Phakodonesis

A sign of incipient lens displacement

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Tremulousness of the lens on movement of the eye was observed by D'Ombrain (1936) in a patient with a mature cataract after an attack of iridocyclitis. He described the tremulousness of the lens as being of the same quality as iridodonesis, but in the absence of iridodonesis he could not consider the lens to be dislocated. He suggested that the tremulousness was caused by a fluid vitreous, and for this reason did not proceed with cataract extraction.

One might add inflammatory degeneration of the zonule as being a contributory factor.

Bellow (1944) described as *cataracta tremulans*, a movement of the lens in which hypermaturity and shrinkage have caused stretching of the zonule. In such cases the lens is found in its normal location in the patellar fossa. Bellows (1944) also described a vibrating lens in which, although the lens remained in its normal position, the anterior chamber was deepened and changes occurred in the vitreous; these cases were associated with retinal detachment.

Irvine (1940) quoted two cases of tremulous lenses associated with pseudocapsular exfoliation without further details.

No other reference to isolated movements of the lens has been found in the literature.

Tremulousness of the lens has been observed in nine eyes of seven patients, and the factors necessary to produce the condition have been studied, and its significance considered. The term "phakodonesis" is suggested as most suitable to describe it.

Material and Methods

Phakodonesis was considered to be present if, on slit-lamp examination, the whole lens trembled upon movement of the eye, but the signs of actual lens displacement were absent—namely; separation of the iris and lens, iridodonesis, and vitreous anterior to the lens. Movement of the whole lens was also distinguished from movement of the nucleus alone, as occurs in a Morgagnian cataract.

After phakodonesis had been seen for the first time, it was routinely looked for in 300 patients undergoing cataract operations and in the fellow eyes of 195 patients with displacement of the lens.

Nine eyes exhibiting this sign were observed in seven patients attending the Eye Department of Baragwanath Hospital and St. John's Eye Hospital, Johannesburg of whom four (six eyes) underwent cataract extraction. The patients were followed up for a maximum period of 13 months.

Results

These are listed in the Table (overleaf). Pseudocapsular exfoliation (PCE) was noted as + if moderate and ++ if very advanced.

Table Particulars of seven cases

Case no.	Age (yrs)	Sex	Eye no.	Vision	Lens	PCE	Iris	Ocular tension (mm. Hg)	Incision	Extraction	Vitreous	Visual acuity with +10 D sph.	Follow-up (mths)
1	60	M	1 Left	Perception of light	Mature cataract phakodonesis	—	—	8	von Graefe	Intracapsular Cryophake	Nil	6/24	4
			2 Right	Perception of light	Mature cataract phakodonesis	—	—	12	<i>Ab externo</i>	Intracapsular Cryophake	Nil	6/36	4
2	66	M	3 Right	Perception of light	Mature cataract posterior subluxation	+	Irido-donesis	22	<i>Ab externo</i>	Intracapsular Forceps	Nil	6/24	3
			4 Left	Hand movements	Mature cataract phakodonesis	+	—	18	<i>Ab externo</i>	Intracapsular Cryophake	Nil	6/18	3
3	73	M	5 Right	6/36	Immature cortical phakodonesis	+	—	13	—	—	—	—	5
			6 Left	Perception of light	Not seen because of corneal opacity	—	—	—	—	—	—	—	—
4	70	M	7 Right	Hand movements	Immature nuclear phakodonesis	+	—	19	<i>Ab externo</i>	Intracapsular Cryophake	Nil	6/18	3
			8 Left	Hand movements	Immature nuclear phakodonesis	+	—	25	<i>Ab externo</i>	Intracapsular Forceps	Nil	6/24	3
5	68	M	9 Right	6/36	Immature cortical Posterior subluxation	++	Irido-donesis	36	—	—	—	—	6
			10 Left	Hand movements	Immature cortical phakodonesis	++	—	38	—	—	—	—	6
6	70	M	11 Right	Hand movements	Immature cortical phakodonesis	++	—	35	<i>Ab externo</i>	Intracapsular Forceps	Nil	6/24	13
			12 Left	6/36	Immature cortical Posterior subluxation	++	Irido-donesis	40	<i>Ab externo</i>	Intracapsular Cryophake	Nil	6/36	13
7	61	M	13 Right	Hand movements	Immature cortical <i>in situ</i>	+	—	24	—	—	—	—	—
			14 Left	Perception of light	Immature cortical phakodonesis	+	—	52	<i>Ab externo</i>	Intracapsular Forceps	Nil	—	1 week

Discussion

The first patient in whom phakodonesis was observed was a 60-year-old man with bilateral mature tremulous cataracts. The significance of this observation was not fully appreciated until the operation on the first eye (1); displacement of the lens occurred after a von Graefe section, and the lens was removed intracapsularly with a cryophake, luckily without vitreous loss. At the operation on the second eye (2), a careful *ab externo* incision was made and the lens was extracted with a cryophake. There was minimal zonular attachment, the lens coming straight out. There was no vitreous complication and chymotrypsin was not used.

This case would seem to fit the description of Bellows's "cataracta tremulans" and of D'Ombraïn's "tremulousness". In the absence of an unduly fluid vitreous, zonular degeneration and stretching are the probable cause of phakodonesis. If the lens is so loosely tethered it is difficult to explain the absence of iridodonesis—the irides in this case were normal and dilated freely. This was the only case of the 300 examined which occurred with a mature cataract alone; 60 per cent. were mature or hypermature. Phakodonesis is therefore uncommon and probably represents a transitory stage before actual displacement occurs.

The remaining six cases (Eyes 4, 5, 7, 8, 10, 11, and 14) were all associated with pseudo-exfoliation of the lens. In three of these eyes (10, 11, and 14), the exfoliative process was advanced and the intraocular pressures raised (to 38, 35, and 52 mm. Hg respectively). In four eyes (4, 5, 7, and 8), the exfoliative changes were mild and the intraocular pressures were between 13 and 25 mm. Hg. In six eyes (5, 7, 8, 10, 11, and 14) there were early lens opacities, but none near maturity. One eye (4) had a mature cataract.

In Eyes 11 and 8 cataract extractions were performed using forceps alone; in both the zonule was extremely weak and the lenses were taken straight out, manipulation not being necessary.

In Eyes 4 and 7 a cryophake was used and again the zonule was extremely weak and the lenses were pulled straight out. There was no vitreous complications and postoperative examination on the slit lamp showed an intact vitreous face with no abnormal fluidity in all cases.

These observations would seem to confirm that the zonule is extremely weak in eyes with pseudocapsular exfoliation where phakodonesis has been noticed, and also that the main cause of tremulousness is degeneration of the zonule and not increased fluidity of the vitreous.

The absence of associated iridodonesis may be explained by an increase in rigidity of the iris infiltrated by pseudocapsular material.

Three of the fellow eyes (3, 9, and 12) with pseudocapsular exfoliation exhibited actual displacement of the lens. Pseudocapsular exfoliation is considered to be a specific cause of secondary lens displacement. It therefore seems reasonable to conclude that, when a tremulous lens has been seen, actual displacement may subsequently occur either spontaneously or with a mild degree of trauma.

Phakodonesis as a sign of incipient lens displacement is significant and its recognition may be taken as an indication for lens extraction, before actual displacement makes surgery more difficult. If surgery is to be performed, suitable precautions may be taken to prevent uncontrolled displacement and possible vitreous complications. Fluid vitreous and vitreous complications are, however, unlikely and the surgical prognosis is good. The final visual acuity obtained using a standard +10 dioptre correction was 6/18 in two eyes, 6/24 in three and 6/36 in one.

Summary

- (1) Tremulousness of the lens is discussed and described with reference to nine eyes.
- (2) The main cause is considered to be degeneration of the zonule, sometimes, but rarely associated with a mature cataract and more particularly with pseudocapsular exfoliation of the lens.
- (3) Fluid vitreous does not seem to be an important factor.
- (4) Lens displacement is likely to occur in these cases and tremulousness of the lens thought to be the earliest sign of future displacement.
- (5) The term phakodonesis is suggested to describe the condition.
- (6) The surgical prognosis is good.

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References

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