SURGICAL TREATMENT FOR IDIOPATHIC EPIRETINAL MEMBRANE

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SUMMARY

Aim: To assess effectiveness of surgical treatment for idiopathic epiretinal membrane.
Material and methods: Retrospective study included on 44 eyes out of 46 patients operated for idiopathic ERM in OFTAL Zvolen with a 20G PPV (32 patients) and posterior vitreous membrane ablation and 23G PPV (14 patients) from August 2008 to December 2014. After the extraction of epiretinal membrane, a peeling of ILM has been implemented following its Blue Membrane identification. Mean follow-up time was 18 months.
Results: Best corrected visual acuity (BCVA) before the surgery was 0.37 (SD 0.15) whereas post-surgery indicated 0.63 (SD 0.25). In 35 eyes (76.1 %) was BCVA after the surgery 0,5 and better and in 2 eyes (4.3 %) was BCVA 0,16 and worse. 29 eyes (63.0 %) acquired 2 and more rows. BCVA improved in 40 eyes (87.0 %) and remained the same in 3 eyes (6.5 %). Degeneration of BCVA in 3 eyes (6.5 %) was due to retinal detachment in one case, to retinal pigment epithelium (RPE) atrophy in the second case and to ischemic optic nerve head atrophy in the last case. According to OCT, the average mean of foveal thickness before the surgery was 496 (SD 88) µm and decreased to 356 (SD 59) µm after the surgery (thus average reduction of 140 µm). In 30 eyes (65.2 %), we achieved a reduced foveal thickness of more than 100 µm, in comparison to 15 eyes (32.6 %) of less than 100 µm. In no case after the surgery did retinal thickness increase comparing to finding before the surgery. Foveal contour restitution was present in 14 eyes (30.4 %). There were no preoperative/ intraoperative complications. In 3 eyes (10.3 %) a combined cataract surgery with PPV was performed. Cataract progression was seen in 20 phakic eyes (76.9 %) out of 26 where all of them were treated surgically at an average time 13 (3–34) months after the PPV. As postoperative complication shows, a retinal detachment occurred in one eye (2.2 %) 5 months after the surgery and in 1 eye (2.2 %) a cystoid macular edema turned out as the reason of residual posterior vitreous adhesion.
Conclusion: PPV with membranectomy and internal limiting membrane peeling is a safe and effective method in idiopathic epiretinal membrane treatment. It leads to a function improvement and foveal thickness reduction in most of the patients diagnosed with IEM. Because phakic eyes conduce cataract progression (76.9 %), on older patients with no transparent lens we now perform a combination of surgical operations - pars plana vitrectomy and cataract extraction.

Key words: idiopathic epiretinal membrane, macular surgery, anatomical and functional changes

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INTRODUCTION

Idiopathic epiretinal membrane (IEM) is an avascular fibrocellular proliferation forming on the surface of the membrana limitans interna (MLI). Its prevalence is 2% in patients aged under 60 years and 12% in patients aged over 70 years (18). The symptoms of patients with ERM depend on its thickness, localisation of frilling and the presence of retinal edema. The most frequent symptoms are impaired vision and metamorphopsia. Micropsia, macropsia or monocular diplopia may also be present (13, 18).

In addition to ophthalmoscopy, optical coherence tomography (OCT) is used for the diagnosis of IEM. Long-term observation of the progression of the pathology and the effect of therapy is also appropriate. This enables determination of the extent of the membrane and its relationship to the retina, a precise quantitative determination of the thickness of the macula and the condition of the vitreoretinal interface. It also detects associated morphological changes of the individual structures of the retina (5, 6, 11, 14).

An effective method of treatment of IEM is surgical extraction, the main indication criterion of which is degeneration of the patient's visual acuity (7, 11, 13).

MATERIAL AND METHOD

This retrospective study evaluated anatomical changes in the macula according to OCT and the functional results according to CVA examined on Snellen's optotypes in patients following surgical extraction of the idiopathic epiretinal membrane. For the purposes of this study, improvement of the anatomical finding is considered to be a reduction of the thickness in the fovea by more than 100 µm. A change within the range of up to ± 100 µm is evaluated as stabilisation of the anatomical finding. Improvement of the functional finding in patients is evaluated as a gain of 1 or more rows of Snellen's optotypes, a deterioration as a loss of 1 or more rows.

The study included 46 eyes of 44 patients, of whom 19

were men and 25 women. The age of the patients at the time of the operation was 57 to 90 years, average 74 years (SD 7). 29 eyes (63.0%) from the group were phakic and 17 (37.0%) were pseudophakic. The average observation period was 18 months (1-40 months). The operations in the study cohort were performed by two surgeons. All the patients were operated on at the OFTAL institute in Zvolen, in the period from August 2008 to December 2013. 32 (69.6%) patients were operated on using 20-G PPV with ablation of the posterior vitreous membrane, 14 (30.4%) patients were operated on using 23-G vitrectomy. After extraction of the epiretinal membrane, MLI peeling was performed following its identification with Membrane Blue.

The change of CVA and thickness of the macula were evaluated using a pair t-test with a level of significance at $\alpha < 0.01$.

RESULTS

Before surgery 12 eyes (26.1%) had CVA of 0.5 or better, 30 eyes (65.2%) had CVA within the range of 0.4-0.2, and 4 eyes (8.7%) had CVA or 0.16 or worse. After surgery CVA reached 0.5 or better in 35 (76.1%) eyes. 9 eyes (19.6%) had CVA within the range of 0.2-0.4 after surgery, and only 2 eyes (4.3%) 0.16 or less. Average CVA before surgery was 0.37 (SD 0.15), after surgery this improved to 0.63 (SD 0.25), in which this concerns a statistically significant improvement ($p < 0.001$). A complete overview of visual functions is presented in table 1.

29 eyes (63.0%) gained 2 rows or more after surgery. The average gain was 2.6 rows (from -4 to +7 rows, median 2 rows). CVA improved in 40 eyes (87.0%), and remained the same in 3 eyes (6.5%). There was a deterioration of CVA in 3 eyes (6.5%), of which in 1 eye this was due to retinal detachment, in 1 eye due to manifestation of age related macular degeneration (ARMD) in the form of atrophy and in 1 eye due to atrophy of the disc of the optic nerve (DON) on an ischemic background (graph 1).

The average thickness of the macula on OCT before surgery was 496 µm (SD 88), and after surgery 356 µm (SD 59), which represents an average reduction of 140 µm ($p < 0.001$).

Before surgery 4 patients (8.7%) had thickness of the fovea of up to 400 µm, 19 (41.3%) up to 500 µm and 23 (50.0%) over 500 µm. After surgery, thickness in the fovea was reduced in 1 patient (2.2%) to less than 200 µm, in 5 patients (10.9%) to less than 300 µm, in 30 patients (65.2%) to less than 400 µm and in 9 patients (19.6%) to less than 500 µm (table 2, graph 2). In 1 eye (2.2%) the anatomical finding could not be evaluated due to occurrence of amotio retinae.

Reduction of thickness by 100 µm or more was achieved in 30 eyes (65.2%), and by less than 100 µm in 15 eyes (32.6%). Postoperative increase of thickness in the macula was not recorded on OCT in any patient. Foveal contour was renewed in 14 eyes (30.4%) (fig. 1).

No perioperative complications were recorded in the observed study cohort. Of the 29 phakic eyes, combined surgery of extraction of cataract with PPV was performed in 3 patients (10.3%). Of the remaining 26 eyes, the cataract progressed in 20 (76.9%). Phacoemulsification of the cataract with implantation of an artificial intraocular lens was performed in all eyes, at an average period of 13 months (3-34 months) after surgery.

In 1 eye (2.2%) retinal detachment occurred 5 months after surgery. In 1 eye (2.2%) cystoid macular edema occurred due to traction of the remainder of the posterior vitreous membrane. This condition required subsequent re-operation.

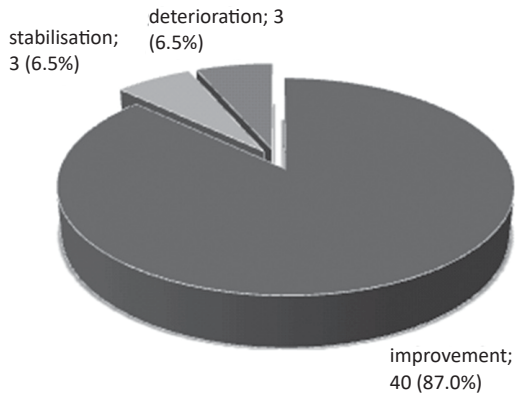
DISCUSSION

Idiopathic epiretinal membrane is an avascular cellular membrane which proliferates on the inner surface of the retina and causes various degrees of damage to sight (18). A number of studies indicate the success and safety of surgical treatment of IEM (7, 17, 18). The predisposing factors for the success of surgical treatment remain the subject of controversy. These are considered to be the length of duration of the disease, visual acuity before surgery, presence of traction and thickness of the epiretinal membrane or the presence of macular edema (10, 12). The fact remains that macular surgery is making substantial progress, and enables very economical extraction of IEM. The aim of this retrospective study is to determine the anatomical and functional changes in patients who have undergone IEM surgery.

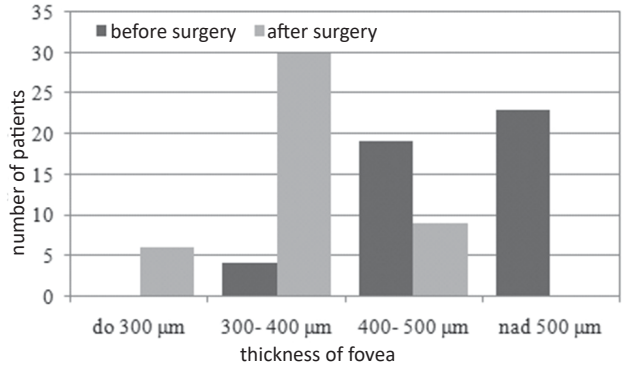
From the patient's perspective, successful surgery means an improvement of vision. In the presented study cohort as many as 93.5% of eyes recorded an improvement or stabilisation of vision. After surgery up to 76.1% of eyes had CVA of 0.5 or better. As many as 29 eyes (63.0%) gained 2 rows or more after surgery. Pascale Massin (2000) in a study including 62 eyes states an improvement of CVA by 2 rows or more in 58% of patients, and 80% of patients attained CVA of 0.4 or better, in comparison with 32% before surgery (12). Comparable results are presented by Thompson (2004), where in the observed group of 40 eyes of patients after surgery for idiopathic ERM with preoperative CVA of 0.4 or better, an improvement of 2 or more rows was recorded in 42% of pseudophakic eyes and only 14% of phakic eyes, in which an obstacle to improvement of vision was progression of a cataract which required surgical solution. After removal of the cataract CVA improved (17).

Table 1 Overview of visual functions before and after surgery

N = 46	CVA before surgery	CVA after surgery
0,5 – 1,0	12 (26,1 %)	**35 (76,1 %)**
0,2 – 0,4	**30 (65,2 %)**	9 (19,6 %)
0,16 a horšia	4 (8,7 %)	2 (4,3 %)



Graph 1 Functional changes following extraction of IEM



Graph 2 Thickness of fovea before and after extraction of IEM

ry (10), and Ting and Kwok (2005) state an improvement of the functional finding up to 1 year after surgery (8, 18). We performed such a combined operation in 3 patients from the group, in whom symptoms of a cataract which would prevent effective PPV with MLI peeling appeared before surgery. In all 3 patients the postoperative anatomical and functional finding was improved.

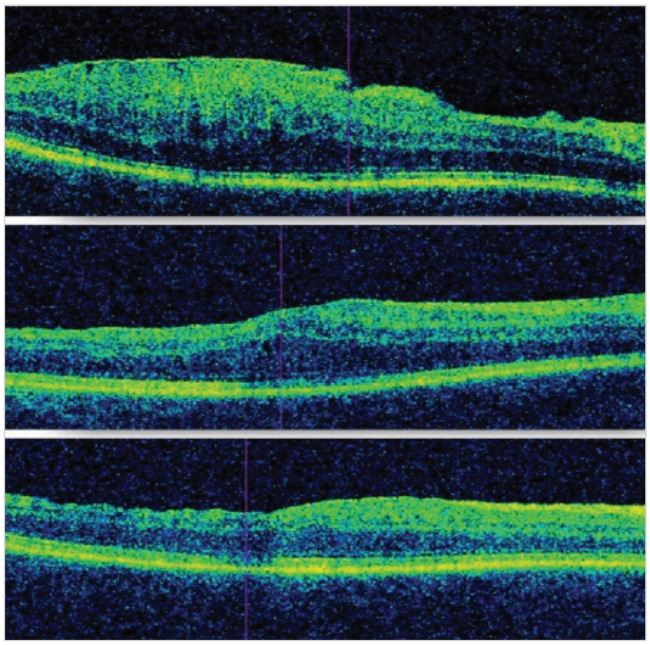


Fig. 1 OCT of patient before PPV, 2 weeks after PPV and 6 weeks after PPV

Progression of a cataract which impaired visual acuity occurred in 76.9% of 26 phakic eyes after surgery (20 eyes). Extraction of the cataract was subsequently performed in all 20 eyes, within a period of 24 months after surgery in 19 eyes and after a period longer than 2 years only in 1 eye. Progression of a cataract, above all sclerosis of the nucleus, is also stated by Pascal Massin and other authors (3, 12). Soon Il Kwon (2009) in his study performed surgery combining phacoemulsification of cataract with extraction of IEM in 18 eyes. He states better functional results in the eyes which underwent combined surgery in comparison with the eyes which underwent only vitrectomy for IEM without extraction of the cataract. He also states that 70% of patients do not attain better vision until up to 7 months after surge-

In the observed study cohort 3 patients (6.5%) had deteriorated vision after surgery. Of these patients, retinal detachment occurred in 1 patient (2.2%) 5 months after surgery. Within this time period phacoemulsification of cataract was also performed on the patient. In the literature retinal detachment is stated as a postoperative complication in 3-14% of cases (3, 7, 12). In 1 eye there was a manifestation of atrophic form of ARMD, accompanied by a deterioration of vision. In 1 eye we explain the deterioration of vision by means of an atrophy of the DON on an ischemic background, in which the postoperative finding in the macula is commensurate.

An anatomical improvement (reduction of thickness in macula by more than 100 µm) was attained in 65.2% of

Table 2 Anatomical changes in macula after extraction of IEM

Thickness of fovea (N = 46)	before surgery	after surgery
Less than 200 µm	-	1 (2,2 %)
200–300 µm	-	5 (10,9 %)
300–400 µm	4 (8,7 %)	**29 (63,0 %)**
400–500 µm	**19 (41,3 %)**	10 (21,7 %)
over 500 µm	**23 (50,0 %)**	-

eyes, and stabilisation (reduction of thickness in macula by less than 100 µm) in 32.6% of eyes, which is in accordance with the data presented in the literature (11, 14). Whereas the thickness in the macula was more than 400 µm in the majority of patients (91.3%) before surgery, after surgery this was reduced to 300-400 µm (63.0%) and 13.1% of patients attained a reduction of macular thickness to less than 300 µm. Foveal contour was renewed in 14 eyes out of 46 (30.4%). Massin (2000) states renewal of FC in 32% of cases, which is comparable data (12).

Perioperative complications referred to in the literature include in particular complications upon administration of anaesthesia, haemorrhage, failure of extraction of ERM and retinal tear. Postoperative complications include the development of a cataract, recurrence of ERM, more serious complications include retinal detachment, glaucoma or endophthalmitis (2, 18).

No perioperative complications occurred in the observed study cohort. Of the postoperative complications, in addition to the development of a cataract (76.9%) and amotio retinae (2.2%), cystoid macular edema occurred in 1 eye (2.2%) as a result of traction of the remainder of the posterior vitreous membrane. Although the condition was not the cause of immediate deterioration of vision, it required subsequent re-operation, after which the edema subsequently regressed. Recurrence of epiretinal membrane and the occurrence of macular hole following extraction of ERM are also stated in the literature as reasons for re-operation (9, 17). In justified cases, re-operation may bring an improvement of the anatomical and functional finding.

CONCLUSION

PPV with membranectomy and MLI peeling is a safe and effective method for treating IEM, which in the majority of cases leads to an improvement in the patient's vision, accompanied by a reduction of retinal thickness. The success of PPV for idiopathic ERM is evaluated on the basis of a statistically significant improvement and stabilisation of the anatomical (97.8%) and functional finding (93.5%) in a representative sample of patients, and safety is evaluated on the basis of minimal incidence of perioperative and postoperative complications which would lead to a deterioration of vision (4.4%). With regard to the fact that in the majority of phakic eyes (76.9%) progression of cataract occurs within a period of 1-2 years after surgery, it is justifiable to perform combined surgical extraction of IEM with phacoemulsification of cataracts in patients with symptoms of cataract

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