Senile pseudoexfoliation in aphakic eyes

ALEXANDER B. RADIAN AND ANA LUCIA RADIAN

From the Department of Ophthalmology, Bacau Hospital, Bacau, Romania

Numerous hypotheses have been advanced about the chemical nature and origin of pseudoexfoliative material since the original description of Lindberg (1917) and the detailed clinical study of Vogt (1921). Neither electron-microscopy studies nor the histochemical and histoenzymatic researches conducted in recent years have succeeded in elucidating the source of the exfoliative material.

The following three cases are rare examples of pseudoexfoliation but their features may lead to a better understanding of this syndrome.

Case reports

CASE 1

A 46-year-old man, was admitted to our department in 1964, with presenile cataract in the right eye. The visual acuity was perception of light. The intraocular pressure using the Goldmann applanation tonometer was 12 mm Hg. Clinical and laboratory investigations showed tonsillar infection and a 6 per cent eosinophilia. On 13 November 1964, intracapsular lens extraction was performed with the cryo-pencil preserving a round pupil. Preoperatively there was no evidence of pseudoexfoliation. The patient was discharged with right corrected vision 5/6.

In 1972 he returned, this time with a mature cataract in the left eye. He was then 54 years old. Increased eosinophilia still persisted (7 per cent), and the blood pressure was 150/80. Although no capsular remnants were found, the pupillary border in the right eye showed numerous Busacca deposits and similar whitish corpuscles. They were seen more clearly after mydriasis. At that time the intraocular pressure in the right eye was 28 mm Hg. The left eye had developed a mature cataract but no sign of pseudoexfoliation was present either at the pupillary border or on the lens capsule. Nine months after intracapsular lens extraction, the left eye was examined by us and there was no evidence of senile pseudoexfoliation, but 16 months after surgery, Busacca corpuscles were noted on the pupillary border and anterior hyaloid, and the intraocular pressure rose to 32 mm Hg. Frequent instillations of 3 per cent pilocarpine and Diamox given daily failed to control the intraocular pressure.

CASE 2

A 58-year-old man was admitted to our department on 21 November 1969 with a mature cataract in the left eye. Two years previously, he had undergone surgery for a gastric ulcer. Otherwise he was in good health.

The visual acuity in the left eye was hand movements and on 27 November 1969 an intracapsular lens cryo-extraction with round pupil was performed. On the sixth postoperative day, the anterior chamber was flat. Full mydriasis was obtained by atropine-cocaine-neosynephrine drops, and oral glycerol and Diamox were given daily. Slit-lamp examination did not reveal any sign of senile pseudoexfoliation. The anterior chamber gradually re-formed and the patient was discharged on 16 December with corrected vision in the left eye of 5/4.

In January 1974, the patient returned with a mature cataract in the right eye. On examining the left eye, Busacca deposits were found to be present on the pupillary border and the intraocular pressure was 16 mm Hg. No pseudoexfoliative material had been present in the right eye before surgery.

CASE 3

A 73-year-old man was admitted to hospital in 1971 with open-angle glaucoma and cataract in the right eye. Slit-lamp examination showed numerous Busacca deposits on the pupillary border. Cyclodialysis was performed and 2 months later an intracapsular lens extraction was done.

Of particular interest to us was the left eye which had suffered a severe blow in the first world war, after which it became blind. At that time the lens was dislocated into the vitreous chamber lying on the inferior part of the retina. No pseudoexfoliative material could be seen around it but numerous Busacca deposits adhered to the vitreous face in the pupillary area, in the region of the inferior traumatic coloboma, and on the pupillary border.

Comment

The presence of pseudoexfoliative material on the anterior hyaloid was noted as part of the senile pseudoexfoliative syndrome (Arnesen, Sunde, and Schultz-Haut, 1963; Dvorak-Theobald, 1954; and Malling, 1923). This fact was histologically con-

firmed by Sunde (1956). Feyler (1969) reported Busacca flecks on the pupillary border before intracapsular lens extraction and found them again on the hyaloid membrane immediately after surgery.

These findings differ from our first and second patients as neither Busacca corpuscles nor pseudoexfoliative material was seen on the lenses of the eyes which underwent cataract extraction. These eyes were examined under full mydriasis before, and immediately after, surgery—a fact that must be emphasized because pseudoexfoliation can be overlooked if slit-lamp examination is performed with undilated pupils (Aasved, Borgman, Lothholtz, 1969; Gifford, 1956; Irvine, 1940; Layden and Shaffer, 1974; Roche, 1968). After a variable length of time—7 years for the right eye and 16 months for the left eye in the first patient, and 3·5 years in the second patient, the presence of pseudoexfoliative material on the hyaloid and pupillary border was typical.

We have been able to find only one similar case in the literature (Gifford, 1956). We reproduce his description:

'Figure 5 however shows material deposited 18 months after a cataract operation. There was no exfoliated material on the hyaloid from October 1954 until November 1955. Since that date, dusting on the hyaloid has increased and tension has risen from 20 to 32 mm Hg. Exfoliated material has appeared in the region of the iris coloboma. This was thought by Dr Sunde to be impossible and it was not found in any of his cases'.

The idea that whitish deposits, which are characteristic of senile pseudoexfoliation, are produced by the lens was first advanced by Vogt (1925), who had in mind a lens degeneration as the starting point of the disease. Bertelsen, Drablos, and Flood (1964) demonstrated that pseudoexfoliative material is produced by the cells of the lens epithelium, in the germinative region near the equator. They saw the material accumulating under the capsule and it eventually produced distinct flecks. Subsequent control studies performed by Bertelsen and Ehlers (1969), Dark, Streeten, and Jones (1969), and Larsen (1969) confirmed this view, thus supporting the new name put forward by Bertelsen 'fibrilopathia epitheliocapsularis'.

On the other hand, the electron micrographs of Ashton, Shakib, Collyer, and Blach (1965a) did not reveal any exfoliative fibrils within or between the cells of the lens epithelium. Only a fibrogranular band in the inner half of the capsule was found in the anterior equator region, which was thought to be degenerative in nature, characteristic of the pseudoexfoliative syndrome, but not sufficient to

explain the formation of flecks. It is stated in the second part of their work (Ashton, Shakib, Collyer, and Blach, 1965b) 'granular filaments similar to exfoliative material were found in the stroma of the iris, especially around the vessels where they were abundant'. The histochemical resemblance of the substance which forms the adventia of the iris vessels and the whitish flecks of pseudoexfoliation is underlined in the works of Layden and Shaffer (1974) and Onofrei, Radian, Stoica, and Serbanescu (1973). A most striking fact is the finding of 'similar but less prominent deposits . . . in the adventia of the conjunctival vessels near the limbus (by Layden and Shaffer, 1974) and in the vessels in the palpebral conjunctiva (Ringvold, 1973).

Our first and second cases prove that senile pseudoexfoliation can occur long after intracapsular extraction of the lens. Radian, Radian, and Rusei, (1973) showed that, in 18 of 28 eyes, pseudoexfoliative material was present one year after lens extraction and in two of these eyes it had increased in amount, despite the fact that lens delivery had been performed *in toto*.

The third case demonstrates the lack of correlation between pseudoexfoliative deposits on the anterior hyaloid and the presence of a lens in the pupillary area.

These clinical observations do not support the assumption that the lens is the only source of pseudoexfoliative material. We must conclude that senile pseudoexfoliation is not a syndrome aetiologically related to the lens and lens extraction as a method of preventing evolution of glaucoma capsulare (as proposed by Bhaduri, 1949; Gillies, 1973; Sampaolesi, 1959; Zlatar, 1965) is not effective. Before the term 'senile pseudoexfoliation' is replaced more research is needed to identify the chemical nature and source of the pseudoexfoliative material.

Summary

In three eyes which underwent cataract extraction no evidence of senile pseudoexfoliation was found either before, or immediately after, surgery in spite of repeated biomicroscopical examination under full mydriasis. Years later pseudoexfoliative material was found on the anterior hyaloid and on the pupillary border. In another case, wherein the lens was traumatically dislocated and had lain in the inferior vitreous chamber for 53 years, pseudoexfoliative material was present on the anterior hyaloid, but not in the vitreous.

Collating these clinical observations with data from electron and light microscopy studies, the authors refute the assumption that lens epithelium is the source of pseudoexfoliative material.

References

- AASVED, H., BORGMAN, H., and LOTHOLTZ, K. F. (1969) *Klin. Mbl. Augenheilk.*, **154**, 443
- ARNESSEN, K., SUNDE, O. A., and SCHULTZ-HAUT, S. D. (1963) *Acta ophthalm. (Kbh.)*, **41**, 80
- ASHTON, N., SHAKIB, M., COLLYER, R., and BLACH, R. (1965a) *Invest. Ophthalm.*, **4**, 141
- (1965b) *Ibid.*, **4**, 154
- BERTELSEN, T. I., DRABLOS, P. A., and FLOOD, R. R. (1964) *Acta ophthalm. (Kbh.)*, **42**, 1096
- and EHLERS, N. (1969) *Ibid.*, **47**, 476
- BHADURI, B. N. (1949) *Proc. All-India ophthalm. Soc.*, **10**, 55
- DARK, A. J., STREETEN, B. W., and JONES, D. (1969) *Arch. Ophthalm.* **82**, 815
- DVORAK-THEOBALD, G. (1954) *Amer. J. Ophthalm.*, **37**, 1
- FEYLER, H. (1969) *Klin. Mbl. Augenheilk.*, **155**, 391
- GIFFORD, H., JR. (1956) *Amer. J. Ophthalm.*, **46**, 508
- GILLIES, W. E. (1973) *Brit. J. Ophthalm.*, **57**, 46
- IRVINE, S. R. (1940) *Arch. Ophthalm.*, **23**, 138
- LARSEN, J. S. (1969) *Acta ophthalm. (Kbh.)*, **47**, 676
- LAYDEN, W. E., and SHAFFER, R. N. (1974) *Amer. J. Ophthalm.*, **78**, 835
- LINDBERG, J. G. (1917) Kliniska undersökningar över depigmentering av pupillarranden och genomlysbarhet av iris vid fall av alderstarr samt i normala ögen hos gamla personer. Diss., Helsingfors
- MALLING, B. (1923) *Acta ophthalm. (Kbh.)*, **1**, 97
- ONOFREI, T., RADIANT, A. B., STOICA, E., and SERBANESCU, C. (1973) *Oftalmologia (Buc.)*, **17**, 345
- RADIANT, A. B., RADIANT, A. L., and RUSEI, M. (1973) *Ibid.*, **17**, 239
- RINGVOLD, A. (1973) *Acta ophthalm. (Kbh.)*, **51**, 411
- ROCHE, J. (1968) *Brit. J. Ophthalm.*, **52**, 265
- SAMPAOLESI, R. (1959) *Ann. Oculist. (Paris)*, **192**, 839
- SUNDE, O. A. (1956) *Acta ophthalm. (Kbh.)*, **45** suppl.
- VOGT, A. (1921) 'Atlas der Spaltlampenmikroskopie des lebenden Auges'. Springer, Berlin
- (1925) *Klin. Mbl. Augenheilk.*, **75**, 1
- ZLATAR, P. (1965) *Ophthalmologica (Basel)*, **150**, 175