

Diabetic macular edema is the most common cause of visual impairment in diabetic patients. Precise pathophysiology of diabetic macular edema is unclear and seems to be multifactorial and includes pericyte loss, microaneurysm formation, basement membrane thickening and focal closure of the capillary bed, vitreomacular traction, and ultimately breakdown of the blood-retinal barrier with increased vascular permeability. Risk factors for clinical significant diabetic macular edema are hyperglycemia, hypertension, hyperlipidemia, duration of diabetes, and pregnancy. The increasing number of individuals with diabetes worldwide suggests that diabetic macular edema will continue to be major contributors to vision loss and associated functional impairment in the working-age population of most developed countries. Although eyes with diffuse macular edema carry a particularly poor prognosis despite laser photocoagulation, laser treatment is still the first choice of treatment for diabetic macular edema as it is safety and less invasive than other surgical options. Diffuse diabetic macular edema is characterized by diffuse leakage from extensive areas of the posterior retinal capillary bed, a scarcity of hard exudates, and often the formation of cystoid spaces. Focal macular edema, in contrast, is characterized by focal leakage from microaneurysms and dilated capillary segments and is more responsive to laser photocoagulation. Laser photocoagulation for diabetic macular edema is mainly sight preserving and not sight resorting. The failure of laser photocoagulation in a substantial subgroup of patients has prompted interest in other treatment methods, including surgical treatment with vitrectomy with or without peeling of the internal limiting membrane, and application of the intravitreal steroids. In conclusion:

1. The findings of our first study in agreement with previous studies support the effectiveness of vitrectomy with or without internal limiting membrane peeling in resolving diabetic macular edema in majority of eyes. This however, is not always associated with visual acuity improvement. Better outcomes were achieved in eyes with evident vitreomacular traction and with short duration of the edema. The discrepancy between anatomic and functional results may relate to irreversible changes of the macula due to long-standing macular edema, therefore optimal timing of the surgery seems to be important prognostic factor. We confirm that DME is good indication for vitrectomy, especially in eyes with vitreomacular traction by the adherent thickened posterior hyaloid following a partial posterior vitreous detachment. Eyes with attached posterior hyaloid in the macular region, but without thickening and without traction on the macula and eyes with detached posterior hyaloid could also benefit (but in less percentage) from vitrectomy. Vitrectomy might involve the multifactorial pathogenesis of diabetic macular edema.
2. The findings of our second pilot study demonstrated that in eyes with diabetic macular edema, refractory to laser treatment and without evident epimacular proliferation, vitrectomy without internal limiting membrane peeling was as effective in reducing the foveal thickness and improving the visual acuity as vitrectomy with internal limiting membrane peeling. We conclude that peeling of the internal limiting membrane is not essential for anatomic and visual success in diabetic macular edema surgery. Internal limiting membrane peeling might be indicated on a case- by- case base, not as a standard procedure during vitrectomy for diabetic macular edema. Furthermore iatrogenic macular hole or lamellar defect can be associated with ILM peeling in eyes with large cystoid spaces composed of thin inner retinal layer.
3. In our third study and in according with previous studies we found that application of triamcinolone acetonide into the vitreous cavity at the end of vitrectomy may have a positive effect in reducing the macular edema and improving the visual acuity, however the complications of triamcinolone may include serious complication as endophthalmitis. Vehicle removal and triamcinolone application must be performed under strict sterile conditions. Because of the novelty of this therapy, one has to be very careful since longterm

experience has not been available yet. There are many questions unanswered yet, such as the optimal dosage, the mode of application, are there other complications than those already reported? Is it necessary to remove the solvent agent prior to the intraocular injection and how should be removed.

4. In our fourth study and in agreement with previous studies we conclude that enhanced thickening of the internal limiting membrane and cell abundance on the its vitreous surface might contribute to the course and the pathogenesis of diabetic macular edema and idiopathic macular hole.

5. Vitrectomy and creating of posterior vitreous detachment for diabetic macular edema refractory to laser treatment might be more effective than traditional management of observation or further laser and might offer a longer lasting effect than injection of triamcinolone. These surgical results have made us considerably reduce the use of laser photocoagulation for diabetic macular edema and decide for earlier intervention in selective cases. However, one should keep in mind that vitrectomy requires a significant surgical intervention with its inherent risks, recovery time, and expense.