

Short Communication

Is Cystoid Macular Edema More Frequent In Vitrectomized Internal Limiting Membrane-peeled Eyes Undergoing Phacoemulsification?

Abstract

Purpose/Aim of study

We postulate that the timing of phacoemulsification (PE) relative to pars plana vitrectomy (PPV) and internal limiting membrane (ILM) peel (before, during or after) is an important risk factor for cystoid macular edema (CME).

Materials and Methods

We report a retrospective study of 43 eyes in 43 patients who underwent PPV and ILM peeling for full-thickness macular hole (FTMH). Patients with postoperative ocular coherence tomography (OCT) -proven CME with at least one cyst within the OCT field associated with increased central macular thickness (CMT) were identified.

Results

CME was noted in 6/43 patients (14%). All CME resolved with 6 weeks of topical non-steroidal anti-inflammatories and topical steroids followed by a tapering period. CME occurred in 3/8 eyes (38%) that had PE post-PPV ILM peel compared to 0/8 (0%), of the phakic group, 2/18 (11%) of the combined group and 1/9 (11%) of the PPV ILM peel post PE group, respectively. The mean (standard deviation) LogMAR best-corrected mean visual acuity (BCVA) improved from 0.44 ($\pm$ 0.27) at time of CME diagnosis to 0.35 ($\pm$ 0.19), with a mean decrease in CMT from 392.2 ($\pm$ 102.5) μ m to 287.7 ($\pm$ 34.0) μ m. Three patients developed symptomatic recurrent CME between 9 and 12 months postoperatively, which resolved with further topical regime. Two of the latter patients had PPV ILM peel followed by PE, the remaining patient had PE followed by PPV ILM peel.

Conclusions

We report a higher incidence and recurrence of CME in vitrectomised ILM-peeled eyes undergoing PE than in other sequences of these procedures. The potential

30 beneficial effect of ILM peeling may be lost in the setting of inflammation post PE,
31 with increased risk of CME.

32 **Introduction**

33 Post-operative cystoid macular edema (CME) is difficult to predict and a source of
34 morbidity to patients affected. CME may be classed as CME affecting vision
35 (symptomatic CME) or CME detected by optical coherence tomography (OCT-
36 evident CME). The reported incidence of symptomatic CME post routine
37 phacoemulsification (PE) is relatively low (0.1 to 2.35%),¹ but OCT-evident CME is
38 considerably higher at 4 to 11%.¹ The incidence would seem to be higher for posterior
39 segment procedures. In a series of pars plana vitrectomies (PPV) for floaters the rate
40 reported is 5.5%, in patients with no ocular comorbidities, the type of CME is not
41 specified.² An OCT-evident CME rate of 26% was reported in patients who
42 underwent PE in eyes that had previous PPV and internal limiting membrane (ILM)
43 peel for full thickness macular hole (FTMH) versus 0% CME in control cases who
44 underwent PE alone.³ This rate appears much higher than a reported symptomatic
45 CME rate for simultaneous PE and PPV (phacovitrectomy) of 1.9%⁴ to 8.1%.⁵

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47 We postulated that the timing of PE relative to PPV (before, during or after) is an
48 important risk factor for CME. We aim to report the rates of OCT-evident and
49 symptomatic CME in patients undergoing PPV preceded by, followed by and
50 concurrent with PE.

51

52 **Materials and Methods**

53 We report a retrospective study of 43 eyes in 43 patients who underwent PPV and
54 ILM peeling for FTMH. All patients with retinal vascular occlusions, diabetes and
55 previous uveitis were excluded. Patients underwent 20 gauge (n = 11) or 23 gauge (n
56 = 32) PPV. PE was a standard clear corneal incision with phaco/chop technique. All
57 procedures were performed by a single surgeon (HJZ) between 2008 and 2012. All
58 patients received dexamethasone (0.1%) topical regime four times per day in the
59 operated eye after every procedure. Patients with CME had at least one cyst within the
60 OCT field associated with increased central macular thickness (CMT).

61

62 **Results**

63 The FTMH was closed with a single procedure in 42/43 patients (98%). The
 64 remaining case resolved with a second procedure. CME was noted in 6/43 patients
 65 (14%, Table 1), between 1 and 5 months post op (mean 3.3 months). Four cases were
 66 symptomatic and two were asymptomatic, but one of these patients became
 67 symptomatic when the CME recurred. All CME resolved with 6 weeks of topical non-
 68 steroidal anti-inflammatories (NSAIDs, Ketorolac) and topical steroids
 69 (dexamethasone 0.1%), followed by a tapering period. Three patients developed
 70 symptomatic recurrent CME between 9 and 12 months postoperatively, which
 71 resolved with further topical NSAIDs and steroids. Two of these patients had PPV
 72 ILM-peel followed by PE, the remaining patient had PE followed by PPV ILM-peel.

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74 The mean ($\pm$ standard deviation; SD) LogMAR best-corrected mean visual acuity
 75 (BCVA) improved from 0.44 ($\pm$ 0.27) at time of CME diagnosis to 0.35 ($\pm$ 0.19)
 76 following treatment, with a mean decrease in CMT ($\pm$ SD) from 392.2 ($\pm$ 102.5) μ m
 77 to 287.7 ($\pm$ 34.0) μ m.

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79 **Discussion**

80 CME incidence is highest in PE following PPV ILM-peel compared to all the other
 81 permutations, recurrent CME was also highest in this group. Our rates of symptomatic
 82 CME in the combined group is comparable to that previously reported (1.9%⁴ to
 83 8.1%⁵ compared to 6% in this study), which suggests our rate of OCT-evident CME
 84 approaches that in the population.

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86 The ILM has no significant influence on the movement of water molecules in the
 87 retina.⁶ ILM peeling may be beneficial in CME, because it removes tangential
 88 traction, increases retinal oxygenation, reduces VEGF production, and allows
 89 intraretinal fluid from the macula to reach the vitreous cavity, it also alters the inner
 90 retinal structure possibly resulting in greater responsiveness to inflammatory stimuli.⁶
 91 The beneficial effect of ILM peeling may therefore be lost in the setting of

92 inflammation post PE, with increased risk of CME.

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94 Our study is limited by sample size and retrospective design. This limits our ability to
95 extrapolate, however, this evidence justifies a large prospective randomized trial to
96 elucidate the relative risk of the timing of phacoemulsification in such patients.

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98 In conclusion, we report a higher incidence of CME in vitrectomized ILM-peeled
99 eyes when PE is performed subsequently, than other sequences with PE. We suggest
100 combined phacovitrectomy may be preferable to PPV followed by PE.

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102 **References**

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126 **Table 1.**
 127 Summary of patients undergoing each procedure by number of cases of cystoid macular edema (CME).
 128 Total: The number of cases undergoing each procedure; OCT-evident CME: The number (and
 129 percentage) of cases with acute postoperative CME evident on ocular coherence tomography (OCT);
 130 CME Sympt: The number of cases who developed acute symptomatic postoperative CME; Late
 131 recurrence: The number of cases who developed acute postoperative CME (all of which were
 132 symptomatic); PPV ILM-peel (phakic): Eyes that underwent pars plana vitrectomy (PPV) and internal
 133 limiting membrane (ILM) peel; Combined (PE +PPV ILM-peel): Eyes that underwent simultaneous
 134 phacoemulsification (PE) with PPV and ILM-peel; Sequential 1 (PE 1st then PPV ILM-peel): Eyes that
 135 underwent PE and then subsequently underwent PPV and ILM-peel; Sequential 2 (PPV ILM-peel 1st
 136 then PE): Eyes that underwent PPV and ILM-peel and subsequently underwent PE.
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Procedure	Total	OCT-evident CME	CME Sympt	Late recurrence
PPV ILM-peel (phakic)	8	0 (0%)	0 (0%)	0
Combined (PE +PPV ILM-peel)	18	2 (11%)	1 (6%)	0 (0%)
PE 1 st then PPV ILM-peel	9	1 (11%)	1 (11%)	1 (11%)
PPV ILM-peel 1 st then PE	8	3 (38%)	2 (25%)	2 (25%)

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