2002. Data was collected on anticoagulated patients under the care of two consultant ophthalmic surgeons. All patients were to undergo phakoemulsification under local anaesthetic as day case patients. In total, seventy case notes were collected, although 20 were discarded due to incomplete record-keeping. Hence, data on 50 patients receiving anticoagulation therapy who underwent phakoemulsification between 1999 and 2002 was analysed. The information which was collected included general demographic data, in addition to anticoagulation details, which encompassed reason for anticoagulation therapy, dose of therapy, preoperative INR, length of time between INR assessment and day of surgery, type of anaesthetic, pre-, per- and post-operative (up to 4 weeks) complications and any changes made to anticoagulation therapy for the surgery.

Results

There were an equal proportion of male and female patients in the study with an average age of 77 years. The most common indications for anticoagulation were AF (48%), heart valve disease (28%), transient ischaemic attacks (14%) and DVT (4%). The average dose of warfarin treatment was 3mg. Preoperative INR was performed between 3 and 14 days preoperatively, the average being at 7 days preoperatively.

The results showed that 68% of the patients had an INR within the normal range for their condition. However, 6% of the patients had preoperative INR reported above the therapeutic range, while 26% of patients had preoperative INR below the therapeutic range. Despite this, only 2% of this (32) had surgery postponed due to a high INR, the remaining 30% underwent surgery as planned. Interestingly, the under coagulated patients were as much as 1.6 units below their lower limit of normal.

At the time of surgery 76% of patients underwent peribulbar anaesthetic; the remaining 24% had sub-Tenon's. Of the patients who had sub-Tenon's anaesthesia, 58% (14% of the total number of patients) suffered preoperative subconjunctival haemorrhage at the time of anaesthetic administration. No perioperative problems were reported in any patients. Only 1 case of postoperative problem was reported, that of a spontaneous subconjunctival haemorrhage 3 weeks after surgery.

Discussion

In conclusion, the data revealed that complication rates were exceptionally low and complications minor in nature e.g. subconjunctival haemorrhage. On reviewing departmental practice with the College guidelines however, we unexpectedly found that 32% of patients had preoperative INR outside the therapeutic range. Despite this, 30% underwent surgery and without any complication. So although we were not working strictly within the College Guidelines there did not appear to be any detrimental effect to the patient. In addition, there was a very variable time period between INR assessment and actual day of surgery.

This study has raised several issues including whether there is a lower limit of INR below which local anaesthesia and intraocular surgery would be contraindicated. If INR is being undertaken, more specific guidance may be useful on how soon prior to surgery the sample must be taken in order to have an accurate result. Another interesting factor to bear in mind is individual variation in the interpretation of the College Guidelines. Not all units actually perform a preoperative INR. The question arises as to whether there is a need at all to perform INR, if, as in our case, in the majority of instances the result will not actually influence the go-ahead with the surgery?

Finally, the question arises as to where the responsibility lies in patients with abnormal levels of anticoagulation i.e. the ophthalmologist, the anaesthetist, the haematologist or the general practitioner, and who should be informed with regard to further management of these under anticoagulated patients who may be at risk of other systemic pathology.

Reference

1 Local anaesthesia for intraocular surgery. The Royal College of Ophthalmologists and The Royal College of Anaesthetists. 2001

Thyroid eye disease: implications for anaesthesia

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Introduction

The conduct of anaesthesia in patients with thyroid disorders (e.g. Graves' disease) has been reviewed thoroughly. Owing to changes and advances in surgical practice many patients with Graves' disease are now undergoing surgery and hence anaesthesia in order to correct a complication of the disorder, namely exophthalmos or Thyroid Associated Orbitopathy (TAO). The prevalence of clinically significant TAO in the UK is 2 per 10000¹ and in a defined population from Midwest America, the overall age-adjusted incidence for females was 16 per 100 000 population/year and for males was 2.9 per 100 000 population/year², thus not an insignificant number and yet very little has been produced in the anaesthetic literature with regards to the conduct of anaesthesia in these patients. We have therefore reviewed the literature and our own experience at a specialized centre for oculoplastic surgery; with the aim of highlighting those factors which we think are important when considering carrying out anaesthesia in those patients with TAO.

Pathophysiology

Graves disease is an autoimmune thyroid disease characterised by hyperthyroidism and by the occurrence of a distinctive orbitopathy, TAO³ It has a lifetime incidence of 1% to 2% in the general population, females are more commonly affected than males (with a female: male ratio of 5-10:1)^{1,4} and it occurs over a broad age range (16yrs-81yrs) with a mean age in the 5th and 6th decade⁵. TAO has a similar, but less pronounced female: male ratio of 2-5:1^{4,6,7} and a mean age of onset of 45yrs (with bimodal peaks in age groups 40-49yrs and 60-69yrs)². Graves' disease is caused by the production of autoantibodies that stimulate the thyrotropin (TSH: thyroid stimulating hormone) receptor resulting in the growth of the thyroid gland, as well as the synthesis and secretion of excessive amounts of thyroid hormone. The TAO is thought to be a closely related but separate organ-specific autoimmune disorder with target autoantigens and circulating autoantibodies⁸. As a result of this autoimmune process the extraocular muscles undergo a characteristic fusiform enlargement caused by inflammatory cell infiltration⁹ one or all extraocular muscles may be affected, either unilaterally or bilaterally. Degenerative changes and fatty infiltration then occur within the muscle which eventually becomes replaced by fibrous tissue.¹⁰ Orbital fat hypertrophy can also occur in some cases. However, the orbit is a pyramidal-shaped bony cavity containing the aforementioned extraocular muscles and fat together with the eyeball, nerves and vessels and because it is a confined space, this volumetric expansion of the muscles and fat

leads to a secondary mass effect which in turn is responsible for the array of symptoms and signs seen in TAO.

The disease process tends to take a specific course and follows a model known as Rundles curve¹¹, which is an accurate reflection of the natural history of TAO. Typically, there are a few months of progressive deterioration up to a plateau followed by a gradual slower improvement over years, although a return to normal would be rare.

It is during the initial period of 18 months to 2 years of active disease that the majority of patients (90%) present with their signs and symptoms. Most patients who present with TAO will have associated hyperthyroidism and indeed the diagnosis is often made simultaneously, but interestingly and for reasons not yet known, a small percentage of patients are actually hypothyroid or euthyroid at presentation.^{12,13}

In addition to Graves' disease, many patients with TAO will have a history or a family history of other autoimmune disorders, particularly diabetes mellitus, but also myasthenia gravis, pernicious anaemia and Addison's disease. This is in keeping with the well established view that Graves' disease is an inherited disorder¹⁴. However, the importance of heredity in the pathogenesis of the associated orbitopathy is not so clear and it is suggested¹⁵ that environmental factors, more so than major genes, were likely to predispose certain individuals with autoimmune thyroid disease to severe TAO. Stress^{16,17}, infection and most importantly smoking^{15,18,19,20,21} are examples of such environmental triggers. It is important to emphasise at this point, the importance these possible co morbidities and the obvious effects smoking will have on any form of anaesthesia carried out in these patients.

Clinical findings

TAO can present with numerous symptoms and signs that can be acute or insidious in onset. They include soft tissue symptoms such as periorbital puffiness, redness, foreign body sensation, tearing or itching or an altered appearance of the eyes due to proptosis or eyelid changes (i.e. retraction or lag). Other presenting symptoms relate to impaired ocular motility resulting in diplopia or to optic nerve dysfunction leading to reduced visual acuity. A particularly distressing symptom, mainly experienced by those cases which run a more fulminant course, is a constant deep boring orbital pain.

Many patients will usually present to an endocrinologist with symptoms of their thyroid disease before their TAO becomes symptomatic. It is therefore particularly important that patients with Graves' disease are carefully and repeatedly examined for signs of TAO. However, some patients will have such severe features of TAO that an ophthalmologist who may then detect the associated thyroid disorder may first see them. Hence, one can see the importance of a close relationship between the endocrinologist and the ophthalmologist in cases of TAO.

Although the diagnosis of TAO is often not difficult owing to the characteristic clinical findings, it is recommended²² that a detailed careful assessment is carried out using objective measurements, not only to aid diagnosis but also

as a means of providing a baseline for serial measurements both in monitoring disease progression and the effects of treatment. It is also useful in determining the type of treatment required. Further evaluation of the patient can be achieved with imaging techniques namely, ultrasound, computerized tomography and magnetic resonance imaging^{23, 24}.

Management

Management of TAO can be medical or surgical depending upon the type, severity and activity of the eye disease. Ultimately the aim of this management is to control or resolve the orbital inflammation and to prevent visual loss from CON (Compressive Optic Neuropathy). The latter occurs in only a small minority (4-5%) of patients and is caused by crowding of the posterior orbit with enlarged extraocular muscles²⁵. This leads to a pressure effect on the optic nerve, which if left untreated, can cause irreversible visual loss. At particular risk of developing CON are male patients with late onset disease, diabetes and those with a greater degree of extraocular muscle enlargement^{7, 25, 26}. It must be said however, that in many patients, provided meticulous control of the thyroid function is achieved the patient is euthyroid, no specific treatment is required for the orbital inflammation as the disease is self limiting. But, in about a third of patients with TAO, the orbital inflammation will be so severe or the risk of developing CON so great that further treatment is necessary.

Initially patients with severe TAO are managed conservatively with medical treatments. These consist of immunosuppressive therapies, mainly corticosteroids and antimetabolites, but also retrobulbar irradiation. However, most of these therapies are only likely to be effective during the active phase of the disease. This is why we see the inflammatory changes, and in many cases the CON, responding well to medical treatment²⁷ whereas the proptosis and restrictive myopathy, which persist into the "burnt-out" or inactive phase of the disease, are relatively resistant to these conservative measures^{28, 29}. Surgical orbital decompression is usually considered once conservative treatment has failed and is usually postponed until the active phase of the disease is resolved. One important exception to this would be progressive CON that has failed to respond to medical treatment, in this situation prompt surgery may be the only option to prevent permanent visual loss.

There has been little in the way of randomized controlled trials comparing modalities of treatment for TAO. However, systemic corticosteroids have been used for the past 50yrs in these patients and are considered the most efficacious drug therapy available. They can be administered orally³⁰ or intravenously³¹, with the latter being marginally more effective, with a more rapid response and possibly fewer side effects. About 2/3rds of patients exhibit a worthwhile response to steroids but sometimes high doses for prolonged periods of time (several months) are required. This is particularly true in cases of CON. As a result, potentially serious systemic side effects are common for example, duodenal ulceration with GI haemorrhage, diabetes mellitus, osteoporosis with pathological fractures, glaucoma, cataracts and a predisposition to opportunistic infection. One way of

reducing these side effects is to use antimetabolite agents in conjunction with the steroids as "steroid spacers". Some of the agents used include cyclosporin, azathioprine, cyclophosphamide and many others, the majority of which have not been subjected to rigorous evaluation and hence their place in the treatment of TAO is unknown. There is some work available looking at the drug cyclosporin. This was shown³² to be disappointing when used alone, compared to oral prednisolone. But when the two drugs were combined the effect was superior to either of the two drugs used alone. However, the one big drawback of this drug is the need for close monitoring due to the significant side effects experienced by most patients. As a result many centres have abandoned this therapy.

Another antimetabolite used is azathioprine. This is frequently used in combination with steroids even though this regime has not been subjected to rigorous evaluation. However, azathioprine used alone has been studied, and was shown to confer no benefit over steroids³³. Again, owing to the significant side effects of this drug its use is fairly limited.

Somatostatin receptor agonist therapy, intravenous immunoglobulin and plasmapheresis have all been studied²⁷ but none have yet superseded the use of corticosteroids.

The other mode of conservative treatment is retrobulbar irradiation. This involves radiotherapy directed on the posterior orbit and is very effective in many patients in causing resolution of the orbital inflammation³⁴. However, the beneficial effects are not seen for 4-6 weeks, during which time the inflammation can worsen along with the signs and symptoms. Orbital irradiation is therefore used in combination with steroids which can provide short term, immediate benefit whilst waiting for the irradiation to exert its effects. Subsequently the steroids are gradually withdrawn. Such combination therapy has been shown to be superior to steroids alone³⁵. This form of treatment is particularly beneficial for those patients who develop CON which fails to respond to immunosuppressive therapy alone (or in whom the side effects of such therapy warrant a change of treatment). Surgical decompression, if not contraindicated, would be an alternative in such patients. One study suggests a combination of orbital irradiation, oral steroids and azathioprine which if instituted early in the course of TAO, will result in a better long term outcome²⁹. But, further prospective evaluation is required.

Thus, it is clear from the above that medical management of TAO is not without its problems and further large prospective controlled trials need to be carried out to look for the ideal medical treatment for TAO i.e. to switch off orbital inflammation without immunocompromising the host. This is also true for surgical management, as there are no studies which compare surgery to other modalities of treatment used primarily.

Surgical management

There are two main approaches to surgical decompression, both of which aim to reduce the pressure on the contents of the orbit. The first is orbital fat removal, which essentially reduces the volume of the orbital contents, and the second is orbital wall removal, which expands the volume of the

orbit by removal of a combination of any of its four walls. These two procedures can be used in combination as well as in isolation.

To enable access to these bony surfaces and the intraconal fat a number of different incisions can be used. These are: transantral (Caldwell Luc), transcaruncular, bicoronal flap, medial canthal (Lynch), transnasal endoscopic, lower eyelid transconjunctival (swinging eyelid flap), lower eyelid subciliary/skin crease, lateral canthal/upper eyelid. Each of these has its advantages and disadvantages.

As previously mentioned, surgical decompression of the orbit is usually reserved for those patients in whom conservative treatment has failed during the active phase of the disease (as in cases of severe CON or exposure keratopathy). Increasingly, however, and often at the request of the patient themselves, elective surgery is being performed for cases of recurrent subluxation of the globe, orbital pain and particularly disfiguring proptosis³⁶. Our own experience reflects this.

We carried out a retrospective analysis of the records of 60 patients who had undergone surgical orbital decompression by one surgeon over a period of 9 years. A total of 98 decompressions were performed on 60 subjects (45 women, 15 men, age range 15 yrs – 76 yrs with an average age of 51 yrs). 37 patients had bilateral decompressions (7 of 37 had both sides performed simultaneously, whereas 30 of 37 had each side performed on separate occasions at least one month apart). 23 required unilateral decompressions only. Surgery was repeated on 7 occasions in 5 of the 60 patients.

The main indications for surgery in our group of patients were compressive optic neuropathy (n=33), disfiguring proptosis (n=24) and exposure keratopathy (n=23). 38 of the 60 patients had more than one indication for surgery. Since Dollinger first described orbital decompression for TAO in 1911, techniques have evolved and various combinations of one, two, three and four wall decompressions have been performed via various approaches. The most popular method today is a two wall (medial and floor) decompression via a transantral approach. However, all of our patients underwent a two (medial and lateral) or three (medial, lateral and floor) wall decompression with or without fat removal via a translid approach. This is thought to give a lower incidence of iatrogenic diplopia^{36, 37} when compared to the transantral approach^{38, 39, 40}. This is because the transantral approach results in removal of the posterior ethmoids and posterior floor, which normally provide the main support to the posterior orbital contents. As a result, the overlying muscles prolapse into the created space causing an imbalance in the action of the muscles. Whereas, if the translid approach is used, access to the posterior ethmoids is difficult and so the posterior support is maintained which in combination with the symmetrical removal of the medial and lateral walls results in a balanced prolapse of muscles and so less of an effect on motility. This also explains why a three wall approach, being more symmetrical, produces less diplopia than a two wall technique⁴¹.

There are various figures given for the incidence of postoperative diplopia following the transantral and translid

techniques^{36, 42, 43}. In our study, diplopia developed (15%) or worsened (33%) overall in 48% of cases. This heterogeneity in the reporting of postoperative diplopia is not only due to the different surgical techniques employed but also because of patient selection. Those patients with more severe preoperative myopia are more likely to develop diplopia postoperatively, as are those with CON, this is because apical crowding is the main problem in these patients and hence surgical techniques which remove the walls of the posterior orbit are employed, which as discussed above, lead to more motility problems.

Anaesthetic considerations

The preoperative preparation of patients who are to undergo orbital decompressive surgery is extremely important. This is not only to reduce the risks associated with general anaesthesia but also to improve conditions within the orbit which will in turn reduce the risk of damage to the eye itself. As mentioned earlier, it is essential that there is a close relationship between the ophthalmologist and the endocrinologist responsible for the overall care of these patients. This will ensure that all patients presenting for surgery (and hence for general anaesthesia) will be euthyroid. In our review, 58 of the 60 patients had a history of hyperthyroidism but all T4/TSH levels were normal preoperatively. In keeping with previous reports^{12, 13} the remaining 2 patients were clinically and biochemically euthyroid at presentation.

The possibility of other autoimmune conditions, most commonly diabetes mellitus and the high incidence of smoking in these patients (with its associated morbidities) are of particular concern to the anaesthetist. 50% (or 30) of the patients we reviewed were smokers. The majority of these smoked 10-20 cigarettes/day but 5 patients were heavy smokers i.e. in excess of 20 cigarettes/day and of the 30 non smokers, 5 were ex-smokers.

36 patients had no preoperative morbidity and were graded ASA 1 (i.e. fit and healthy) whereas the remaining 24 patients had a variety of conditions, with 6 having 2 or 3 co-morbidities. These preoperative morbidities were as follows: diabetes mellitus, DM (n=11), asthma (n=9), chronic airflow limitation, CAL (n=8), obesity (n=6), hypertension (n=5), arrhythmias (n=5), IHD (n=3), inflammatory bowel disease (n=2), CVA (n=1). This high incidence of DM is particularly important to note as it has been frequently reported as a factor in poor response to any treatment modality⁴².

56% of the cases (i.e. 54/98) we reviewed were taking prednisolone preoperatively in doses ranging from 5mg to 80 mg/day. The doses at the lower end of the range were being administered for conditions other than TAO, such as CAL, whereas, the higher doses were required to control the orbital inflammation. The long term use of steroids in patients undergoing anaesthesia poses several problems. There is an increased risk of infection and hence all procedures must be performed with scrupulous attention to sterility. Blood sugars may be poorly controlled either as a result of steroid induced DM or secondary to the combination of the stress of surgery and treatment with steroids in pre-existing DM. Hence an insulin sliding scale must be established preoperatively in such patients and

blood sugars checked regularly. Of great importance is the effect of steroids on adrenal suppression. Therefore all patients on preoperative steroids must be given supplementary steroids perioperatively to reduce the risks of acute adrenocortical insufficiency. And finally, fragile skin and vessels can make intravenous access difficult and there is increased risk of bruising. This may seem a fairly minor point but it can actually add sizeable problems to the anaesthetist. However, it is equally as important from a surgical point of view, as all bleeding within the orbit must be kept to a minimum because of the potential pressure effects from a retrobulbar haemorrhage. Hence, a full blood count and platelet count must be performed as a routine preoperatively. If there is a history of excessive bleeding or anticoagulation therapy then a clotting screen must also be performed. All antiplatelet drugs and warfarin must be discontinued and heparin substituted. Advice from the haematology department may be necessary.

The need for further investigations is dependant upon the nature of any preoperative morbidity. However, as mentioned earlier, radiological imaging is essential-either in the form of a CT Scan or an MRI scan- and this must be available pre and intraoperatively.

The duration of anaesthesia will obviously vary depending upon the surgeon, the extent of surgery and whether unilateral or bilateral decompressions are being performed. In our study, we found the average duration of anaesthesia to be 134mins for unilateral and 184mins for bilateral surgery. As a result one must prepare for a prolonged duration of anaesthesia. Thus special consideration must be given to patient positioning with particular emphasis on pressure points in those with fragile skin and the patient must be kept warm and the temperature monitored.

There are several other important points to be aware of when anaesthetizing patients for orbital decompression. The proptosed eye can be easily damaged during the induction phase of anaesthesia, particularly by poor positioning of the face mask, resulting in pressure on the globe and abrasions of the cornea which is inadequately protected by the retracted lid. The anaesthetic technique of choice must take into account the fact that for the most part, decompression surgery is not particularly stimulating and that it is important for the surgeon to be able to assess the visual acuity of the patient immediately postoperatively (in the recovery room). Thus an alert, comfortable patient free of post operative nausea and vomiting (PONV) is advantageous.

In the cases we reviewed there were roughly two ways in which anaesthesia was administered. In 74% of cases balanced anaesthesia involved a volatile agent (isoflurane>sevoflurane>enflurane), an O₂/N₂O mix and either remifentanyl or fentanyl +/- morphine, whereas in the remaining 26% of cases total intravenous anaesthesia (TIVA) was achieved using remifentanyl, a target controlled infusion (TCI) of propofol and an O₂/AIR mix. Unfortunately the numbers in the second group were too small to make a comparison of the two techniques, but we hope to address this in the future. From our current knowledge one would suspect the latter technique to be the most ideal in achieving the above requirements.

Normotensive anaesthesia was used throughout in all cases we reviewed. However, (provided there are no contraindications) the anaesthetist may be asked to induce moderate hypotension. It may be that the use of TIVA makes this easier to achieve.

On induction of anaesthesia all our patients received intravenous antibiotics and acetazolamide 500mg. The latter aims to reduce intraocular pressure and permit easier subperiosteal retraction, which improves the view of the posterior aspect of the medial orbital wall. A throat pack was used in all cases, because of the risk of contamination of the airway from postnasal secretions and blood. To help reduce this further (and to aid surgery) a nasal epistaxis tampon is placed in the nostril aiming for the medial canthus, it is then moistened with 5% cocaine solution. To aid venous drainage all patients are positioned in reverse trendelenberg and the neck extended. In the translid approach, as used in our study, the surgeon infiltrates the lower eyelid with a combination of bupivacaine 0.5% (~3mls) and 1:200000 epinephrine about 5mins prior to the start of surgery. This is to reduce bleeding which improves surgical conditions and limits complications but also provides very good analgesia for the patient.

Analgesia is a very important component of any anaesthetic but it has particular importance in patients undergoing orbital decompression surgery as it improves cooperation with postoperative acuity tests, which are extremely important in the early detection of complications. In addition to the balanced anaesthesia mentioned above, 34% and 3% of the cases we reviewed were given ketorolac 10mg and pethidine 50mg, respectively. We recorded postoperative pain scores of zero in 86% of cases (pain scores were recorded at arrival in recovery, 10mins and just prior to discharge from recovery). And for the entire hospital stay, 49% of patients used only simple analgesics (paracetamol/codeine) whereas 27% used no supplemental analgesics at all. It would be interesting to compare the incidence of postoperative pain associated with the different surgical approaches. However, as yet there is no literature available.

Surgery on the eye is associated with a high incidence of intraoperative bradycardia (resulting from the oculocardiac reflex when traction is exerted on the eye) and postoperative nausea and vomiting (PONV). In our review, 30% of cases required anticholinergic therapy for bradycardia, with glycopyrrolate being the agent of choice in 28%. However, PONV was absent in 92% of cases-43% of whom had not had antiemetic therapy intraoperatively. It is not possible to say from the results, which of these patients had a volatile anaesthetic with N₂O and long acting opiates.

There are several potential complications of orbital decompression surgery, all of which should be discussed fully with the patient in clinic before the patient is listed for surgery. Earlier we discussed in detail the most common complication, diplopia. Although many patients already experience diplopia and adapt well using prisms it is vital that the patient is aware of the risks of developing or worsening their diplopia and that subsequent surgery may be required to correct it. However, it would appear⁴⁴ that in

practice very few patients refrain from surgery through fear of developing diplopia.

A very rare but devastating complication of decompression surgery is blindness. There were no cases of visual loss in our study. It is particularly likely to occur if there is excessive bleeding or traction on the globe or direct damage during removal of orbital fat. Therefore, one must be particularly vigilant following (and during) orbital fat removal. Strict regular monitoring of the eye is essential postoperatively, looking for sudden pain, proptosis or reduction in visual acuity and changes in pupil size.

Infraorbital anaesthesia is a fairly common complication. 11% of cases in our study experienced it to varying degrees, but all had complete resolution of symptoms within a maximum of 12 months (the majority taking less than 6 months to resolve). Other studies have reported similar results^{45, 46}. However, there are several reports of permanent facial anaesthesia^{44, 47, 48}, two of which underwent a transantral approach and one a transcranial approach. The risks can be minimized by meticulous bone removal using a diamond burr and minimal use of cautery when close to the nerve.

A rare but particularly important complication for the anaesthetist to be aware of is the risk of a CSF leak (+/or meningitis). In two of the cases we reviewed, a CSF leak developed intraoperatively. In both cases a lumbar drain was inserted by the anaesthetist. The aim of this is to reduce the pressure in the subarachnoid space so as to enable the defect to close over and heal. In one case a fascial patch was applied over the defect having been harvested from the orbicularis muscle of the lower eye lid wound. Both resolved completely within 24 hrs with no sequelae. The neurosurgeons were contacted for any additional advice. A similar incidence was reported⁴⁹ in one study in which the approach was coronal whereas, others^{45, 48} have reported no cases of CSF leak. To avoid this complication, it is essential that visualization of the medial orbital wall is optimized and that the anatomy of the fovea ethmoidalis (together with its close proximity to the cribriform plate) is ascertained on coronal CT Scan prior to surgery.

In our review of cases none of the other potential complications associated with orbital decompression were experienced. These include, haemorrhage, orbital cellulitis, hypoglobus and epiphora. Blood loss in all our cases was minimal (<5mls) and only maintenance fluids were required intraoperatively, however losses of 100-200mls have been reported elsewhere⁴⁸.

One of our patients suffered a cerebrovascular accident 2 days postoperatively (after discharge from hospital), resulting in permanent disability. A "minor perioperative stroke" has been reported elsewhere⁴⁷. The patient in our study was undergoing a unilateral procedure for CON and had no significant preoperative morbidity although she was a moderately heavy smoker. This complication is not specific to orbital decompression surgery but is a potential complication following any surgery and anaesthesia.

We found very little in the literature commenting on duration of hospital stay despite the ever-increasing pressure on bed availability and the obvious economic

implications. In one study⁴⁸ hospitalization was required for 6 days whereas in our review 72% of cases were discharged on the first postoperative day. The majority of the remaining cases were discharged home 2 days postoperatively. Most patients were admitted the night before morning surgery or in the morning if surgery was scheduled for the afternoon.

The postoperative management of patients following decompressive surgery has an extremely important part to play in the success of the procedure and extends way beyond the hospital stay. All of our patients were given a one-week course of systemic antibiotics and a rapidly tapering course of systemic steroids. They were taught lower eyelid massage on the first postoperative day and this was continued for a minimum of 6 weeks. Advice was given not to blow the nose nor hold the nose when sneezing, again for a 6 week period. All were reviewed in clinic 1 week postoperatively. Further review depended upon progress, but the period between the visits gradually increased from weeks to months.

As expected a number of our patients went on to have strabismus surgery and eyelid repositioning surgery before recovery from the TAO was complete.

Conclusion

In our review of the literature we have offered a comprehensive guide to orbital decompression surgery for TAO that we hope will be of practical value to those unfamiliar with anaesthetising such patients. In reviewing our own practice we have highlighted many important points including, duration of anaesthesia, postoperative pain, PONV, duration of hospital stay and other anaesthetic factors specific to decompression surgery, which have so far gone unreported in the literature.

Acknowledgement

An abstract of our retrospective review was presented in the 4th BOAS meeting in June 2002.

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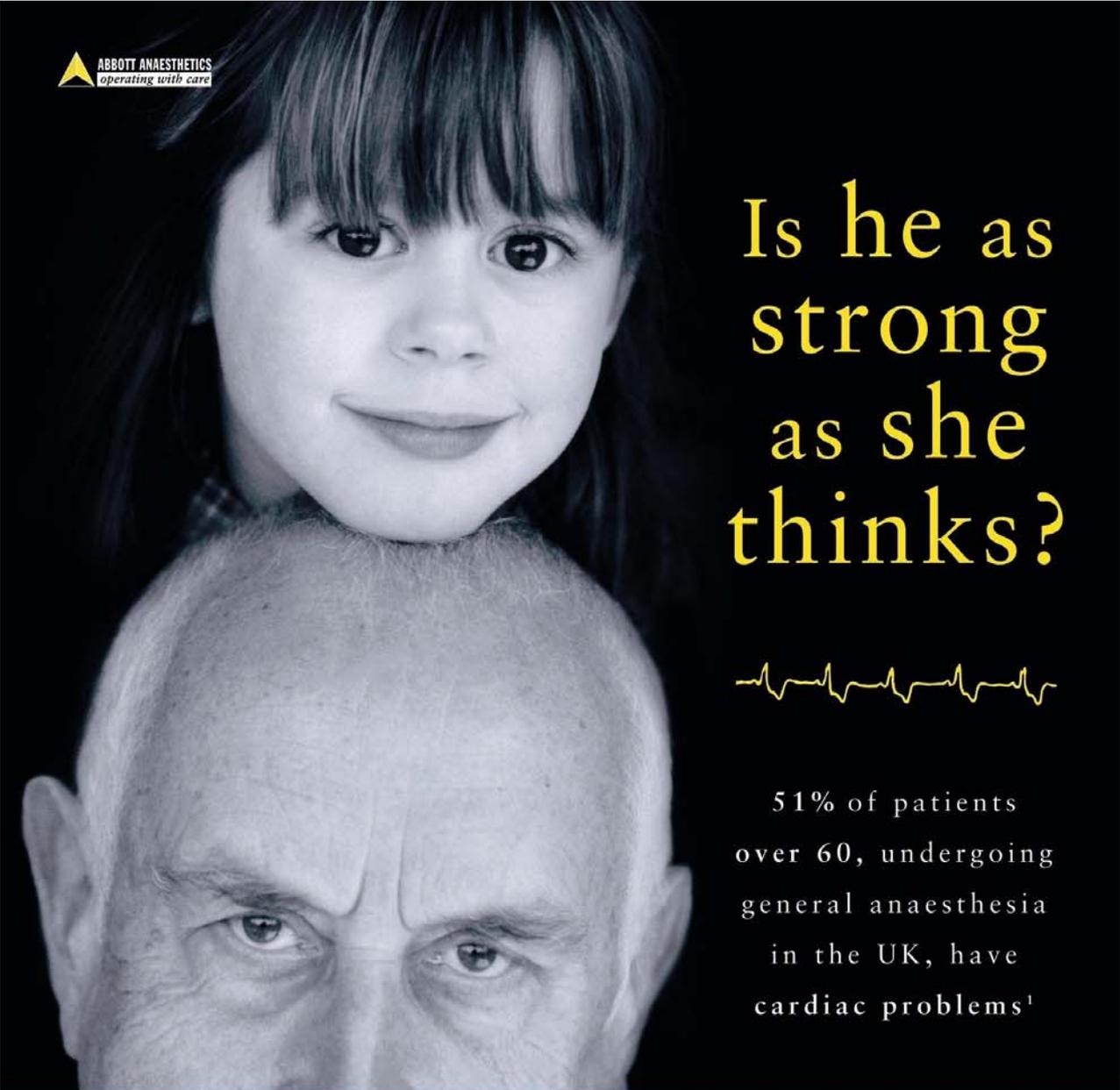
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shock; and use in paroxysmal block is obstetric. The 7.5 mg/ml solution is contra-indicated for obstetric use due to an enhanced risk for cardiac events based on experience with bupivacaine. There is no experience of levobupivacaine 7.5 mg/ml in obstetric surgery. **Precautions:** Epidural anaesthesia with any local anaesthetic may cause hypotension and bradycardia. All patients must have intravenous access established. The availability of appropriate fluids, vasopressors, anaesthetics with anticonvulsant properties, myoelaxants, atropine, resuscitation equipment and expertise must be assured. Levobupivacaine should be used with caution for regional anaesthesia in patients with impaired cardiovascular function e.g. serious cardiac arrhythmias and in patients with liver disease or with reduced liver blood flow e.g. diabetics or cirrhotics. **Interactions:** Metabolism of levobupivacaine may be affected by CYP3A4 inhibitors e.g. ketoconazole and CYP1A2 inhibitors e.g. methylxanthines. Levobupivacaine should be used with caution in patients receiving anti-arrhythmic agents with local anaesthetic activity, e.g. mexiletine, or Class III anti-arrhythmic agents since their toxic effects may be additive. No clinical studies have been completed to assess levobupivacaine in combination with adrenaline. **Side-Effects:** Adverse reactions with local anaesthetics of the amide type are rare, but they may occur as a result of overdosage or unintentional intravascular injection and may be serious. Accidental intrathecal injection of local anaesthetics can lead to very high spinal anaesthesia possibly with apnoea, severe hypotension and loss of consciousness. The most frequent adverse events reported in clinical trials irrespective of causality include hypotension (22%), nausea (13%), anaemia (11%), post-operative pain (8%), vomiting (8%), back pain (7%), fever (6%), dizziness (6%), foetal distress (6%) and headache (5%). Other side effects include: CNS effects: numbness of the tongue, light-headedness, dizziness, blurred vision and muscle twitch followed by drowsiness, convulsions, unconsciousness and possible respiratory arrest. CVS effects: decreased cardiac output, hypotension and ECG changes indicative of either heart block, bradycardia or ventricular

tachyarrhythmias that may lead to cardiac arrest. Neurological damage is a rare but well recognised consequence of regional and particularly epidural and spinal anaesthesia. This may result in localised areas of paraesthesia or anaesthesia, motor weakness, loss of sphincter control and paraplegia. Rarely, these may be permanent. **Use in Pregnancy and Lactation:** Levobupivacaine should not be used during early pregnancy unless clearly necessary. The clinical experience of local anaesthetics of the amide type including bupivacaine for obstetrical surgery is extensive. The safety profile of such use is considered adequately known. There are no data available on excretion of levobupivacaine into human breast milk. However, levobupivacaine is likely to be transmitted in the mother's milk, but the risk of affecting the child or therapeutic doses is minimal. **Overdose:** Accidental intravascular injection of local anaesthetics may cause immediate toxic reactions. In the event of overdose, peak plasma concentrations may not be reached until 2 hours after administration depending upon the injection site and, therefore, signs of toxicity may be delayed. Systemic adverse reactions following overdose or accidental intravascular injection reported with long acting local anaesthetic agents involve both serious CNS and CVS effects. **Special Storage Conditions:** No special storage precautions for the closed ampoule. Once opened, use immediately. **Legal Category:** POM. **Marketing Authorisation Number:** PL 0037/0300-0302. **Basic NHS Price:** 2.5 mg/ml pack: £14.60, 5.0 mg/ml pack: £19.00, 7.5 mg/ml pack: £28.50. Further information is available on request from Abbott Laboratories Ltd, Abbott House, Norton Road, Maidenhead, Berkshire SL6 4XE. PL/93/1/001. **Date of Preparation:** March 2003. **Reference:** 1. Burke D & Bonnistar J. Current Anaesthesia and Critical Care 1999; 10: 242-248.

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by trained anaesthetists. Hypotension and respiratory depression increase as anaesthesia is deepened. Malignant hyperthermia. Experience with repeat exposure is very limited. Until further data are obtained, sevoflurane should be used with caution in patients with renal insufficiency. Levels of Compound A (produced by direct contact with CO₂ absorbents) increase with: increase in canister temperature; increase in anaesthetic concentration; decrease in gas flow rate and increase more with the use of Baralyme rather than soda lime. **Interactions:** Potentiation of non-depolarising muscle relaxants. Similar to isoflurane in the sensitisation of the myocardium to the arrhythmogenic effect of adrenaline. Lesser concentrations may be required following use of an IV anaesthetic. Sevoflurane metabolism may be induced by CYP2E1 inducers, but not by barbiturates. **Side-Effects:** Dose-dependent cardio-respiratory depression. The type, severity and frequency of adverse events are comparable to those seen with other inhalation anaesthetics. Most adverse

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Further information is available on request from Abbott Laboratories Ltd., Abbott House, Norden Road, Maidenhead, Berkshire SL6 4XE. Ref. PI/12/1/008. **References:** 1. 2000 Medicare Anaesthesia Diary Study. 2. Ebert T J et al. Anaesthesiology 1994; A138. **Date of Preparation:** February 2001. HXSEV2001011.



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News and information

World Congress of Ophthalmic Anaesthesia

World Congress of Ophthalmic Anaesthesia will be hosted by BOAS on 15-16th April 2004 in the premises of the Royal College of Physicians, London. Details are available on BOAS Website www.boas.org

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Contribution for the 9th issue

The next Newsletter will be published in October 2003. Please send your articles or any contributions for inclusion in the Newsletter by 30th September 2003, to Dr Chandra Kumar, Secretary BOAS, The James Cook University Hospital, Middlesbrough TS4 3BW, UK or email cmkumar@boas.org

Subscription to Journal of Cataract and Refractive Surgery

Anaesthetist members of BOAS can receive the journal at a discounted rate of £65 by writing to Andre Welsh, Director ENTER, North Riding Infirmary, Newport Road, Middlesbrough.

Acknowledgement

BOAS office is grateful to Mr Stephen Moore, Information Officer, The James Cook University Hospital, Middlesbrough for his valuable help in the production of the Newsletter.

Mrs Pat McSorley

Mrs Pat McSorley has been running the society administration since 1998. She will be retiring soon and many BOAS members will miss her. BOAS wishes her a happy retirement. She has agreed to continue to administer the society business from her home.

Reasons for joining BOAS

BOAS was formed in 1998 to provide a forum for anaesthetists, ophthalmologists and other professionals with an interest in ophthalmic anaesthesia to facilitate co-operation on all matters concerned with the safety, efficacy and efficiency of anaesthesia for ophthalmic surgery. It is concerned with education, achievement of high standards, audit and research. BOAS will organise annual scientific meetings, produce a newsletter and maintain a web page.

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Morbidity and patient satisfaction following day case cataract surgery under local anaesthesia

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Introduction

Local anaesthesia for day case cataract surgery is a recognised and accepted technique. The most commonly used techniques are either Sub-Tenon or Peribulbar anaesthesia. The choice is usually determined by the individual anaesthetist's or surgeon's preferences or by contraindications to a particular block. We were quite alarmed by the results of study performed by A Mitchell and M Hardwick [1] who reported rather high incidence of postoperative morbidity associated to local anaesthesia and 26.4% patients complaining of moderate to severe pain on injection.

In order to assess the quality of the anaesthetic service we provide it was decided to audit the overall morbidity associated with cataract surgery under local anaesthesia and patient satisfaction.

Methods

All patients had their operation as a day case and were unpremedicated. 0.5% proxymethacaine drops were instilled prior to a Sub-Tenon block performed as described by Stevens [2] using 5 ml of 2% lignocaine with 30IU/ml of hyalase into posterior Sub-Tenon space. A Metal Visitec cannula was used in all cases. Peribulbar technique was performed using 25G 25mm needle. Up to 10 ml of 2% lignocaine with 30IU/ml hyalase was injected into peribulbar space split between infero-temporal and nasal (medial to caruncle) points.

We sent questionnaires to 100 patients who had their cataract surgery performed in November 2001. The questionnaires were sent in early January together with a stamped addressed envelope (see Appendix 1).

The criteria against which we audited were:

1. Pain of no more than 5 on the scale of 1-10 during the injection of local anaesthetic.
2. No pain during the operation.
3. Pain of no more than 5 on the scale of 1-10 after the operation.
4. No major morbidity after the operation.
5. Minor morbidity less than 20%.
6. 100% patient satisfaction.

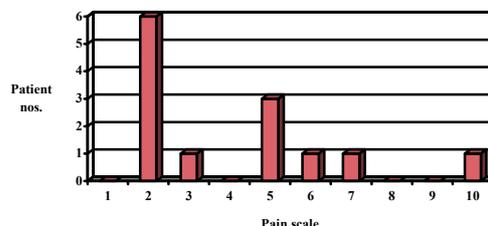
Results

The 100 questionnaires sent and 67 returned (response rate of 67%). All returned questionnaires contained answers to all of the questions asked. 54 (80.6%) of our patients did not experience any pain during injection of local

anaesthetic. Remaining 13 (19.4%) scored their pain on 1-10 scale (Fig 1). A score of 5 and above was recorded in 6 patients (8.9%).

Figure 1 Pain during the injection of local anaesthetic
Figure 1

If yes, how would you describe the pain on a scale of 1 to 10? 64 (95.5%) of our patients did not experience any pain during the operation. The other 3 (4.5%) patients graded



their pain from 2 to 7. Only 1 patient had a pain score of 7. To the question about postoperative pain 63 94% patients had none. 4 (6%) patients graded their pain from 2-4. 9 (13.4%) experienced double vision after the operation. 24 (35.8%) developed subconjunctival haemorrhage but only 3 (4.5%) suffered from periorbital haematoma. Same 3 (4.5%) patients suffered from periorbital numbness. Interestingly, 30% patients have answered YES to the question of "other problems". Their comments are listed in Table 1. 62 (92.5%) of patients were satisfied with their procedure and would have their other eye done in the same way.

Table 1

Discussion

Overall 9 anaesthetists in our Department are involved in providing anaesthesia for ophthalmic surgery. As questionnaires were anonymous we were unable to

- Very misty
-Sight not restored.
-I had problems after the 1st cataract. I had a blood shot eye after the 2nd. Also, now 2 weeks since the last, my eye is uncomfortable but not painful.
-Floating black spots; and still I find my eyes watering constantly. Infection and pain. I had to come back in all 9 times.
-Dry eye.
-Blurred vision.
-Infection in the eye.
-Soreness in white of eye for several days.
-Upper eyelid inflamed and itchy.
-Infection behind the eye – still taking steroids.
-Bruised feeling.

determine exact anaesthetic technique used but from personal communication approximately half use Peribulbar and the other half Sub-Tenon blocks as their technique of choice

Pain on injection was found to be the case in 13 (19.4%) patients. However, only 6 (8.9%) patients complained of a pain with score of 5 and above on a scale from 1-10. Severe pain (score 6-10) was recorded in 3 patients. These figures are lower than found in Mitchell and Hardwick study [1] but still relatively high. During the operation 3 (4.5%) patients experienced pain. 2 patients scored it as 2 and only one put the score of 7. Although we failed to reach our target of 100% no pain during the operation it seems that local anaesthesia was not completely adequate in only 1 case.

Postoperative pain was an issue for 6% (4 patients) but we consider their score (2-4) as acceptable and clearly that degree of pain could be easily alleviated with simple analgesics. Pain during the operation is unacceptable. It should not be ignored and treated accordingly either by topping up the local anaesthetic block or converting to GA if still uncomfortable. Postoperative pain seems to be mild and uncommon.

Double vision was a complaint of 9(13.4%) of our patients although we find it difficult to attribute this to local anaesthesia alone.

Subconjunctival haemorrhage was reported in 24(35.8%) patients, which is almost half of that reported the Mitchell and Hardwick [1] study. Even so it is still a very high percentage. Perhaps patients undergoing cataract surgery should be warned about developing blood-shot eye. 3 (4.5%) patients experienced periorbital haematoma and the same 3 (4.5%) complained of periorbital numbness. It seems that one could be associated with another.

Probably the most interesting finding in our audit is that 20 30% patients reported "other problems". Complaints like dry eye, blurred vision, infection, itchiness, misty vision and floating black spots, which are mentioned in patient's returns, are clearly as important to them as complications perceived to be important by clinicians.

Nevertheless, 62 (92.5%) of our patients were satisfied with the procedure and the same 62 (92.5%) would prefer their next cataract surgery to be performed under local anaesthesia. Unfortunately, we did not ask those who opted out in preference to general anaesthesia (GA) what were their reasons for disliking local anaesthesia. But pain on injection and indeed pain during the operation would be an obvious guess.

Conclusion

In conclusion, that pain on injection of local anaesthetic is still a problem and could contribute to patient's preference in choosing type of anaesthesia after they had previous unpleasant experience with local anaesthesia. Subconjunctival haemorrhage seems inevitable minor complication of local anaesthesia and patients may have to be warned about it in advance in order to prevent unnecessary complaints. Prolonged periorbital numbness could be associated with periorbital haematoma.

References:

1. Mitchell A and Hardwick M. Post-op Morbidity in Day Case Cataract Surgery. In *Abstract Handbook of British Ophthalmic Anaesthesia*

Society 3rd Annual Conference. Middlesbrough 2001 p.45

2. Stevens JD *Br J Ophthalmology* 1992; 76: 670-674

Appendix 1

Audit Questionnaire

1. Did you experience any pain during local anaesthetic injection?
 - 1a. If YES, how would you describe the pain on a scale of 1-10?
2. Did you experience any pain during the operation?
 - 2a. If YES, how would you describe the pain on a scale of 1-10?
3. Did you experience any pain after the operation?
 - 3a. If YES, how would you describe the pain on a scale of 1-10?
4. Did you experience any double vision after the operation?
5. Did you develop a blood shot eye (subconjunctival haemorrhage)?
6. Did you suffer from a black eye?
7. Did you have a numb eye afterwards?
 - 8a. If YES, for how many days?
8. Did you experience any other problems?
9. Were you satisfied with the procedure?
10. If your other eye needs to be done, would you get it done under local anaesthetic?
11. Was the information regarding the local anaesthetic injection given to you adequate and helpful?

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