Routine Evaluation of Endothelium in Human Donor Corneas

F. Bigar1*, B. Schimmelpfennig1, and R. Gieseler2

1 University Eye Clinic (Head: Prof. R. Witmer), CH-8091 Zurich, Switzerland and
2 WILD-LEITZ, Zurich, Switzerland

Summary. Specular microscopy allows a direct evaluation of the corneal endothelium in intact donor eyes. It is therefore superior to previous methods for assessing donor material for penetrating keratoplasties. In a study of 278 eyes (139 donors) 226 could be examined by specular microscopy without any preparatory major manipulations. Twenty-four pairs and 12 single eyes (27%) of the 226 corneas were considered not suitable for grafts according to their morphologic endothelial changes. The discarded eyes were found all normal at conventional slit-lamp examination. Specular microscopy of the endothelium was not possible in 52 eyes as the corneal swelling was already too advanced.


1. Introduction

Successful penetrating keratoplasties depend on the viability of the donor endothelium. The endothelial cells act as a fluid barrier and pump, guaranteeing dehydration and clarity of the cornea. An evaluation of the quality of donor tissue is therefore an evalu-
tion of the condition of the endothelium. Slit-lamp examination of donor eyes is of limited value in an eye bank. Epithelial and stromal scars can be recognized by biomicroscopy whereas it is not possible to detect with certainty endothelial changes in enucleated eyes because of too little magnification and existence of folds in Descemet's membrane. Vital stains with trypan blue [1] or lissamine green [2] for evaluation of donor endothelium have been suggested as indicators of viability. The tests are performed on the excised cornea which represents a danger of damaging the endothelial cells during the manipulations. The histochemical method of Kaufman et al. [3] employing paranitroblue tetrazolium has increased the knowledge of endothelial changes in corneas. This method cannot be used as a routine procedure in Eye Banks as the tissue is frozen before staining and renders the corneas useless for surgery. A technique of direct visual examination of the endothelium through the cornea of the intact donor eye with the specular microscope of Maurice [4] has been indicated by Hoefle et al. [5]. A report on the diagnostic value of this method has never been published. It was therefore of interest to perform a study to evaluate a series of donor eyes by high power specular microscopy in order to check the suitability of corneas for penetrating keratoplasties based upon their endothelial morphology.

II. Methods and Material

Donor eyes obtained through the Zurich Eye Bank are put in gas-sterilized plastic containers with a screw cap. The top plate has a central hole of 11 mm in diameter. Around the periphery of the top plate is a collar to hold sterile saline. The globe is placed intact