Practice guided learning

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Chemical eye injuries 2: management and nursing care to promote visual rehabilitation

An outline of how to treat chemical injuries to the eye, with advice on emergency and ongoing nursing care to promote healing and rehabilitation

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This second in a two-part unit examines treatment and nursing management of chemical eye injuries. Part 1 described the different chemical agents and types of injury. This part outlines the various treatment options, the management protocol used at the Birmingham and Midland Eye Centre, and nursing management of eye injuries.

INITIAL MANAGEMENT

Most of the damage in chemical eye injuries is done in seconds and minutes, emergency treatment involves immediate irrigation (Coster, 2002).

Ideally, this should be started where the injury occurred, for example at the patient’s workplace, with further irrigation in A&E with sterile balanced salt solution.

Immediate irrigation is vital to ensure the chemical agent is washed away. This is the most important consideration in chemical burns and offers the best chance of reducing the ultimate damage to the eye.

A study evaluating lactated Ringer’s solution compared with normal saline for ocular irrigation, concluded lactated Ringer’s gave maximum patient comfort (Jones et al, 1998).

Another study investigating comfort using a lidocaine-saline solution rather than saline alone concluded that the lidocaine-saline caused less discomfort in healthy volunteers (O'Malley et al, 2006).

Dougherty and Lister (2008) gave procedure guidelines for eye irrigation using sterile 0.9% sodium chloride or sterile water for irrigation. However, Ehlers and Shah (2008) pointed out that if non-sterile water is the only liquid available, it should be used.

The procedure

- Evert the eyelids and fornices, and remove any retained particulate matter in the fornices that may perpetuate alkalinity.
- Using a cotton-tipped applicator, swab the fornices (the upper end of the lacrimal sac above the entrance of the lacrimal canal). The area where the palpebral conjunctiva joins to become the bulbar conjunctiva is called the conjunctival fornix. The space between the palpebral and bulbar conjunctiva is called the conjunctival cul-de-sac (Barn et al, 1997).
- Use double evasion for the upper eyelid with eyelid retractor.
- Blazys (1999) described the technique used to insert the Morgan Lens for eye irrigation. The Morgan Lens provides the only method for effective hands-free ocular irrigation.

ACHIEVING NORMAL pH

At least 1L of solution (normal saline) should be used then the pH of the eye should be tested with litmus paper. If the pH is near neutral (6–8), irrigation can be discontinued.

The volume of irrigation fluid needed to reach neutral pH varies, depending on the chemical and duration of exposure. It may range from one litre to over 10 (Ehlers and Shah, 2008).

About 5–10 minutes after stopping irrigation, let the litmus paper touch the inferior cul-de-sac to test the pH.

LEARNING OBJECTIVES

1. Explain the importance of close monitoring in managing severe chemical injury that leads to partial or complete blindness.
2. Identify the discharge management plan for a patient with severe visual impairment.

MEDICATION

A combination of drugs can be used to treat chemical eye injuries (Box 1). The eye cannot cope with alkaline substances in the same way as it can with acids, as alkalines cause immediate swelling of the epithelium followed by desquamation (Yanoff and Fine, 2002).

This allows the alkaline direct access to the deep corneal layers due to its penetration.

Long et al (2003) explained that ascorbic acid is essential for collagen formation, which is an organic constituent of the intercellular tissue of the endothelium. Ascorbic acid stimulates the collagen peptide synthesis, which induces healing of the injured tissue; this makes it useful in alkaline chemical burns. However,
ascorbic acid should not be used in acid burns as these are superficial in nature and there is no penetration of the tissue.

Additional treatment might be needed to control intraocular pressure (IOP). Collagen hydration causes fibrin distortion and shortening, leading to trabecular meshwork alterations that can result in increased IOP.

Trabecular meshwork is described as the area of loose fibres located around the base of the cornea and the iris (iridocorneal angle), which filters the aqueous humour as it drains from the anterior chamber of the eye (Al-Asward et al, 1999).

In addition, the inflammatory mediators released during this process stimulate the release of prostaglandins, which can further increase IOP (Pfister and Wagner, 1997). In this situation, acetazolamide 250mg four times a day orally and/or timolol 0.5% eye drops twice a day may be prescribed.

Patients with chemical injuries experience mild to severe pain, and the use of analgesia should be considered. Oral analgesia, for example paracetamol with or without codeine, can be considered and patients monitored.

WARD MANAGEMENT

The decision to admit to hospital is discussed with patients, including the treatment to be started on the ward.

Treatment may include topical ascorbic acid and a steroidal anti-inflammatory agent, for example preservative-free dexamethasone and an antibiotic, preservative-free ofloxacin (all are topical eye drops).

These are instilled on an hourly basis and sometimes alternating half-hourly (day and night). If a patient is having more than one topical medication, these should be instilled at 5–10-minute intervals to ensure each one is absorbed into the eye and not washed away. Oral ascorbic acid may also be prescribed to promote healing.

Patients with chemical burns often experience severe pain. Analgesia is given as needed and pain monitored as ocular pain could indicate raised intraocular pressure and complications.

Patients are normally nursed in a side room where they can rest in between topical instillations. To minimise the effects of photophobia, the curtains/blinds are drawn to make them more comfortable. Their temperature is measured twice a day or more often if necessary; a rise could indicate an infection needing treatment.

Patients are encouraged to consume a healthy diet and fluids to promote healing. Ward nurses at the centre give advice on eating a balanced diet that includes protein, carbohydrates and minerals.

Patients receive a daily eye examination to review progress and/or further damage.

MANAGING ANXIETY

Patients and relatives are often extremely concerned about the degree of injury and the possibility of permanent sight loss. The nurses’ role is to offer comfort and support during their stay on the ward.

Alexander et al (2006) discussed patients’ concerns, which may include visual impairment, body image, lifestyle and return to work. Effective communication skills are important and any questions must be answered as honestly as possible and referred to medical staff if necessary.

Open discussion with patients using focused questions and answers can be a good way of finding out information and helping to plan appropriate care.

Patients need to feel that nurses have the time to answer their questions. Nurses instilling hourly drops can use this as an opportunity to discuss any issues patients may have. It is also an ideal opportunity to monitor patients’ behaviour such as withdrawal and aggression, which can be attributed to anxiety and depression.

Nurses need to be aware that patients may become depressed, particularly if the eye damage is severe. They may need practical and psychological support, and must be assessed before discharge. Counselling support should be discussed and started on the ward if necessary.

DISCHARGE

Focus, a local charity, has an information desk in the outpatients’ waiting area of the Birmingham and Midland Eye Centre. The information officer can also come to the ward if patients need to discuss issues about discharge. Financial information and benefits, education or employment can also be discussed while they are still in hospital.

The Royal National Institute of Blind People (www.rnib.org.uk) helps patients to rebuild their lives after sight loss. Its specialist advice services include welfare benefits and rights, education, employment, legal rights, emotional support, daily living help and residential care.

Goals on discharge would also include ensuring homeostasis is achieved, pain is controlled or reduced and any complication is limited or prevented by medical intervention. Surgical intervention may also be needed.

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Patients must be aware of and adhere to their medication regimens. Any support services, such as district nurses, should be put in place to meet their needs on discharge. Finally, patients are given a follow-up appointment. The timing depends on the severity of the injury and urgency of any intervention, but is usually 1–4 weeks after discharge. They will also be referred to a cornea consultant for further intervention if this is needed.

HEALTH EDUCATION
Health education and support must be given to all patients in A&E and should be reinforced when they are on the ward. This includes explaining complications likely to arise from the injury and the importance of attending for any follow-up treatment.

Nurses need to be aware of community follow-up care in their area to ensure patients are properly informed about health and safety, and aftercare.

CONCLUSION
Chemical injuries to the eye are an ophthalmic emergency as they can cause corneal blindness. It is therefore important for healthcare professionals to be aware that timely intervention can help to prevent this.

In hospital, aggressive early management and close long-term monitoring is essential to promote ocular surface healing and provide the best opportunity for visual rehabilitation.

REFERENCES

Office and Emergency Room Diagnosis and Treatment of Eye Disease. Philadelphia: Lippincott, Williams and Wilkins.