MINI REVIEW

Pneumoretinopexy: a personal view

The use of intravitreal air as an adjunct to retinal detachment was first used seriously by Rosengren about 60 years ago. When scleral buckles were later used to close breaks and to relieve vitreoretinal traction the use of air became much less popular. Development both of pars plana vitrectomy and of gases capable of intraocular expansion has reactivated great interest in the use of such gases. The use of expanding gases as part of pars plana vitrectomy to hold the layers of the retina together, while apposition is secured by the use of a laser or cryotherapy induced adhesion, is well accepted. However, the use of such gases for the treatment of retinal detachment without pars plana vitrectomy or of scleral buckling (pneumoretinopexy) is much more controversial, and is now attracting much interest, livening up a rather quiescent retinal detachment scene.

Pneumoretinopexy relies on the capacity of an intraocular gas bubble to tamponade a retinal break, and by doing so, effectively closes the break and results in retinal reattachment without a scleral buckle. In addition to break closure, the gas bubble may also act by relieving dynamic vitreoretinal traction on the break; retinal redetachment is prevented by adhesion produced by cryotherapy or argon laser. Clinical guidelines have been suggested for cases suitable for this procedure. The most favoured gas is perfluoropropane (C_3F_8), which will expand four times its original volume after injection into the eye, and thus only a small volume needs to be used. For best results, the retinal break(s) must be in the superior part of the retina – that is, allowing closure from the rising gas bubble – but must not be too large, and if multiple the breaks must be close together. Cases with extensive proliferative vitreoretinopathy are not suitable.

After the injection the patient must be capable of following a demanding postoperative regimen so that the break is in the uppermost position, maintaining this posture for most of the day for at least five days after injection. The operation, performed under local anaesthetic, is quick and simple, and, although paracentesis is often necessary to combat a high intraocular pressure, admission to hospital is not necessary.

It cannot be claimed that pneumoretinopexy is superior to an entirely extraocular non-drainage retinal detachment procedure. Thus, if the depth of subretinal fluid between pigment and neuroepithelium is not great, there is little risk of inaccurate break localisation or of excessive cryotherapy if the non-drainage technique is used. Even though local scleral buckles (which would be preferred to close simple breaks) may sometimes result in infection, refractive changes, and muscle imbalance, the risk of serious intraocular complications is very small.

On the other hand, in pneumoretinopexy severe intraocular problems consequent to the injection of gas have occurred occasionally (such as vitreous incarceration, subretinal gas, haemorrhage, and others). When, however, the depth between pigment and neuroepithelium is deep enough to make break localisation difficult, success rates with the non-drainage approach fall. In these cases, does pneumoretinopexy compare favourably with the drain, air injection into the vitreous, cryotherapy, and explant surgical sequence (D-ACE) that may be used for the management of these cases? The latter approach has as a disadvantage the potential intraocular complications of vitreous injection and of the drainage of subretinal fluid, as well as the extraocular

ones related to scleral buckling.

In a recent painstaking and thorough study¹ a randomised comparison between pneumoretinopexy and conventional scleral buckling was made. It was not possible to deduce if some of these cases could have been treated by the non-drainage method, and the great majority of cases in the conventional scleral buckling group were treated with encirclement, drainage of subretinal fluid and in about a third of the cases, an injection into the vitreous cavity. The most important aspect of the study was that in the pneumoretinopexy group reattachment with either one procedure or with subsequent added cryotherapy or laser was achieved in 79.6% of cases. In the scleral buckling group reattachment was advised in 82.2%; so there was no real difference between the groups. In both groups higher reattachment rates were achieved with further procedures.

A recent study was made of 66 cases of retinal detachment in which there was deep subretinal fluid between the retinal break and the pigment epithelium (i.e. not suitable for non-drainage scleral buckling).² Other clinical features of these cases – namely, single or breaks close together in the upper half of the retina in cases without proliferative vitreoretinopathy – would otherwise have made them suitable for consideration for pneumoretinopexy. The cases were all treated by the D-ACE surgical sequence, and a figure of 85% reattachment was achieved with one operation. This incidence seems to be very similar to that in Tornambe and Hilton's groups.¹ However, in the latter study,¹ although the incidence of missed (or less likely new) retinal breaks was worryingly higher in the pneumoretinopexy group, an important and challenging finding was that the return of visual acuity following recent macular detachment was better in those cases treated by pneumoretinopexy than in the scleral buckling group. This aspect needs further study.

In many parts of the world the relatively simple sorts of retinal detachments being discussed are treated by general ophthalmologists who, working in hard pressed conditions, might welcome the procedure of pneumoretinopexy for the wrong reasons – namely, apparently a quick simple procedure without the need for expensive hospitalisation and without the risk of inaccurately localising a scleral buckle. However, the opportunity to examine the retina under relaxed operative conditions (an opportunity welcomed by most retinal experts) is lost and with it the chance to find previously undetected retinal breaks. These breaks will result in redetachment when the gas bubble is absorbed and result in an uncomfortably high failure rate in the hands of the inexperienced practitioner.

At present it would seem correct to advocate non-drainage surgery when there is little risk of inaccurate buckle localisation. When this risk rises, it remains to be seen if pneumoretinopexy is superior to other methods such as the D-ACE surgical sequence, as judged by both anatomical reattachment and visual outcome.

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1 Tornambe PE, Hilton GF. The Retinal Detachment Study Group. Pneumatic retinopexy – a multicentre randomised controlled clinical trial comparing pneumoretinopexy with scleral buckling. *Ophthalmology* 1989; 96: 72–84.

2 Little BC, Inglesby DV, Wong D, Chignell AH. Results and complications of conventional retinal detachment repair using posterior segment gas injection. College of Ophthalmology meeting, 1989.