Development of a Risk Calculator to Predict Outcomes after Penetrating Keratoplasty

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Purpose

To investigate recipient risk factors related to graft rejection and failure after penetrating keratoplasty (PK) and to develop a risk calculator to predict these outcomes based on the presence of various factors.

Methods

This retrospective chart review study identified 1029 transplants in 903 eyes of 835 patients who underwent PK at the Wills Eye Hospital Cornea and External Disease Service from May 1, 2007 to September 1, 2018. Rejection was defined as the presence of either at least one keratic precipitate or anterior chamber inflammatory cells, and graft failure as irreversible visually-significant graft edema or haze. The association of baseline factors with graft rejection and failure events was assessed by multivariate Cox models accounting for correlated data. A model to predict graft outcomes given the presence of patient variables was created using these results.

Results

Mean follow-up was 4.22±3.05 years, 35% of grafts had ≥1 rejection episode, and 37.4% of grafts failed. Significant pre-operative recipient factors for rejection included a history of anterior uveitis/endophthalmitis (hazard ratio [HR]=1.83), any neovascularization (NV, HR=1.75), and prior PK in the contralateral eye (HR=1.34) (all $p<0.05$). Risk factors for failure included history of systemic autoimmune disease (HR=2.77), prior glaucoma surgery (HR=1.73), any anterior synechiae (HR=1.52), and increasing quadrants of NV (HR=1.26) (all $p<0.05$). With this data, we constructed a model that predicted the probability of graft rejection-free survival and overall survival at 5 years after PK.

Conclusion

PK graft prognosis may be modeled based on the presence of recipient risk factors. Although based on retrospective data, such information would be valuable for comprehensive patient counseling prior to corneal transplantation.