Ammonia burns of the eye: an old weapon in new hands

The use of ammonia sprays in cases of criminal assault has recently increased in London. Victims are temporarily immobilised by ammonia solution squirted into their eyes. It causes intense discomfort. What is often not appreciated is that such injuries may permanently impair vision and even cause blindness. Immediate prolonged irrigation of the eyes with copious quantities of water is the most important aspect of management.¹

Twenty years ago ammonia was used commonly during payroll, bank, or security firm robberies. The introduction of protective eye wear for employees at risk may have contributed to a subsequent fall in these injuries. But at this west London eye hospital we saw two cases of ocular ammonia burns in 1985, 14 cases in 1986, and 35 cases in 1987. This increase has also been reported from Croydon eye unit.² The motive may be robbery, but sometimes there is no apparent reason for the attack.

The ammonia is squirted from a plastic container (often a Jif lemon juice container, which delivers a fine jet of fluid). The preparation used is probably household ammonia, which is freely available as a cleaning agent at up to a 9.5% solution, although commercial preparations range up to 35%. Ammonia causes one of the most serious ocular chemical burns. Its high lipid solubility allows diffusion through the cornea into the anterior chamber within a few seconds of injury,³ with subsequent damage to the cornea, lens, drainage system, and even the retina.⁴

Immediate first aid with thorough and prolonged irrigation of the affected eyes with water is essential.¹ Any delay is likely to increase ocular damage.⁵ Medical treatment should start with further irrigation (with universal buffer if available) for 30 minutes or longer until the eye reaches neutral pH as tested in the conjunctival sac.

Cursory examination of the eye may show some erythema of the lids and minimal ocular injection because of blanching of the conjunctival vessels. The serious nature of the injury may be missed. Fluorescein staining of the cornea is needed to show the extent of epithelial loss, and examination with a slit lamp is mandatory. Corneal stromal damage, conjunctival and episcleral ischaemia, and the extent of intraocular inflammation must be recorded to assess the needs for treatment and the long term prognosis.^{6,7}

Minor damage with little epithelial loss can be treated with topical antibiotics. Patients with more serious burns usually require admission to hospital for intensive treatment with topical steroids and ascorbate drops. The ascorbate reduces the incidence of corneal perforation in rabbits.⁸ It may act by scavenging and therefore reducing the effect of toxic free superoxide radicals released by neutrophils and by reversing the aqueous vitamin C depletion that may be measured up to four weeks after the injury.⁹

Healing is often accompanied by progressive scarring and vascularisation of the cornea with further deterioration of vision; some eyes become hypotonic because of ciliary body damage, whereas others develop secondary glaucoma. Conjunctival damage may lead to symblepharon (adhesion of the eyelids to the eyeball), and diffuse loss of conjunctival goblet cells leads to a poor tear film. This poor film is one of several factors that makes these patients poor candidates for corneal grafting. Over the past three years, five of our patients have lost the sight of one eye, and one patient is registered blind because of severe bilateral ammonia burns.

Further efforts must be made to reduce these attacks. The terrible consequences of the attack may not be apparent to the assailants. Harsher penalties for those convicted of these assaults or of possessing ammonia sprays may be needed to stop this epidemic.

J D L BEARE
senior registrar

R S WILSON
senior registrar

R J MARSH
consultant ophthalmic surgeon

Western Ophthalmic Hospital,
London NW1 5YE

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A better deal for senior house officers

Senior house officers are the largest group on the medical career ladder. They contribute much to the National Health Service, and yet, suggests a recent report from the Council for Postgraduate Medical Education in England and Wales, they do not get much in return.¹ Senior house officers are contracted to work 86 hours a week but receive less than two hours of formal education, which, says the report, is not nearly sufficient. The balance between service and training has evolved haphazardly, and now is the time to plan a better structure.

The report dismisses the canard that senior house officers can learn properly only by being on the job round the clock. The service commitment is now so great that few opportunities exist for more formal study, and exhausted senior house officers are not capable of obtaining full benefit from their experiences. Furthermore, since doctors now spend longer in junior posts it is no longer true that hours must be long to provide the required experience. Indeed, many senior house officers judge much of their working week to be spent on tasks that do not need their skills and provide no opportunity for learning. The report calls for a detailed study of the senior house officers' working week so that a proper balance between training, service, and education can be achieved. This would also help to identify tasks that would be better performed by other people, including consultants. Many jobs often done by senior house officers could, although the report does not say so, be done by nurses or ward clerks if sufficient numbers of them were employed.

Another difficulty for senior house officers is that they spend so much time canvassing for their next job and covering their colleagues' annual leave. The report calls for contracts for senior house officers to be for two years, which would allow better planning of the balance between service and training. Some specialties inevitably mean more routine work for the senior house officer, but these should be balanced by jobs where more time can be spent on study. A structured programme over two years would ensure that

senior house officers could be given personal education plans, with regular monitoring of their progress and the prospect of effective responses to difficulties.

The report calls on the colleges and faculties to consider training senior registrars and consultants so that they can better undertake teaching, which should be required of them. The controlled system of appointing general practice trainers is praised, and the need for similar formal and skilled teaching of hospital juniors is emphasised. The report wants senior house officers to be given half day release study sessions to allow them to attend formal teaching in the same way as general practice trainees. Senior house officers should have named people to supervise them and advise them when they run into difficulties. Too often the education of the senior house officer is pushed aside by other concerns. Private study leave is often denied and attendance at courses severely restricted because of financial and staffing pressures. As a result morale is very low among many senior house officers. The health service can only benefit from having a more closely monitored, better informed team of senior house officers.

Allowing senior house officers reasonable study leave and ensuring that rotas are not so onerous as to make study impossible will cost money. The report recommends that staffing in certain specialties should be increased to ease the difficulties of providing cover. This carries the risk that the career pyramid will become even steeper, and the suggestion that intermediate grade and part time senior house officers could provide the extra cover might lead to a two class system with excellent education for some and little for the rest. This must be carefully planned if inequalities are to be avoided. With beds closing and operating lists being cut across Britain it is unrealistic to expect the needs of senior house officers to receive much support, but doctors must emphasise that medical education is not a luxury: it is essential for improving patient care. The report contains a programme for implementing its recommendations, many of which could be quickly and inexpensively introduced. Many senior house officers think that their education is already being sacrificed as an acceptable and almost invisible means of cutting costs. As the report says, "The belief that postgraduate medical education can be provided by enthusiastic amateurs in non-existent time is no longer tenable."

STELLA LOWRY

Assistant Editor, *BMJ*

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Psychosocial factors and hypertension

There is much interest in how psychosocial factors such as occupational stress, personality trait, and socioeconomic state may be related to hypertension, but the relation is highly complex and difficult to unravel.¹ Social groups differ in their diets and alcohol intake, in their genetic characteristics, and in their prevalence of obesity, all of which may confound any relation between psychosocial factors and the prevalence of hypertension. Furthermore, whether a person seeks and complies with medical care is affected by psychosocial background,^{2,4} and a diagnosis of hypertension may alter psychological health.^{5,7}

Many investigations of this complex relation show flaws in methods: measurements of blood pressure may not be blind, measurement techniques may vary from group to group, and inferences about causation may be drawn unjustifiably from cross sectional studies. Psychological characteristics and psychiatric symptoms are difficult to measure reproducibly, and spells of hypertension recorded in the laboratory may not indicate sustained disease. Patients with hypertension may react to stress differently from those with normal blood pressure,⁸ and those who are treated or observed may differ psychologically from others.⁹

Occupational stress arises when a person experiences excessive psychological or physical workload with little control over how the work is to be conducted.¹⁰ Studies relating occupational stress to hypertension are made difficult by the "healthy worker effect" and by confounding factors such as race, age, social class, and area of residence. A recent study that found an increased prevalence of hypertension in male bus drivers largely succeeded in controlling for these variables, but the authors emphasise that driving a bus differs from other occupations in many ways including the degree of physical activity, disruption of diet and sleep, and exposure to atmospheric pollutants and noise.¹¹ This increased rate of hypertension was not explained by race or age, but the effect of body mass index has not apparently been excluded.

Noise is a comparatively easily studied element of the occupational environment, yet a recent series of Dutch papers concludes that no relation has been established between total exposure to noise and blood pressure.¹² There may, however, be a subset of patients at increased risk for both hearing loss and hypertension.¹³ Hearing loss itself could add to stress, or, if both hearing loss and raised blood pressure are caused by arteriosclerosis, other undiagnosed effects of this condition could add to the stress of performing competently at work.

Studying the relation of personality traits and socioeconomic status is even more difficult than studying the relation to occupational stress. Behavioural traits may not be invariant but may indicate responses to specific economic, social, or interpersonal problems.¹ Although difficulties with submissiveness and anger expression, prolonged attempts to cope with stress¹⁴⁻¹⁶ and an unsupportive social structure,^{17,18} and tension within the family¹⁹ have often been related to an increased prevalence of hypertension, the results remain inconclusive and difficult to interpret.²⁰ When there are so many variables and when each may contribute little to the total effect, showing the importance of individual factors may be beyond the competence of epidemiology.²¹ None the less, probable associations have been considered adequate bases for preventive action in other subjects, and perhaps the same should apply for adverse psychosocial factors that are remediable.

The contents of this article represent the author's views alone and do not commit the Department of Health and Social Security.

GILLIAN GREENBERG

Senior Medical Officer,
Department of Health and Social Security,
London SE1 6BY

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