6. Schwingshandl J, Mache CJ, Rath K, Borkenstein MH. SHORT syndrome and insulin resistance. Am J Med Genet 1993;47:907–9.
7. Sorge G, Ruggieri M, Polizzi A, Scuderi A, Di Pietro M. SHORT syndrome: a new case with probable autosomal dominant inheritance. Am J Med Genet 1996;61:178–81.
8. de Chadaremian JP, Kaplan P, Vekunas M, Kaplan BS. Aniridia/glaucoma and Wilms tumour in a sibship with renal tubular acidosis and sensorineural deafness. Am J Hum Genet 1987;Suppl 3:323–8.

Adam Booth ✉
Department of Ophthalmology
St James's University Hospital
Leeds LS9 7TF, UK

Fax: +44 (0)113 242 6496

Sir,

We welcome the comments made by Mr Adam Booth regarding the family that we recently described.[1] We became aware of the autosomal dominant iridogoniodysgeneses only after submission of our own manuscript, hence their omission from our differential diagnosis. As suggested by Mr Booth, we hope to use the known loci for these conditions as a starting point for our own investigations.

Reference

1. Rundle P, Lotery A, Archer DB, McGinnity FG. Familial deafness associated with iris deneration and glaucoma. Eye 1997;11:476–8.

Paul Rundle ✉
Eye and Ear Clinic
Royal Victoria Hospital
Grosvenor Road
Belfast BT12 6BA
Northern Ireland

Sir,

We were interested to read the paper by Zambarakji *et al.* on the interesting complication of anterior capsular shrinkage following phacoemulsification surgery.[1] We would argue with their conclusion that silicone folding lenses are at greater risk of this complication, as this is neither supported by the literature nor proven by their data.

The capsule contraction syndrome (CCS) is an incompletely understood phenomenon, but is likely to involve many factors besides optic material. Those implicated in the literature to date include: (1) factors relating to the patient (as summarised by Zambarakji *et al.*); (2) factors relating to surgical technique, including degree of capsular polishing[2] and capsulorhexis size;[3] and (3) factors relating to intraocular lens (IOL) design including both optic materials[1] and haptic materials,[3] as well as design of haptic (loop vs plate).[4]

Whilst the authors dealt with the patient risk factors by excluding subjects with ocular co-morbidity, they failed to deal adequately with the surgical risk factors. Two surgeons performed the surgeries and the subjects were not randomly allocated to lens type or surgeon. It is likely that the two surgeons involved have slightly different techniques and differ in their preference for IOL design. When investigating a phenomenon such as the interaction of the CCS with so many putative risk factors there is no substitute for randomisation in order to eliminate conscious or unconscious bias. Ideally randomisation of IOL should occur after cortical aspiration is completed in order to ensure that IOL design does not influence the preceding steps of surgical technique. A further step in the elimination of bias would have been the use of an objective system of capsulorhexis measurement as used by Gonvers *et al.*,[4] or masking the observer to the date of surgery and previous measurements.

The importance of randomisation in a prospective study of this sort is not mere academic pedantry. The two groups in a study such as this must be identical apart from the variable under investigation. In this paper they clearly were not identical. A striking difference is that the mean capsulorhexis sizes in the two groups were unequal at 20.43 mm^2 in the PMMA group and 16.05 mm^2 in the silicone group on day 1. It is not surprising that the silicone IOL group had smaller capsulorhexes at 6 weeks when they started off smaller!

The data presented in the paper could easily be used to argue that a small capsulorhexis is more liable to the CCS. There is a sound pathophysiological basis for this theory in that a 5.5 mm capsulectomy removes twice as many lens epithelial cells as a 4.0 mm capsulectomy;[5] contact between lens epithelial cells and an optic causes proliferation and metaplasia;[6] and finally the centripetal force required to close a smaller opening is less than for a larger opening.

A further potential reason for the apparent shrinkage of the capsulorhexis in the silicone IOL group is the nature of the haptic on the particular IOL chosen. Polypropylene haptics are recognised to provide less resistance to deforming forces and to be more prone to decentration.[7] If one were to suspect that the optic material influences the development of the CCS then a more rational comparison would be between a PMMA lens and a silicone lens with PMMA haptics. We appreciate that these lenses may not have been available at the time of the study. A recent study by Gonvers *et al.*[4] found that capsular shrinkage was not statistically significantly different between one-piece PMMA lenses and silicone lenses with PMMA haptics.

In conclusion we feel that Zambarakji's study cannot be considered strong enough evidence to justify their condemnation of silicone lenses. It is possible that silicone lenses are a factor, but without meticulous attention to experimental methodology it is premature to make that judgement. We thank Zambarakji and colleagues for their thought-provoking study of this increasingly common problem. None of the authors of this letter have any proprietary interest in any form of lens manufacture.

References

1. Zambarakji HJ, Rauz S, Reynolds A, Joshi N, Simcock PR, Kinnear PE. Capsulorhexis phymosis following uncomplicated phacoemulsification surgery. Eye 1997;11:635–8.
2. Joo CK, Shin JA, Kim JH. Capsular opening contraction after continuous curvilinear capsulorhexis and intraocular lens implantation. J Cataract Refract Surg 1996;22:585–90.
3. Hansen SO, Crandall AS, Olson RJ. Progressive constriction of the anterior capsular opening following intact capsulorhexis. J Cataract Refract Surg 1993;19:77–82.
4. Gonvers M, Sickenberg M, van Melle G. Change in capsulorhexis size after implantation of three types of intraocular lens. J Cataract Refract Surg 1997;23:231–8.
5. Davison JA. Capsule contraction syndrome. J Cataract Refract Surg 1993;19:582–9.
6. Hara T, Hara T, Kojima M, *et al.* Specular microscopy of the anterior lens capsule after endocapsular lens implantation. J Cataract Refract Surg 1988;14:533–40.
7. Apple DJ, Soloman KD, Tetz MR, *et al.* Posterior capsule opacification. Surv Ophthalmol 1992;37:73–116.

S. Wong ✉
T. Eke
J. Deane
Department of Ophthalmology
Leicester Royal Infirmary
Infirmary Square
Leicester LE1 5WW, UK

Sir,

We thank Wong *et al.* for their comments on our paper[1] discussing capsular phymosis following uncomplicated phacoemulsification surgery.

Although the starting capsular diameters in our study were smaller in the foldable intraocular lens (IOL) group, we do not consider that the observed greater reduction in anterior capsular areas is solely due to the initial capsular diameters. We found no significant difference between the

percentage reduction in the capsular areas during period 1 (day 1 to week 6) between the one-piece PMMA and the silicone optic/polypropylene haptics foldable IOL groups ($p = 0.34$, Mann–Whitney *U*-test), but a significant difference in the percentage reduction in the capsular areas during period 2 (week 6 to month 6, $p = 0.0018$, Mann–Whitney *U*-test). This clearly is at least a pointer towards a possible cause and effect between IOL type and capsular shrinkage, indicating a similar degree of capsular shrinkage during the initial 6 weeks, and a relatively greater degree of capsular shrinkage in the foldable three-piece IOL group between 6 weeks and 6 months. Admittedly, this detailed analysis was not published in our paper, and therefore would not have been available to Wong and his colleagues.

Whilst Wong *et al*. recognised that our study accounted for patient factors, they also refer to the importance of surgical technique. However, they make reference to the work of Joo *et al*.[2] who give no detail of the randomised process prior to lens epithelial cell removal (LEC). Furthermore, Joo *et al*.[2] do not present the raw data relating to the group of eyes that had LEC removal and those that did not. They refer to the index (%) of size and demonstrate a statistically significant difference at 12 weeks without any reference to the type of statistical test used or the distribution of their data. The two starting groups (at < 1 week or at 1 week) each had 100% index size, but we do not know whether the absolute capsular areas were statistically different or not at that time point.

As regards capsulorhexis size, Wong *et al*. make reference to the work of Hansen *et al*.[3] This publication is in fact a series of three cases of progressive anterior capsular constriction, which is not any demonstration of the effect of capsulorhexis size on the incidence of capsule contraction syndrome. However, Hansen and colleagues[3] have reviewed the possible pathophysiology of this condition in a very comprehensive manner. They correctly indicate the importance of fibrous dysplasia of the anterior LEC in the subsequent contraction of the anterior capsular opening, and implicate a possible combination of factors including a small capsulorhexis, a flexible IOL and a short overall diameter.

In addition to the above-mentioned factors, it is interesting to note that Hansen *et al*.[3] state in their discussion that they did not observe any progressive capsular contraction in more than 250 cases of pseudoexfoliation despite the notion that the strength of centripetal contraction can overcome the centrifugal zonular forces which may result in this condition.[4] Although Joo's study,[2] as well as others,[5] showed that the initial capsulorhexis size did not have a statistically significant effect on the post-operative index of size, it is a well-known fact that the centripetal forces required to close a smaller opening are less than for a larger opening.

The differences observed in the percentage reduction of the capsular opening in our study[1] are, in our view, attributable to the use of a three-piece flexible IOL with polypropylene haptics. This appears to be consistent with the work of Masket,[6] who found that constriction of the capsulorhexis occurs more often with polypropylene loops, which exhibit early loss of shape and memory. Our conclusion[1] should therefore read 'Silicone intraocular lens implants with polypropylene haptics may be undesirable in eyes at risk'. Wong *et al*. may have misunderstood our study, which by no means tried to condemn silicone implants, of which we are frequent users. This may stem from the fact that we referred to folding implants as 'silicone' implants, in order to point to the IOL group and not the IOL material. The important factor is that silicone implants with polypropylene haptics are subject to distortion, therefore preventing the desired stretching of the capsular bag.[7]

Finally, Wong and colleagues refer to the study by Gonvers *et al*.[5] that found no significant difference in capsular shrinkage between one-piece PMMA lenses and silicone lenses with PMMA haptics. We would like to point out, however, the absence of any randomisation prior to IOL insertion and the different surgical approaches used in this study[5] in terms of wound type and location. Furthermore, silicone lenses with PMMA haptics were not available to us at the time of our study.

In short, it is clear that capsular phymosis is a rare and probably multifactorial condition, which appears to be more common in predisposed eyes. Despite the absence of a randomised clinical trial, it would be wise clinical judgement to consider using one-piece rigid PMMA lens designs in high-risk eyes. Wong *et al*. made a valid point regarding randomisation; however, the additional analysis we present in these comments indicates that caution should be exercised when choosing a silicone lens implant with polypropylene haptics in eyes at risk.

The authors would like to thank Wong *et al*. for their comments on the phenomenon of capsular phymosis, which, in most cases, appears to be an interesting observation but only rarely a serious clinical challenge.

References

1. Zambarakji HJ, Rauz S, Reynolds A, Joshi N, Simcock PR, Kinnear PE. Capsulorhexis phymosis following uncomplicated phacoemulsification surgery. Eye 1997;11:635–8.
2. Joo C-K, Shin J-A, Kim J-H. Capsular opening contraction after continuous curvilinear capsulorhexis and intraocular lens implantation. J Cataract Refract Surg 1996;22:585–90.
3. Hansen SO, Crandall AS, Olson RJ. Progressive constriction of the anterior capsular opening following intact capsulorhexis. J Cataract Refract Surg 1993;19:77–82.
4. Davison JA. Capsule contraction syndrome. J Cataract Refract Surg 1993;19:582–9.
5. Gonvers M, Sickenberg M, van Melle G. Change in capsulorhexis size after implantation of three types of intraocular lenses. J Cataract Refract Surg 1997;23:231–8.
6. Masket S. Post-operative complications of capsulorhexis. J Cataract Refract Surg 1993;19:721–4.
7. Apple DJ, Soloman KD, Tetz MR, *et al*. Posterior capsule opacification. Surv Ophthalmol 1992;37:73–116.

H.J. Zambarakji
S. Rauz
A. Reynolds
N. Joshi
P.R. Simcock
P.E. Kinnear
Department of Ophthalmology
Charing Cross Hospital
London W6 8RS, UK

H.J. Zambarakji ✉
Department of Ophthalmology
Chelsea and Westminster Hospital
London SW10 9NH, UK