IATROGENIC ENDOTHELIAL DAMAGE DURING CATARACT EXTRACTION

(Leyden)

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ABSTRACT

Morphological changes in the endothelium of rabbits' corneas after rinsing with Ringer's solution, chymotrase 0.05% or acetylcholine could not be demonstrated by vital staining with nitroblue tetrazolium.

Local lesions caused by manipulations in the anterior chamber were conspicuous.

Endothelial lesions due to manipulations with an intra-ocular lens were studied in the same way.

INTRODUCTION

To become more aware of the possible iatrogenic endothelial damage occurring during cataract extraction, some series of experiments were performed on rabbits, in which one part of a cataract extraction was carried out on the left eye of the experimental animal, while the right eye served as control. Table 1 gives particulars about the number of rabbits per series of tests and the part of the cataract operation which was being studied.

MATERIAL AND METHODS

For the first two series of tests chinchilla rabbits were used weighing 2 - 3 Kg. For the other series random animals were used of varying weights and ages.

All the steps were performed as carefully as possible under the operation microscope and an exact report of each case was made in which special difficulties or anything unusual were noted.

After the animal had been killed with an overdose of thiopental (Pentothal) sodium, the anterior chamber was opened with a small incision at the limbus. Through a fine anterior chamber cannula in this incision the chamber was then rinsed out for 5 minutes continuously with Ringer's solution obtained from ampoules. Directly afterwards the eye was enucleated and the cornea freed via a scleral incision in the same way as the cornea
of a donor eye for corneal transplantations. Great care was taken that the anterior chamber did not empty during these steps. The chamber angle was then pulled free, after which the cornea was placed on a Teflon punchblock and four 6 mm trephine specimens were punched out. These were stained with nitroblue tetrazolium, an enzyme stain with which only living endothelial cells stain blue.

The most important result of these first two series was that this experimental set-up produced no evidence of abnormalities on the cellular level. Neither did cell-counts per unit of surface area reveal any significant difference between the eye which had been rinsed with Ringer’s solution and the control eye.

Several 6 mm trephine specimens from the left and right eyes were cultivated by Dr. Dandrieux and a standard lesion on the endothelial side was inflicted by a method described in 1975 (Lopes Cardozo et al.). The regeneration speed of the endothelium of the rinsed and the control eyes were then measured; again no significant difference was found.

These findings made the severity of the lesions made locally in spite of the use of the operation even more striking.

Fig. 1 shows a 6 mm corneal trephine specimen enlarged 40 x; the local lesion made by the contact between the rinsing cannula and the endothelium is obvious.

Fig. 2 shows another 6 mm corneal trephine specimen enlarged 40 x. In this photograph the endothelial damage can be seen caused by directing the stream of fluid towards the endothelium instead of in the plane of the iris. As the rabbit cornea is very limp the specimens folded double several times when they were being freed; in Fig. 3 the curved defects where the two layers of endothelium touched are visible.