Ophthalmic patients present to the A&E department with a wide range of problems; their treatment, however, generally involves a small range of ophthalmic medications. Ultimately, patients’ compliance with treatment – and the course of their illness or condition – often depends on the information given to them, and the knowledge and skills of the A&E nurse. It is hoped this article will add to the knowledge base of A&E nurses as a further enabler towards the continued goal of excellence in practice.

This article will consider a number of eye drops and ointments which may be used or considered for use in A&E. It will discuss the mode of action and the appropriate use of these substances which include both those used for diagnostic, and those used for therapeutic purposes.

DROPS USED FOR DIAGNOSTIC PURPOSES
Fluorescein is the only staining agent commonly used in A&E and is available in three forms. The first, and most common is as an orange coloured 2 per cent solution in single dose packs – ‘Minims’. It is also available as a yellow coloured liquid 0.25 per cent combined with lignocaine 4 per cent for use when measuring intraocular pressure, and in a similar single dose form with proxymetacaine for the same purpose. Fluorescein is also available as sterile fluorescein papers, for example, ‘fluorets’, which have the benefit of having a longer shelf life than the Minim form. Fluorescein is never used in a multidose form as it is liable to contamination with Pseudomonas aeruginosa which is not only devastating to the eye, but is difficult to treat. Fluorescein is used to stain damaged areas of the eye’s surface. It does not penetrate intact cell membranes but is taken up by damaged tissue and fluoresces green in cobalt blue light. A single drop of fluorescein should be instilled into the lower fornix and the patient asked to blink to spread the drop over the whole eye surface. A cobalt blue light is then used to show areas of epithelial cell damage. It is sometimes helpful to use one or two drops of sterile normal saline to wash out excess fluorescein from the eye to make the damaged areas more obvious. Often, a significant area of damaged epithelium may be seen without the aid of the blue light. Fluorescein may be used even if there is the possibility of penetrating injury. It is, in fact, used to identify small perforations of the globe using Seidel’s test where fluorescein is instilled into the eye and the clinician examines the eye under a cobalt blue light, looking for aqueous outflow. Before instillation of fluorescein the clinician must be sure that the patient has no contact lens in situ. Fluorescein will have no
effect on hard lenses but will stain all soft lenses a startling yellow/green which is difficult to remove, necessitating cleaning by an optometrist and, occasionally, a new lens, for which of course, the patient is likely to hold the A&E unit responsible.

A little fluorescein does tend to go a long way and the patient may need to have excess fluorescein removed from his eyelids and face before leaving the unit. She or he should also be informed that, as the lacrimal apparatus drains into the nose, a bright yellow/green stain on handkerchiefs may be noticed.

LOCAL ANAESTHETIC DROPS
The most commonly available topical anaesthetic drops are amethocaine 1 per cent, oxybuprocaine (Benoxinate) 0.4 per cent, and proxymetacaine (Ophthaine) 0.5 per cent.

All are available only as Minims. As mentioned above, lignocaine and proxymetacaine with fluorescein are available for use in tonometry. Of these, Amethocaine and Benoxinate are the most widely used. Ophthaine is useful in treating children as it stings less on instillation. Benoxinate appears to be the least expensive of the three.

Topical anaesthetic drops are useful for examination purposes, to enable the patient with severe eye pain due to eye injury to co-operate with the examination, because only eye pain caused by surface injury will be helped by local anaesthetic. They should be used before irrigation, again, to enable the patient to open his or her eye and co-operate with the procedure, thus enabling effective irrigation. They may also be used as a single drop before the patient leaves the department in order to facilitate safe travel home.

All of these topical preparations sting on instillation. Ophthaine rather less so than Benoxinate, and both of these less than Amethocaine. Onset of anaesthesia takes about 10-20 seconds with all three drops. The anaesthetic effect lasts between 10 and 20 minutes for Ophthaine and Benoxinate, and about 20 minutes in the case of Amethocaine (Pavan Langston and Dunkel (1991), Ounefrey et al (1998), Vale and Cox (1985). A single drop will enable sufficient anaesthesia for corneal foreign body removal, although the amount of discomfort and the depth of anaesthesia depend on the patient’s perceptions; further drops may be needed to facilitate co-operation.

TOPOCAL ANAESTHETIC DROPS
Topical anaesthetic drops are inhibitors of wound healing. They disrupt the tight junctions between cells, interfere with corneal epithelial metabolism and, therefore, the healing of corneal wounds. Abuse of topical anaesthetic drops occurs either from physicians prescribing them for the control of pain symptoms or from patients obtaining the drops and self treating for eye pain. Increased frequency of dosage gives shorter and shorter relief from pain and progressive toxicity results in retardation of healing, corneal oedema and in extreme circumstances, severe intraocular inflammation.

It is most important that these drops are used only in A&E, that patients are not given drops to take home and that access to...
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The drops is controlled so that patients, having experienced the enormous symptomatic relief which these drops produce, are not tempted to remove these drops from the department. It is important however that the patient is pain free during examination in order to facilitate co-operation. The number of drops used to achieve this in A&E is not likely to effect corneal healing to any significant degree.

One of the common myths about topical local anaesthetics is that the eye should be padded after instillation to prevent any possible further injury from foreign body or trauma that the patient does not notice because of the corneal anaesthesia. As these drops last about 20 minutes at the most, it would be necessary to pad the eye for a maximum of 20 minutes only, rather than the 4-24 hours which anecdotal evidence suggests is practised in some A&Es, an unnecessary and wasteful procedure.

Patients whose eye is padded should not drive. Using pads inappropriately can seriously disadvantage patients and cause unnecessary disruption to their lifestyle. Padding an infected eye encourages the infective organism to multiply in a warm, damp environment. Nearly all patients who attend any ophthalmic unit have both eyes anaesthetised so their ocular pressure can be checked. No patient has their eyes padded after this procedure, and lignocaine tends to last rather longer than the anaesthetics mentioned here. No problems are experienced because of this. There is no indication therefore for padding an eye because the patient has had instillation of local anaesthetic drop.

DROPS/OINTMENT USED FOR THERAPEUTIC PURPOSES

Dilating drops

Three common dilating drops are: tropicamide (0.5 per cent and 1 per cent), cyclopentolate (0.5 per cent and 1 per cent), and homatropine hydrobromide (2 per cent). These are all available in single dose form. Drops which dilate the pupil may be used for diagnostic or for therapeutic purposes. In the A&E department, their use will often be associated with the treatment of corneal trauma, that is, the pupil will be dilated therapeutically to relieve ciliary spasm and therefore a component of the pain which is often severe after corneal injury.

Tropicamide – has a good mydriatic (pupil dilating) action which lasts for about eight hours and takes 15-30 minutes to achieve maximum pupil dilation (Vale and Cox 1985). Its cycloplegic (paralysis of the ciliary muscle to relieve spasm) action is much weaker and it is seldom used for therapeutic pupil dilation, although it is most useful for diagnostic purposes as the patient’s eye returns to normal relatively quickly.

Cyclopentolate – The pupil will be widely dilated in about 30 minutes and cycloplegia occurs at the same time. Both may last up to 24 hours.

Homatropine – takes slightly longer to achieve maximum dilation and cycloplegia, 30 minutes or over, which can last up to 48 hours.

In the A&E unit, cyclopentolate drops are likely to be the preferred option for therapeutic dilation and tropicamide for diagnostic purposes. There may be some concerns about dilating patients’ eyes in the A&E department because of the possibility of precipitating an attack of acute angle closure glaucoma. This is likely to happen only in an infinitely small proportion of a well defined group of patients.

Acute glaucoma occurs most frequently in elderly, long-sighted women (Cheng et al 1997). It is characterised by severe pain in and around the eye, and by nausea and vomiting, possible abdominal pain and certainly, severe, sudden reduction in vision. If these symptoms are explained to the patient, with instructions to return immediately should they occur, nearly all patients can be dilated safely. However, patients who have had cataract surgery and have a lens clipped to their iris, or a lens in the anterior chamber – situations which are obvious when the eye is examined – should not be dilated.

If an attack of acute glaucoma is precipitated, all these drops are reversible and treatment will not be delayed. However, atropine drops are not reversible; their action lasts for 10-14 days, and for this reason, should never be used in A&E.

Patients who state they have glaucoma and are treated with eye drops have a chronic form of the disease which is not affected by pupillary dilation. They may, therefore, have their pupils dilated as they do at ophthalmic outpatient appointments.

The patient should be informed...
Acanthamoeba, a condition which is usually rare but is seen more frequently now due to the wide use of contact lenses

ANTIBIOTICS

The two most commonly used antibiotics in A&E are chloramphenicol in drop (0.5 per cent) and ointment (1 per cent) form and fusidic acid (Fucithalmic 1 per cent) in a viscous drop form. Chloramphenicol has high lipid solubility, excellent corneal penetration and low corneal toxicity and a broad spectrum. Although it has an association with blood dyscrasias when used systemically, no positive link has been discovered when used topically and it remains the drug of choice for superficial eye infection and for prophylaxis (BNF September 1998). Fusidic acid is useful in the treatment of superficial bacterial infection such as bacterial conjunctivitis, particularly in children as its dosage is twice daily as opposed to a more usual four times daily if chloramphenicol drops are used.

Chloramphenicol ointment is used extensively in the treatment of superficial ocular trauma. When the corneal epithelium is breached, antibiotic prophylaxis is essential. The ointment form provides lubrication or the damaged ocular surfaces and ensures a degree of comfort which does not occur with the drop form. Fusidic acid is presented as a viscous drop and therefore has no lubricant properties. It has little place in the treatment of ocular trauma.

Many other antibiotics are used in ophthalmic units but are not generally of use in A&E. Chlorotetracycline ointment is used to treat chlamydial eye infections but positive diagnosis of chlamydia relies on microbiological results which take some time. Patients with suspected chlamydial eye infection should be referred to ophthalmologists. Proamidine isethionate (Brolene) may be obtained from pharmacists. It is of little value in the treatment of bacterial infections (BNF) and has a single ophthalmic use – in the treatment of acanthamoeba, a condition which is usually rare, but is seen more frequently now due to the wide use of contact lenses. This condition can be quite devastating and again, patients in whom this is suspected should be referred to an ophthalmologist.

As the tear drainage system of the eye drains into the nose and then from there to the back of the throat, some residue from eye drops may end up in the throat. This is most noticeable in the case of chloramphenicol because it has an obvious and unpleasant taste. The patient should be warned about this but also informed that this can be minimised in the case of all eye drops by instilling only one drop and occluding the lower punctum for a minute or so after instillation. A therapeutic amount of the drop will remain in the eye and be absorbed, excess will spill over onto the cheek as more tears are produced and can be wiped away.

TREATMENT OF ALLERGIC REACTIONS

Drops such as antazoline (Otrivine Antistin), levocabastine (Livostin), sodium cromoglycate (Opticrom, Hay Crom, etc) and medocromil sodium (Rapitil) are available in multi-dose form. Patients present to the A&E department with either an acute allergic reaction where the conjunctiva is chemosed (swollen and ‘jelly-like’) or a chronic reaction characterised by a red eye, with roughness (papillae) on the underside of the lids and often accompanied by other signs and symptoms of an allergy such as hay fever.

On the whole, acute allergic reactions disappear very quickly, usually within minutes to an hour or two, and do not need any treatment. It is usually impossible to ascertain their cause, and all that is needed is to reassure the patient that the discomfort is temporary and possibly offer some artificial tears to make the eye slightly more comfortable while the reaction settles. Single drops of steroid are never indicated and may, if the diagnosis is incorrect, be positively dangerous.
More chronic allergic reactions, such as hay fever, respond best to topical antihista-
mamines such as antazoline (Otrivine Antistin) or levocabastine (Livostin); oral antihista-
mines may also be useful. Eye drops such as sodium cromoglycate (Opticrom, Hay Crom,
e tc) and medocromil sodium (Rapitil) act by inhibiting the release of histamine from
mast cells in the mucosa, by stabilising mast cell membranes. They must therefore be
administered before mast cell priming, at the beginning of the ‘hay fever’ season. They
will have little effect after the mast cells have
degranulated due to allergens (Forrester et al
1996). If used after the onset of allergy, they
will take a number of days, and up to as long
as six weeks to have a therapeutic effect.
Once a therapeutic effect has commenced,
the drop must be used continuously until the
risk of allergy has receded (Pavan-Langston
and Dunkel 1991). Patients who know they
have hay fever symptoms should be encour-
eged to obtain supplies of drops before the
‘hay fever’ season and to use them through-
out to prevent symptoms occurring.

STEROIDS
Steroid drops should not be prescribed for
patients with eye problems except under the
direct supervision of an ophthalmologist.
While this may appear a rather sweeping
statement there are very few ophthalmic con-
ditions in which steroids are indicated. All
these, such as, uveitis, chemical burns, mar-
ginal ulcers, corneal transplant rejection,
need treatment and monitoring by an oph-
thalmologist. Steroid use on the eye when
not indicated can be devastating and poten-
tially blinding – secondary open angle glau-
coma may occur; some patients react to top-
ical steroids with a very rapid rise in intraoc-
ular pressure. Microbial infections may be
enhanced, wound healing is significantly
delayed and in the longer term, cataracts may
form.
The statement above can be seen to
be sensible in the context of the problems
which may be caused by the incorrect use of
steroid eye drops.

TEAR SUBSTITUTES
There are many different tear substitutes
available in drop, gel and ointment form.
Some of these are mentioned later. One of the
many causes of gritty, irritable and even

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watering eyes are actually ‘dry’ eyes. The tear film may be deficient in quantity so that the eye is actually dry, or in quality – the tears may not include enough mucin or oil to enable them to stay on the eye for a usual amount of time. Dry eyes are often a problem during and after conjunctivitis, particularly with a viral infection; patients may suffer with this condition for months or even years after the infection has resolved; those with rheumatoid arthritis and other associated conditions often have dry eyes.

Tear substitutes such as Hypromellose are useful when tears are deficient, other drops such as polyvinyl alcohol (Hyptears, Liquifilm, Sno tears) may be useful when tears are of poor quality. These drops may be used as often as the patient feels necessary – every 5 or 10 minutes in patients with severe dry eye is not unreasonable. When these drops are prescribed for the first time, it is useful to suggest that the patient uses them hourly and ‘experiments’ to find a time interval between drops where the eye is comfortable all the time and does not become irritable again before the next drop is instilled.

**COMPLIANCE**

Compliance with treatment is, as always, in the patient’s hands. As nurses however, we are able to influence compliance to all drug regimes by giving full information about the drugs which are prescribed for the patient and including how and when to use them, what is likely to happen when they are used, possible side effects and what to do about them, etc.

When prescribing eye drops or ointments, do not just assume the patient knows how to use them. It is not uncommon for patients to return with no resolution of symptoms only to find they have been rubbing the ointment directly to the skin of the eyelids rather than instilling it into the lower fornix.

A single drop of medication is enough. Multiple drops will spill over on to the cheek and will be lost. No more will be absorbed by the eye. Patients may feel they need to target a particular part of the eye with the drop or ointment. In fact, both should be instilled into the lower fornix, by pulling the lower lid down, perhaps while looking into a mirror and instilling the medication onto the inside of the lower lid. A single millimetre of ointment is plenty – overseuse of ointment leads to excessive stickiness of the lids and eye and the complaint that the patient’s vision is blurred for a significant period.

Young children are often best treated while asleep, but if they are awake and unhappy, drops can be placed onto the closed lids and then the lids gently opened to allow the drop onto the eye. This is generally less traumatic and complicated than attempting to hold a child’s lids open, while they are trying to close them and instilling the drop at the same time. Instilling ointment in the eye of an uncooperative child is often a two-person job and is much easier again, when the child is asleep. Parents will need explanations and help in order to achieve the optimum treatment for their child.

**REFERENCES**


