detachments is unparalleled in the literature. Among patients undergoing conventional retinal detachment repair in the pneumatic retinopexy study, for example, the success rate was only 84%.[1] All the patients in that study were operated on by vitreo-retinal specialists and the inclusion criteria were such that a better-than-average result would have been expected.

Before altering the standard for success in retinal reattachment surgery or adopting universal consultant supervision, however, we would suggest that such a unique result should be backed up by well-presented data that allows at least objective analysis of case-mix (for example, were certain categories of patients excluded?) and methods (for example, was silicone oil used in any patients and, if so, was it retained in any?).

We await with interest the results of the Royal College of Ophthalmologists audit which should clarify some of these issues.

Reference

1. Tornambe PE, Hilton GF and the Retinal Detachment Study Group. Pneumatic retinopexy: a multicenter randomised control trial comparing pneumatic retinopexy with scleral buckling. Ophthalmology 1989;96:772–83.

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Sir,

We read with interest the report of the Moorfields prospective audit of primary retinal reattachment surgery[1] and noted from Wong's accompanying editorial that there was a paucity of similar published outcome data from Vitreo-retinal units in the UK.

A 15 month prospective audit was performed at the Bristol Eye Hospital of the anatomical and visual outcome of primary conventional scleral buckling (rather than vitrectomy) retinal reattachment procedures. We believe that the results of this audit contribute to the literature as they specifically relate to the group of patients whose surgery might be undertaken by a general ophthalmologist rather than being referred to a specialist vitreo-retinal unit.

Included were 77 eyes in which retinal visualisation was not significantly impeded by media opacities and where the causative breaks were both identifiable and situated either at or anterior to the equator. Patients with proliferative vitreoretinopathy (PVR) of grade C or worse were excluded. Follow-up was for at least 4 months.

All cases were assessed pre-operatively by either a vitreo-retinal fellow or a consultant vitreo-retinal surgeon and this assessment resulted in the prescription of an appropriate surgical plan. Eighty-eight per cent of eyes were phakic, 35% had myopia of 3 dioptres or more, the fovea was fully attached in 42%, and 22% of eyes had breaks in the inferior quadrant. Fifty-three per cent of detachments resulted from retinal tears, 19% from atrophic holes and 13% from retinal dialyses. The remainder had mixed breaks. Fifty-seven per cent of procedures involved drainage of subretinal fluid and 30% injection of air or gas.

Seventy-six per cent of retinas remained reattached 4 months after the primary procedure. Eighty-three per cent (15/18) of the primary reattachment failures in this series were due either to new or missed breaks (8/18) or to inadequate buckling or inadequate retinopexy (7/18). It is notable that these same causes were implicated in a similarly high proportion (93%) of the primary reattachment failure in the Moorfields series.[1] Only 3 of the 18 primary failures (17% of failures and 4% of all eyes) in our series were due to the formation of PVR.

Seventy-four per cent of the procedures in the Bristol series were performed by registrar or senior registrar grade trainees and among this group the failure rate was 26% (15/57) compared with 15% (3/20) when the surgery was performed by a second-year vitreo-retinal fellow or a consultant. As in the Moorfields series these differences due to surgeon grade did not achieve statistical significance. This may be due to a lack of power to detect a real difference of this magnitude. The observed differences may, however, have arisen purely by chance and the groups may not have been comparable in respects other than surgeon grade. It is nevertheless tempting to speculate that the proportion of missed and/or inadequately supported or treated breaks might be reduced if the primary surgery were performed by a more experienced surgeon.

In Bristol the majority of primary procedures are now performed or directly supervised by a vitreo-retinal fellow or consultant. Specialist registrars, when performing such surgery, are also much more closely supervised. The effect of this change in the experience of surgeons performing the primary procedures will be addressed in a follow-up audit.

The importance to the patient of early detection and primary success in retinal detachment surgery is emphasised by the acuity outcomes of this audit. Ninety-two per cent (24/26) of patients with an attached fovea at presentation and primary success retained an acuity of 6/12 or better. With first procedure failure only 1 of 5 such patients retained this level of vision. Where the fovea was detached at presentation the corresponding proportions were 28% (9/32) and 0 (0/10).

Retinal detachments arise sporadically and the surgery is both urgent and time-consuming. It goes without saying that the provision of an experienced vitreo-retinal surgeon to perform every primary detachment repair would have considerable local and regional logistical and financial implications.

Reference

1. Sullivan PM, Luff AJ, Aylward GW. Results of primary retinal detachment surgery: a prospective audit. Eye 1997;11:869–71.

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Sir,

We are grateful to Laidlaw *et al.* for their comments. We would certainly agree that an experienced vitreoretinal surgeon should be present at every retinal reattachment operation. The current practice at Moorfields is that a vitreoretinal consultant or fellow must be present at every case. We would point out that 'the provision of an experienced vitreoretinal surgeon to *perform* every detachment repair' could have adverse training implications as well logistical and financial ones.

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Sir,

We read with interest the paper entitled 'Relationship of diabetic microvascular complications to outcome in panretinal photocoagulation treatment of proliferative diabetic retinopathy' by M.F. Cordeiro *et al.*[1] They studied the resolution of diabetic neovascularisation in relation to the number of laser burns

delivered during panretinal photocoagulation (PRP) and went on to define a group of poor responders who overall had fewer laser burns (mean 3510 burns) than those who responded well (mean 5800 burns). We agree that the amount of retinal laser treatment is an important factor in inducing regression of neovascularisation, as has been shown in several trials. However, we feel that counting the number of laser burns applied is an inaccurate method of assessing the area of retina treated.

Cordeiro *et al.*'s study prospectively assessed the effect of one standard session of PRP with follow-up at 6 weeks. The standard PRP was given with a Rodenstock panfundoscope lens using a mean spot size, at the laser output, of 403 μm; we are not told the lens type used for previous PRP treatment. A 400 μm setting at laser control when delivered through a Rodenstock lens gives a retinal burn size of approximately 800 μm (laser magnification factor = 2). This combination of lens and laser spot size results in a significantly larger retinal burn than if a 400 μm laser spot size had been used with, for example, a Goldmann standard three-mirror lens (laser magnification factor = 1.08). The effect of lens type used, and the subsequent retinal burn size, is magnified as the area of retina treated is given by the formula:

$$\text{Surface area of burn} = \pi r^2$$

where r is the radius of the burn.

If a 400 μm burn is delivered through a Rodenstock lens, effective diameter of retinal burn = 400 × 2 = 800 μm, radius = 400 μm. If a 400 μm burn is delivered through a Goldmann standard three-mirror lens, effective diameter of retinal burn = 400 x 1.08 = 432 μm, radius = 216 μm. Thus:

$$\begin{aligned}\text{Ratio of the surface area Rodenstock burn to Goldmann burn} &= 400^2\ \pi : 216^2\ \pi \\ &= 160\,000\ \pi : 46\,656\ \pi \\ &= 1 : 0.29\end{aligned}$$

Therefore, PRP performed using a 400 μm burn delivered through a Goldmann three-mirror lens treats approximately 30% of the retinal area treated by a 400 μm burn delivered through a Rodenstock panfundoscope lens. Alternatively, one would need 3000 burns of 400 μm using a Goldmann lens to treat the same area as 1000 burns of 400 μm delivered via a Rodenstock lens.

Consideration should also be given to the fact that retinal burns become smaller as the retinal periphery is approached due to increased focusing of the laser burn as it traverses a longer distance within the lens. Final retinal burn size may also be larger than that originally delivered due to post-application spread of reaction.

For reference, the effect of some of the commonly used laser delivery lens systems on retinal burn size is shown below. All information is direct from the manufacturer's or the UK distributor's technical information service.

Laser spot size set at 100 μm. Size of retinal burn:

Rodenstock panfundoscope[2]: 200 μm
Volk Quadraspheric[3]: 192 μm
Mainster Ultrafield[4]: 189 μm
Mainster wide field lens[4]: 147 μm
Goldmann standard three-mirror[4]: 108 μm.

Because the radius of the burn is squared when calculating retinal burn area it is essential to consider the type of delivery lens used in performing PRP to avoid unnecessarily large or inadequately small burns. To allow valid conclusions and comparisons between this and other trials, we feel the surface area of retina treated should be the standard for comparison and not the total burn count alone.

References

1. Cordeiro MF, Stanford MR, Phillips PM, Shilling JS. Relationship of diabetic microvascular complications to outcome in panretinal photocoagulation treatment of proliferative diabetic retinopathy. Eye 1997;11:531–6.
2. Rodenstock Inst. GmbH, Ottobrunn-Riemerling, Germany.
3. Volk Optical Inc., Mentor, Ohio, USA.
4. Mainster and Goldmann lenses distributed in UK by Tinsley Medical Instruments, Newbury, England.

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