LETTERS TO THE EDITOR

Sir,

We were most interested to read the paper by Dr Dunbar *et al.* entitled 'Intraocular deposition of metallic fragments during phacoemulsification: possible causes and effects.'[1] We wish to present two further cases of 'phacoshrapnel' and explore further the implications to patients undergoing phacoemulsification.

Case 1

A 74-year-old woman underwent simultaneous bilateral sutureless phacoemulsification in March 1994. Similar surgery was performed on each eye under general anaesthetic. A fornix-based conjunctival flap was formed and a scleral, three-plane tunnel fashioned. Under viscoelastic, a circular capsulotomy was performed, followed by hydrodissection. Phacoemulsification was carried out with a one-handed technique. At no time during phacoemulsification were two instruments in the eye. After cortical aspiration, a PMMA intraocular lens was introduced into the capsular bag. Viscoelastic was aspirated and the water-tightness of the section tested. Topical, preservative-free antibiotics were instilled. For the second eye a completely new set of instruments was used, the patient's operative field re-draped and theatre staff re-gloved.[2]

On the first post-operative day metal fragments were noted in both eyes. There was one large fragment of a dark metal (Fig. 1) on the right iris and multiple smaller fragments of a silver colour on both irises. The eyes were otherwise unremarkable.

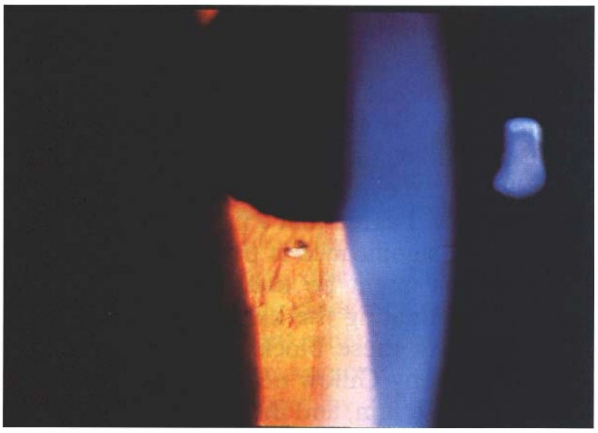

Fig. 1. *Case 1. A large fragment of dark metal on the right iris.*

Visual inspection of all operative instruments used in the procedure failed to identify any manual instrument that was defective. The phaco handpieces were withdrawn by the manufacturer for inspection.

One week later the large metallic foreign body and numerous small slivers or flakes were removed from the right eye through the original incision. The samples were equally divided and sent to both the phacoemulsification manufacturer and an independent laboratory for analysis. The results from both indicated that the metal was the same as that used in the phacoemulsification hand-piece.

At the latest post-operative visit both eyes were quiet with 6/9 unaided acuity. Intraocular pressures were normal.

Case 2

A 71-year-old woman underwent simultaneous bilateral phacoemulsification combined with trabeculectomy in February 1995. Pre-operative intraocular pressures were 28 and 30 mmHg in the right and left eye respectively.

Similar surgery was performed on each eye under general anaesthetic as described above. A scleral block was dissected from the base of the tunnel. Viscoelastic was aspirated, the sclera and conjunctival wounds sutured and antibiotic drops instilled. For the second eye a completely new set of instruments was used, the patient's operative field re-draped and threatre staff re-gloved.

On the first post-operative day two metal fragments were noted on the iris inferiorly in the right eye. There was minimal anterior chamber activity and a small hyphaema. Intraocular pressure was 3 mmHg with a deep anterior chamber and forming bleb. Visual acuity was 6/24 unaided. Careful examination of the fellow eye showed no signs of metal fragments.

A week later these fragment were removed under general anaesthetic through the original wound. These were sent to the manufacturer and an independent assessor. Both analyses confirmed the metal to be of a type used in the phacoemulsification hand-piece.

At her last clinic visit, the patient's visual acuities were 6/9 unaided and intraocular pressures were 21 and 20 mmHg, right and left respectively, with no additional anti-glaucoma treatment.

Discussion

These two cases illustrate the spectrum of 'phaco-shrapnel'. Metallic foreign bodies shed from phacoemulsification hand-pieces can be macroscopic or microscopic.

The common cause of metallic fragments from phacoemulsification hand-pieces is second instrument touch.[3] However, with single-handed use this is not possible. Other possibilities include poorly polished lumens, milling and lathing problems and metal fatigue.[3,4] It is possible for other instruments to be the source of metal fragments. One would expect, however, that an instrument vibrating at about 28 kHz would be a richer source than, for example, a simcoe cannula.[5]

There are few reports in the medical literature of macroscopic intraocular metallic foreign bodies.[6] However, all incidents that are brought to the manufacturer's attention are reported to the FDA in the USA, in Scotland to Scottish Healthcare Supplies and in England and Wales to the Medical Devices Agency. In most cases there is the strong suspicion of second instrument touch or inadequate maintenance.

Given the potential bioreactivity[7] of titanium alloy, the question of microscopic particulation by phaco-emulsification hand-pieces needs to be addressed. Do these fragments need to be removed? If so, when? What effect would a shower of fine metal particles have on the trabecular meshwork? Could such damage only be evident in years to come by the development of glaucoma? Given the incidence of glaucoma in the population, would such development be noticed?

It was thought that each manufacturer would be aware of how much particulation their hand-pieces shed, of what size and under what conditions of use. This question of particulation has been posed by the authors – most comprehensively at the trade fair during the Royal College of Ophthalmologists Annual Congress in May 1995. Anecdotally, it was admitted that all hand-pieces shed micrometre-sized particles, but to date no manufacturer has responded formally to our repeated requests for information. We note that a similar request in a publication in 1993 was declined.[3]

We assume that commercial confidentiality is the main reason why manufacturers do not release information on particulation directly to phacosurgeons. As this problem is apparently universal in all phaco machines, we feel that there would be no commercial implications affecting one manufacturer over another should all publish their information. We believe that this information should be made available.

Although incidences of particulation are reported, not all are fully investigated. The FDA does not issue regular reports and Scottish Healthcare Supplies does not hold enough data to make any conclusions. We believe that regular incidence reports should be made available for scrutiny by both doctors and patients.

Charles J. M. Diaper, FRCS, FRCOphth
Flat 4/2
15 Clarendon Street
St George's Cross
Glasgow G20 7QP
UK

Zeidoon A. Y. Beirouty, FRCS, FRCOphth
Stobhill Hospital
Glasgow
UK

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Sir,

I was most interested to read Mr David Boase's editorial[1] and the two papers by Gillow *et al.*[2,3] It is timely to remind all those involved of the risks of serious sight-threatening complications of local anaesthesia such as globe perforation, and to stress, as Mr Boase does, the need for detailed anatomical knowledge of the eye and orbit, proper training and regular practice. I agree that a knowledge of the axial length and its significance is paramount, and would agree that this might be used as a discriminatory question in evaluating the knowledge of those who wish to perform these blocks. However in the six cases described by Gillow none had an axial length longer than 25.10 mm, and the mean length was only 23.35 mm, implying that normal-length eyes are also at risk of perforation.

As Mr Boase rightly points out, there is increasing involvement of anaesthetists in this field – a