Fibrin Sealant in the Treatment of Perforating Injuries of the Anterior and Posterior Lens Capsule

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Abstract

A microsurgical method has been developed, experimentally tested and clinically applied in perforating injuries of the lens. Removal of the damaged lens matter and closure of the capsule wounds with a human fibrinogen concentrate resulted in a high percentage of the patients in maintenance or restoration of the clear lens with a circumscribed scar in the lesion area. Even extended subcapsular traumatic rosettes disappeared in the long term, if the capsule wounds were successfully sealed. The surgical technique in the anterior lens capsule and in through-and-through perforation is described, and an analysis of the results in the first consecutive series of 31 patients treated is given with special reference to the time interval between injury and fibrinogen application, age of patients, extent of capsule lesions and technique of fibrinogen application.

Introduction

Until now, the surgeon's role in perforating injuries of the lens capsule has been just to wait, to hope for the rare favourable course of spontaneous healing and later to remove the traumatic cataract in most patients. Spontaneous healing of the capsule wound with restoration of a useful visual acuity was observed by us in 11 out of 131 perforating injuries with lens lesions (= 7.6%). An analysis of these spontaneously favourable courses gave a hint as to the role of iris trauma and spontaneous protein exsudation. Extended experimental research proved that fibrinogen application could markedly support the healing of lens capsule wounds. Several microsurgical application techniques were developed. Clinical application was started in early 1982.

Many ophthalmic surgeons do not believe that wounds of the lens capsule may heal. Again and again they have seen that even small capsule lesions usually result in progressive traumatic cataract. The posterior capsule even has no epithelium at all. That is the background to the widespread feeling that this is a hopeless situation. However, spontaneous healing has been observed and reported by a number of authors during the past 100 years, and a detailed evaluation was given by Duke-Elder [6].
Patients, Indications and Application Techniques

This is an analysis of the first consecutive series of 31 patients with perforating injuries of the lens capsule, treated in 1982–1984. Microsurgical fibrinogen-sealing of capsule wounds was routinely applied in all patients who where admitted to our hospital and had an anterior lens capsule perforation or a through-and-through lens perforation (anterior and posterior capsule, e.g. intraocular foreign bodies). The method was not applied if symptoms of sufficient spontaneous healing were found or diffuse damage of the lens (apart from the lesion site) was already visible at slit-lamp examination. Some patients had a spontaneous scar formation initially, but later on this proved insufficient and we decided to apply fibrinogen despite the delay.

Application Technique

The Duploject device is not suitable for our purposes. We need 0.01–0.02 ml fibrinogen. A reliable 1:1 mixture of fibrinogen and thrombin cannot be achieved with the Duploject in such small quantities. Therefore, we had to apply both fluids successively. It is nearly impossible to feel the necessary small syringe piston movement, and it is nearly impossible to see the unclotted, clear fibrinogen within the aqueous humour. Stained samples of the fibrinogen glue are now on test, but were not available in the mentioned period. Thus we took care that the syringe was filled only with the desired amount, but had to make sure that the needle volume was regarded. Usually some degenerated lens matter already protrudes through the capsule wound. This is removed using suction with a blunt needle. Then, thrombin S is injected with a blunt needle, the tip located far from the capsule lesion. Subsequently the fibrinogen is directly applied to the lesion site. Uncotted fibrinogen must reach and overlap all exposed lens cortex and capsule edges. The fibrinogen should not reach the chamber angle or the corneal endothelium, and the margin of the pupil should remain fibrinogen-free for at least half of its circumference. This can be achieved by the mentioned limitation of the fibrinogen amount.

In through-and-through perforations of the lens, initially we treated the anterior capsule wound only, because we did not have a technique for the posterior capsule defect and wanted to learn about the effectivity of vitreous tamponade. Later on, we approached the posterior defect via basal iridectomy, introducing a blunt, bent needle beside the lens equator. This technique did not enable us to remove all swollen lens matter from the posterior lesion area. Finally, we approached the posterior wound by injection of the fibrinogen through the lens perforation channel with the blunt needle placed in the cortex level at the anterior lesion. In this way, the degenerated lens matter at the posterior capsule perforation is pressed into the posterior chamber together with a small amount of the fibrinogen. It forms a clot between the lens and vitreous and this becomes absorbed within a few days.