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Failed temporal inverted ILM flap in cases of FTMH, what to do next?!

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The aim of this presentation is to highlight the temporal inverted ILM flap technique for different types of FTMH, focusing on failed hole closure and how can those cases be managed on a second surgery and how are the visual and anatomical results after the second intervention.

Modified Inverted Internal Limiting Membrane Flap Technique in Macular Hole Surgery: Perfluorocarbon Iron

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Introduction: The inverted internal limiting membrane (ILM) flap technique in macular hole (MH) surgery was first introduced in 2010.In the inverted ILM flap technique, the flap can be dislodged during air-fluid exchange.Various techniques have been described to prevent this situation. In this study, we aim to describe the modified reverse ILM flap technique with the help of perfluorocarbon (PFC) weight for flap stabilization in macular hole surgery.
Methods: Five patients with idiopathic macular hole were included.Preoperative macular hole diameters of the patients were measured with spectral domain optical coherence tomography (SD-OCT).Preoperative and postoperative 2nd month best corrected visual acuity (BCVA) and macular hole status were evaluated. After the PFC is placed on the flap during the surgery, it is aimed to move the globe right-left, up and down, and ironing it with the weight of the PFC, to rub the folded part of the flap and make it more stable.Results: Five eyes of 5 patients were included in the study.The mean MH diameters were 581 microns. While the mean BCVA was 1.44 in pre-op according to LogMAR, it was increased as 0.84.After the operation, it was observed that the MH was closed in all of them. All eyes had a near-normal foveal contour in relation to the postoperative restoration of the foveal contour observed with OCT.
Conclusion: Approximately 14% of reverse ILM flaps are dislodged during fluid-air exchange. To solve this problem, retinal adhesive such as OVD was used to stabilize the ILM flap. We have seen that the modified technique we developed is advantageous in preventing the flap from detaching during fluid-air exchange.In this technique, it becomes easier to stabilize the ILM flap with PFC movement and weight. Therefore, folding the ILM flap with the perfluorocarbon ironing technique may be an easy, safe and effective method for the treatment of MH.

Surgical outcome of cabbage leaf technique of ILM peeling in large macular holes

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Purpose: Large macular holes have an increased risk of surgical failure with conventional macular hole surgery. Inverted ILM flap technique has been described for large holes with good surgical outcome. However, the technique involves risk of RPE damage and has a learning curve. The authors describe a new technique of inverted ILM flap in large, full-thickness macular holes, in which multiple ILM flaps were inverted over each other and the hole-like cabbage leaves and these flaps were gently placed over the hole.
Method: In this prospective, interventional case series 24 eyes with macular holes larger than 400 μm were included. All patients underwent 23 gauge pars plana vitrectomy with posterior vitreous detachment and ILM peeling with SF6 gas injection and post-operative prone positioning of one week. During ILM peeling, after trypan blue staining, remnants of ILM attached to the margins of the macular hole were left in place like cabbage leaf with gentle placement of these flaps over macular hole. Fluid-air exchange was then performed. The patients were followed up with respect to visual acuity (BCVA) and SDOCT pictures for 3 months.
Result: The mean age of patients was 62.6±9.9 years.60% patients were males while 40% were females. Mean duration of history of decrease in vision was 6.8±4.4 months (Range 3-15 months).Mean baseline BCVA was 0.084±0.04 that improved to 0.28±0.19 at 3 month (p=0.002). The mean minimum linear diameter (MLD) was 623.9±139μm (Range 418-855 μ).The mean macular hole index (MHI) was 0.39 (Range 0.25-0.55). Macular hole closure was observed in 91% of patients in (21 of 23 eyes) at 3 months. None of the eyes showed a decrease in vision.
Conclusion: This technique of leaving a rim of ILM at the edges of macular hole is effective, prevents inadvertent damage to the parafoveal neurosensory retina and subfoveal RPE, and preserves xanthophyll pigment as well.

A New Finishing Touch For The Temporal Inverted Internal Limiting Membrane Flap Technique

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The temporal inverted internal limiting membrane (ILM) flap technique was developed in an effort to improve vitreoretinal surgery for large macular holes (MH). However, in addition to the difficulty of the surgical procedure, the main concern is the displacement of the ILM flap due to small fluid leakage into the posterior pole, even in the short time required to close the sclerotomies after fluid-air exchange. Here, a new approach to the temporal inverted ILM flap technique is described. In this approach, when the ILM flap is inverted over the MH, a closed-ended ILM forceps is gently pressed over the fold edge and passed over (just like folding a paper in half). Thus, it can be seen that the minimal fluid leaking into the posterior pole ventilates the free edge of the flap, but the force formed along the fold edge prevents the flap from being aired. In cases where the standard temporal inverted ILM flap technique is applied, it can be thought that this new finishing touch will increase the postoperative stability of the flap.

Human Amniotic Membrane Graft for Chronic Macular Hole

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Purpose:
Full thickness macular holes are age related neurosensorial defects in foveal region. The patients suffer from metamorphopsia and low visual acuity. Macular hole closure rate is low in chronic and large macular holes. Many surgical techniques were defined to overcome this problem. In the current study we aimed to present anatomical and functional results of human amniotic membrane graft in chronic macular hole closure.
Methods: Nine eyes of 9 patients were included in the study. All patients underwent a detailed ophthalmic examination. Macular holes were detected upon fundus examination and were graded with spectral domain optic coherence tomography. Basal hole diameter and minimum hole diameter were measured with a caliper. Six patients underwent a 25-gauge pars plana vitrectomy and internal limiting membrane (ILM) peeling as first line treatment. The remaining 3 patients had previous pars plana vitrectomy and ILM peeling for macular hole which was not sufficient for macular hole closure. In all surgeries after ILM peeling an amniotic membrane graft was placed into the macular hole and underneath the borders of the macular hole neighboring neurosensorial retina. Air tamponade was used for all patients.
Results: The median age of the patients was 66±6.54 (54-76) years, male/female ratio was 3/6. The median best corrected visual acuity was 0.01±0.11 (0.001-0.3) preoperatively and increased to 0.075±0.14 (0.04-0.4) postoperatively ($p<0.01$). The median basal hole diameter was 1142±123.52 (1064-1390) micrometer and the minimum hole diameter was 704±95.77 (517-813) micrometer. Anatomic closure rate was 100% with single surgery.(Figure 1)
Conclusion: Macular hole closure rate is very high with the current surgical techniques. Human amniotic membrane is also an efficient technique for macular hole closure. The anatomical success in the current study was %100. Further studies are needed to evaluate structural changes after human amniotic membrane use.

Determination of postoperative positioning time after macular hole surgery by Optical Coherence Tomography Angiography (OCTA)

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Introduction: Pars plana vitrectomy with or without internal limiting membrane (ILM) peeling followed by gas tamponade with face-down positioning (FDP) is the main treatment for macular hole (MH). In this study, we report the anatomical and visual outcomes after MH repair with OCTA guided FDP.
Methods: The study included 44 patients who underwent surgery for idiopathic MH. Firstly, it is very difficult to get an image on the 1st postoperative day under gas tamponade; shots under gas were taken by experienced skilled hands with Optovue Angiovue System (OCTA) in the postoperative first day control, the prone position requirement was removed for patients who had their macular holes closed. Patients whose MHs were not closed were invited for follow-up on day 3 and were recommended to remain prone during this time. Preoperatively,first and third month postoperatively best corrected visual acuity (BCVA), MH closure time, FDP duration, and surgical success rate were all recorded.

Results: Thirty patients had phacovitrectomy + ILM peeling + SF6 tamponade, while 14 had vitrectomy + ILM peeling + SF6 tamponade. The mean minimum diameter of MHs was 376.72±69.18 micron (258-526). Postoperatively, 38/44 MHs closed on the first day, four on the third day, and two on the first week. There were 25 MHs in stage two (56.8%), 17 in stage three (38.63%), and two in stage four (4.54%). Furthermore, it was noted that all patients whose MH did not close on the first postoperative day had non-combined vitrectomy surgery.
Conclusions: OCTA guided FDP gives good outcomes in MH surgery, and with the help of OCTA, postoperative prone position time can be shortened, which does not cause macular hole recurrence and is more suitable for patient comfort.

Autologous Retinal Transplantation Mexican Consortium, experience of 100 cases - ***Sergio Rojas Juárez***

Prediction of functional and anatomical progression in lamellar macular holes

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Purpose: To evaluate imaging risk factors for anatomical progression and visual acuity deterioration over time of treatment-naïve degenerative lamellar macular holes(LMHs) with both traditional statistical methods and artificial intelligence(AI) enhanced features.

Methods: Multicentric retrospective recruitment of patients diagnosed with LMH with follow up>2 years, no previous pars plana vitrectomy, availability of optical coherence tomography(OCT) B-scan and/or OCT angiography(OCTA) acquisitions at baseline and follow up and age>18 years was performed. Patients were divided in two groups according to the presence or absence of a visual acuity(VA) deterioration> 1 line in ETDRS chart during the follow up(respectively VA-STABLE and VA-LOSS groups).Study population was further divided in 2 groups, according to the presence (AN-PROG group) or absence(AN-STABLE group) of anatomical progression during the follow up. Baseline OCT B-scan and OCTA variables of interest were evaluated with both binomial logistic regression and a support vector machine (SVM) model.A deep learning (DL) model for each task was also created.

Results: On 110 eyes of 105 patients(mean follow up 2.9±0.6 years), independent risk factors for anatomical progression and VA deterioration were parafoveal superficial and intermediate capillary plexus(SCP and ICP) vessel density(VD) and vessel length density(VLD), ellipsoid zone(EZ) interruption and choriocapillaris(CC) intercapillary distance(ICD). VA deterioration was also correlated to tissue loss(TL).The SVM and the DL model(550 OCT B-scan images and 320 OCTA images)reached 90.5% and 92.1% testing accuracy for VA deterioration and 91.2% and 93.0% testing accuracy for anatomical progression respectively.Visualization methods enhanced regions of future TL in baseline OCTB scan images and parafoveal areas in colocalizing with TL in OCTA enface acquisitions.

Conclusions: Parafoveal VD in SCP and ICP and CC ICD are correlated to LMH progression. AI can help visualize regions that will develop TL over time and enhance low flow areas in parafoveal OCTA. AI can accurately predict anatomical and functional stability of LMHs within 2 years follow-up.

Long-term follow-up in the lamellar macular hole without vitrectomy

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Aim: To demonstrate long-term morphological and functional changes in the patients with lamellar macular hole (LMH) without vitrectomy
Methods: The medical records of patients with a diagnosis of LMH in the retina department of Prof. Dr. Cemil Tascioglu City Hospital, who were followed up for at least one year and did not undergo surgical treatment, were retrospectively reviewed. The patients were divided into three groups; degenerative LMH, tractional LMH and mixed LMH. Main outcome measures were best-corrected visual acuity (BCVA), inner diameter of LMH (opening), maximum diameter of LMH, minimum outer retinal thickness (ORT), area of LMH associated epiretinal proliferation (LHEP) and the status of ellipsoid zone (EZ) and external limiting membrane (ELM).
Results: Thirty-nine eyes of 35 patients were included in the study. Mean follow-up was 25.8 ± 13.5 (12-53) months. The mean age was 70.8 ± 11.8 years. The mean minimum ORT was significantly lower in the patients with LHEP than without LHEP both at baseline and at last visit (p=0.011 and p=0.010; respectively). BCVA decrease was found only in the mixed group, but it was not statistically significant (p=0.105). The mean area of LHEP increased statistically significant over time (p=0.043 and p=0.030; respectively). There was no difference between groups in the mean inner diameter and maximum diameter values, or in intragroup changes over time (p=0.775, p=0.680, p=0.407, p=716; respectively). In the correlation analysis, BCVA change was found to be negatively correlated with the baseline and final minimum ORT, the presence of LHEP and EZ defect (r=-0.381, p=0.017; r=-0.406, p=0.010; r=0.332, p=0.039; r:-0.362, p=0.023; respectively).
Conclusion: LMH can remain stable for a very long time. However, the presence of LHEP may be a sign of poor prognosis.

Surgical outcomes for the treatment of tractional and degenerative lamellar macular holes

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Purpose:
To compare the functional and anatomical results of internal limiting membrane (ILM) peeling during vitrectomy for tractional lamellar macular hole (LMH) with degenerative LMH associated with epiretinal proliferation.

Methods:
A prospective comparative study of standard ILM peeling in a consecutive cohort of patients with lamellar macular holes over a 24-month period. Spectral-domain optical coherence tomography and Early Treatment Diabetic Retinopathy Study letters best-corrected visual acuity were assessed preoperatively and 6 months postoperatively. Fourteen eyes with tractional LMH (Group T) were compared with thirteen eyes with degenerative LMH (Group D) who received gas tamponade with prone posture postoperatively.

Results:
Groups showed no significant preoperative differences. After 6 months, best-corrected visual acuity improved in both Group T and Group D (respectively, -0.20 lower (-0.38 to 0) and -0.17 lower (-0.42 to -0.02) logMAR; $P < 0.001$) There were no significant differences in mean change in BCVA from baseline to 6 months follow-up between two groups.

Conclusion:
ILM peeling with a gas tamponade and prone posture is a feasible treatment option for degenerative LMH, yielding improvements in best-corrected visual acuity. Further studies are needed to optimize this new surgical approach. An appropriately powered randomized controlled study is warranted.