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## LETTERS TO THE JOURNAL

Sir,

### **Microwave Ovens May Cause Serious Ocular Injury**

Microwaves have become popularised due to the ease of use, short period of time required for cooking, rapid reheating of foodstuffs and the small size of ovens, making them convenient kitchen items in the home. This type of cooking facility is also ubiquitous in many restaurants as well as other catering institutions. Although in general they are a safe form of cooking major injuries can still occur if precautions are not taken or readily available. Three further cases of serious bilateral ocular injury directly attributable to heating in a microwave oven are described.

#### *Case Reports*

*Case 1.* A 62-year-old woman heated milk in a tall cup in a microwave oven following the instructions supplied with the microwave. On removing the cup immediately the woman noted that a skin had formed over the milk and on tilting the cup slightly the contents exploded into her face. She sustained serious ocular injuries requiring admission to an ophthalmic unit.

Examination showed she had facial burns to the lids bilaterally and around the mouth (Fig. 1). It was not possible to assess visual acuities at this stage due to severe pain, lacrimation and photophobia, but anterior segment examination revealed almost total corneal epithelial loss in the right eye and two-thirds corneal epithelial loss in the left eye. The remainder of her ocular examination was normal. Her inpatient treatment consisted of homatropine 2% drops, chloramphenicol ointment and padding bilaterally with analgesia. The skin burns were treated with saline soaks after consultation with a burns specialist. The next day her acuities were 6/24 both eyes and the epithelial defects were much smaller. She continued to improve daily and her padding was stopped after 2 days. This patient was discharged after 4 days of hospital treatment with an acuity of 6/9 either eye.

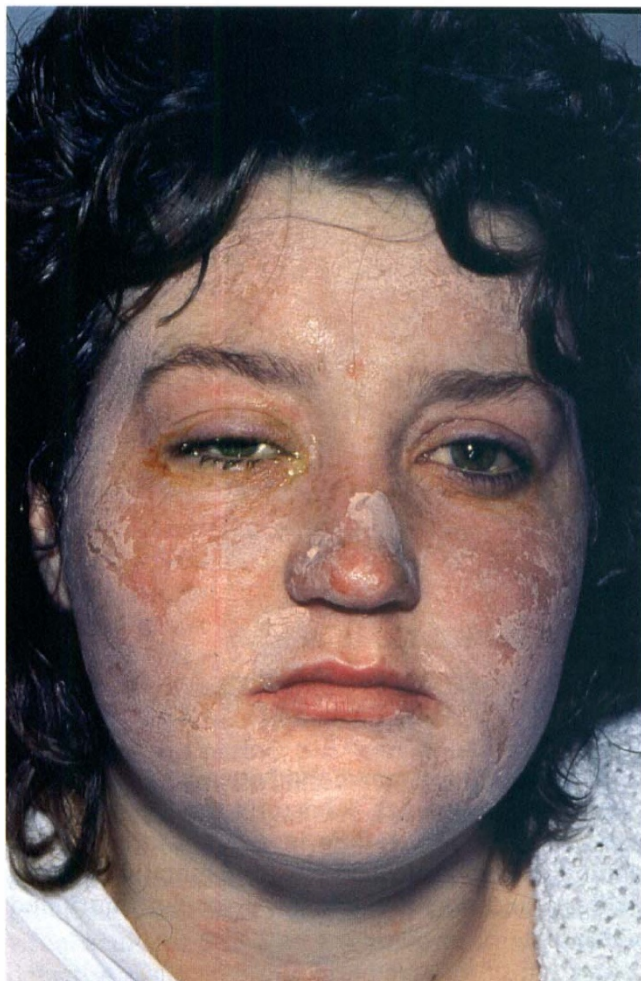
On review 14 days later her final acuities were 6/5 in both eyes with total healing of her corneas and skin burns. She was instructed to continue to use an ocular lubricating ointment at night for the next 3 months but she was discharged from the clinic.

*Case 2.* A 20-year-old woman cooked two eggs in their shells in a jug of water in a microwave. On removing them from the oven the eggs exploded into her face. The woman sustained severe ocular injuries requiring admission to an ophthalmic department.

Examination revealed superficial burns to the face and periorbital swelling with chemosis of the right eye (Fig. 2). Both eyes had to be irrigated thoroughly with saline and several pieces of egg and eggshell were removed from both sides. Visual acuity was 6/12 right eye and 6/18 left eye. The right cornea had an almost total epithelial defect and the left cornea showed the presence of multiple abrasions. The remainder of her ocular examination was normal.



**Fig. 1.** *Case 1. Superficial burns affecting both periorbital areas, cheeks and upper lip due to microwaved milk.*



**Fig. 2.** Case 2. Superficial burns to both periorbital areas, cheeks and nose. The right palpebral fissure is narrower due to periorbital swelling and there is also some chemosis of the right conjunctiva.

Her inpatient treatment consisted of chloramphenicol ointment, a cycloplegic agent and padding of both the eyes. The skin burns were treated with saline soaks only. The next day both her corneas were beginning to heal and she was discharged after 2 days on an antibiotic ointment.

Follow-up in the outpatient clinic approximately 3 weeks later revealed that both corneas had healed completely and she had a visual acuity of 6/5 in either eye. She was discharged at this stage.

**Case 3.** A 49-year-old woman heated pot pourri in a porcelain bowl covered by cling film in a microwave at medium power for 1 minute. (The cling film had not been pierced.) Heating of pot pourri in a microwave oven is to enhance its essence and this method of reviving the odour was described in a magazine that the patient had read. On removing the bowl immediately and piercing the cling film the contents exploded into her face and the porcelain bowl was shattered into several pieces. The woman received serious ocular injuries requiring admission to an ophthalmic department.

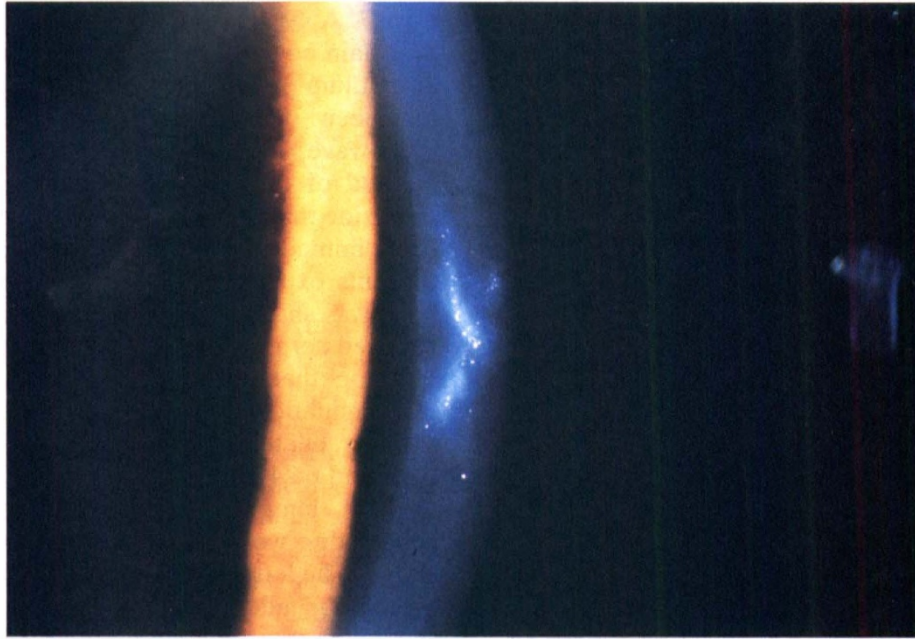
Examination showed the presence of bilateral lid swelling, bilateral chemosis and visual acuities of 6/36 right and 6/24 left. Anterior segment examination at the slit lamp revealed a full-thickness corneal penetrating wound in the right eye which was self sealed. The left eye had a one-third corneal epithelial defect. In addition there was also a moderate traumatic anterior uveitis present in both eyes but with normal intraocular pressures. Fundal examination after dilatation was normal. This patient was too distressed to allow photography at initial presentation but she consented to anterior segment photography of her right eye several months after her injury (Fig. 3). It is not possible to say what exactly caused the corneal perforation but we suspect a piece of porcelain may have been responsible. Her inpatient treatment consisted of homatropine 2% drops, chloramphenicol ointment, padding of the eyes and analgesia with no specific treatment required for the skin injury. The self-sealing corneal perforation was small and did not require surgery. The anterior uveitis did, however, necessitate the use of topical steroids and a cycloplegic agent once the epithelium had healed. She was discharged after 6 days of inpatient treatment and acuities of 6/9 either eye.

This patient's ocular injuries grumbled on for some time. Both corneas showed continued punctate staining for several months and she was symptomatic with gritty irritable eyes. Eventually the eyes settled on lubricating drops after 7 months follow-up requiring a total of four outpatient attendances. Her final acuities were 6/6 both eyes.

**Table I.** Visual morbidity and outcome

Case	Presenting acuity		Ocular injury		Final acuity		Length of admission (days)	No. of outpatient visits	Recovery time from initial injury (days)
	R	L	R	L	R	L			
1	6/24	6/24	Subtotal corneal epithelial loss	Two-thirds corneal epithelial loss	6/5	6/5	4	1	14
2	6/12	6/18	Subtotal corneal epithelial loss	Multiple corneal abrasions	6/5	6/5	3	1	12
3	6/36 (acuities only possible on second day of admission)	6/24	Penetrating corneal injury with a traumatic anterior uveitis	One-third corneal epithelial loss with a traumatic anterior uveitis	6/6	6/6	6	4	210

R, right eye; L, left eye.



**Fig. 3.** Case 3. Anterior segment photograph showing the right cornea. The arrow indicates the presence of a healed full-thickness corneal perforation. Fortunately this scar is outside the visual axis and the patient retains good vision of 6/6.

#### Discussion

Microwave ovens are an extremely convenient method of cooking or reheating. They are on the whole safe to use but serious injury can occur unexpectedly. Oropharyngeal injuries and skin burns due to microwaved foods have been reported with the use of these appliances.<sup>1-5</sup> In addition there have also been reports of ocular injury due to microwaved foodstuffs.<sup>6-8</sup> We report 3 further cases of thermal burns to the skin with serious bilateral ocular injury highlighting the dangers of using microwave heating when care is not taken. All the cases required admission to an ophthalmic unit for several days and case 3 recovered only after several months of follow-up in the outpatient department. The clinical outcome is shown in Table I.

It is likely that the mechanism of injury is similar in all three cases presented, and results from the rapid heating and expansion of contents under a sealed surface (the skim of milk, the eggshell and the cling film respectively). Without adequate time for cooling the sudden release of pressure can lead to the rapid expulsion of contents in an explosive manner, resulting in severe ocular damage necessitating hospital and outpatient treatment. We would recommend that the manufacturer's guidelines supplied with microwave ovens are strictly adhered to and any substance heated in a microwave should be allowed to stand for cooling initially in the oven. A possible recommendation for manufacturers could be for a warning label to be attached to the door of microwave ovens explaining the importance of allowing cooling of substances after initial heating. Alternatively it may be possible to fit a timing device

to microwave doors preventing opening immediately after heating, so that foodstuffs can be given an adequate time for cooling in a safe place, that is, within the oven itself. These features should be taken seriously and may prevent severe ocular injury and morbidity.

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