7/14/2022 01:20 pm

Surgery Symposium 2

Multilayered Inverted Internal Limiting Membrane Flap Technique vs Standard Internal Limiting Membrane Peeling for Large Macular Holes: Comparative Study

- Vishal Agrawal, MD, FRCS,FACS,FASRS
- Vikas Gupta, MD
- Amit Gupta, MD, FACS

Objective:
Is ML-IILM peeling for large macular holes superior to conventional ILM peeling in terms of anatomical and functional outcome?

Is ML-IILM peeling under PFCL superior to conventional inverted ILM peeeling interms of safety and efficacy?

Purpose:
To evaluate the outcome of vitrectomy with ML-IILM technique versus vitrectomy with standard ILM peeling for large macular holes in terms of visual acuity and anatomical closure.

Methods:
Hospital-based, prospective, randomized, interventional consecutive study .Study duration- 4 years

150 eyes (75 in each group) were included after informed consent of the participants. All cases were randomized using sealed envelope method in 2 groups—vitrectomy with standard ILM peeling (Group A) and vitrectomy with ML-IILM technique (Group B).

Inclusion criteria- treatment naive patients (>50 years) with idiopathic FTMH with minimum base diameter >600 μm.

Exclusion criteria-patients with amblyopia, inflammatory eye diseases, hypertensive & diabetic retinopathy, retinal detachment or retinal surgery, glaucoma, high myopia (≥ − 6 D), or patients refusing for consent.

From each OCT study, the macular hole parameters - minimum diameter, maximum diameter, and height were calculated. Stage of macular hole (Gass classification) & macular hole index was calculated. This was a blinded study. In both groups after PVD induction,Brilliant blue G dye was used to stain ILM.In group A ,ILM peeled off in a circumferential pattern around the hole using forceps. In Group B, a small bubble of perfluorocarbon liquid (PFCL) was injected at the posterior pole after staining the macula. Multilayered flaps were fashioned toward the macular hole edge and rolled up inside the edge with forceps. During fluid air exchange the PFCL bubble was aspirated. 20% SF6 gas was used as tamponade. Postoperative face dow position was instructed for 1 week.

Final followup was at 1 year.

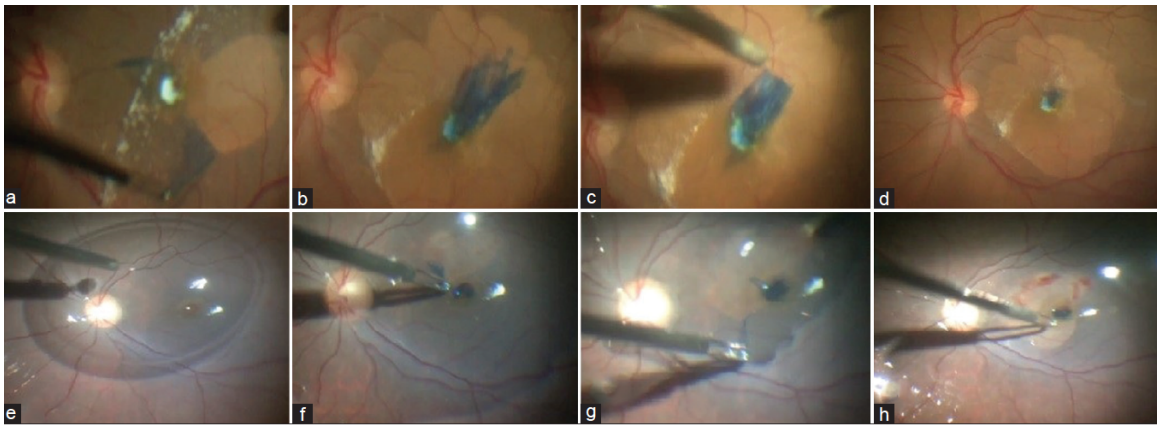
Results:
During follow-up, the mean post-operative BCVA at 1 month, 3 months, 6 months, and 12 months was significantly better in Group B (0.12 ± 0.07 at 1 month, 0.14 ± 0.10 at 3 months, 0.18 ± 0.11 at 6 months, and 0.19 ± 0.12 at 12 months) compared to Group A (0.20 ± 0.11 at 1 month, 0.22 ± 0.13 at 3 months, 0.30 ± 0.12 at 6 months, and 0.31 ± 0.14 at 12 months) (P 0.001 for each).Anatomical closure was achieved in 100% (75/75) cases in Group B compared to 93.33% (70/75) cases in Group A .

Type 1 closure was better in group B compared to group A and was achieved in 70/75 (93.33%) in Group B compared to 59/75 (78.66%) in Group A. Type II closure occurred in 6.66% (5/75) cases in Group B compared to 15.66% (11/75) cases in Group A ($P < 0.05$). Among Group A ,6.67% (5/75) cases failed to achieve any anatomical closure.

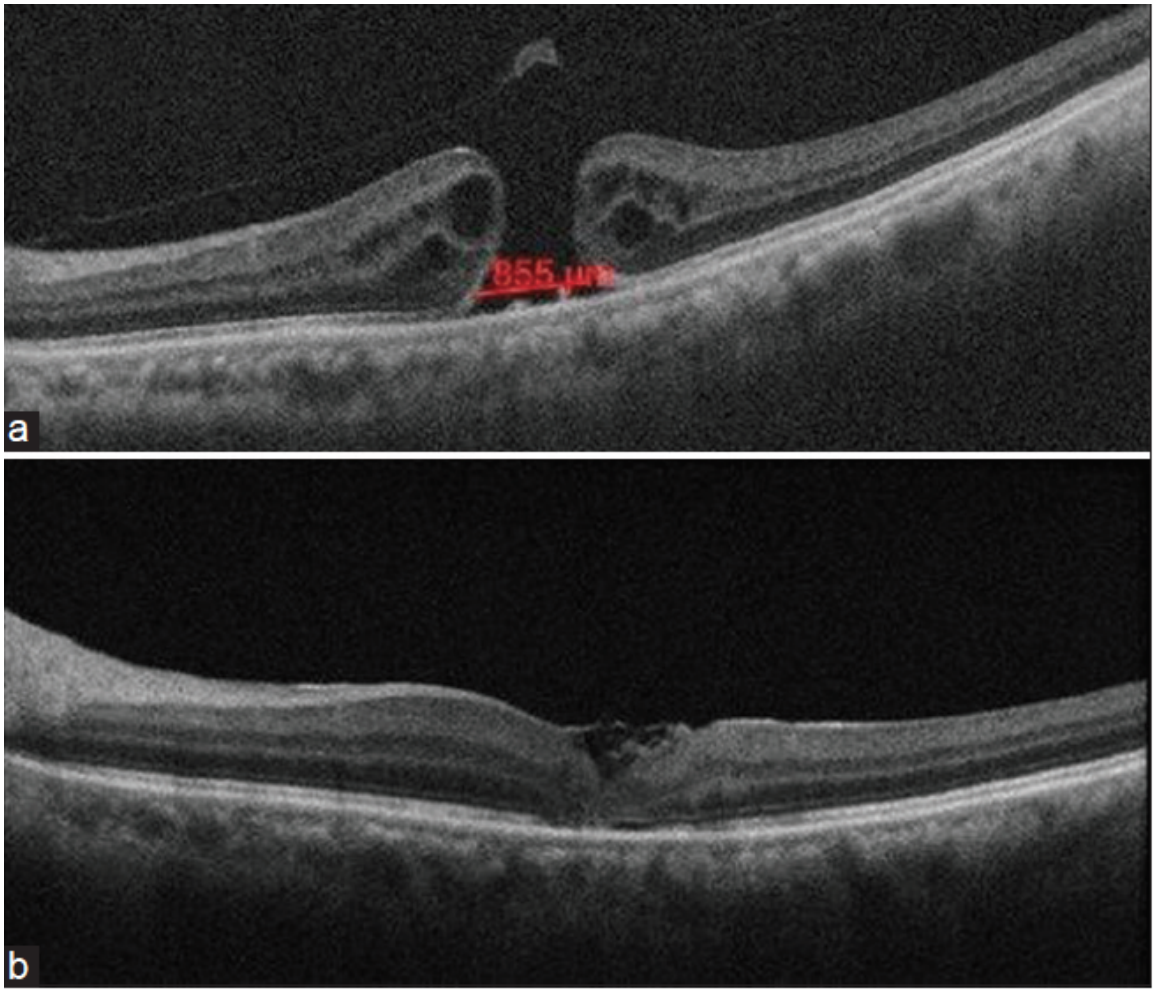
Conclusion:
This study concludes that vitrectomy with ML-IILM flap technique had significantly better success rate (anatomical closure) and better visual outcome than the

standard macular hole surgery (Vitrectomy with ILM peeling).The ML-ILM technique under PFCL is a safe and easily reproducible technique and offers distinct advantages over all the currently described ILM peeling technique in terms of flap-related complications.

IRB APPROVAL Yes



(a-d) Inverted ILM flap (e-h) ML-ILM flap technique under PFCL



(a)Large FTMH (b)Closed hole after ML-ILM flap technique

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Surgery Symposium 2

Pars Plana Vitrectomy for Symptomatic Vitreous Opacities: Large Multicenter Case Series

- Samuel Houston, MD, FASRS
- Edwin Ryan, MD
- John Kitchens, MD
- Ian Seddon, BS
- Matthew Cunningham, MD, FASRS
- Elias Mavrofrides, MD

Objective:
To evaluate the safety and efficacy of pars plana vitrectomy (PPV) for the treatment of patients with symptomatic vitreous opacities.

Purpose:
Vitreous opacities with symptoms of “floaters” are common. New, symptomatic floaters are usually observed and most are not bothersome after several months. However, some patients have persistent symptoms that significantly affect their activities of daily living (ADLs). Although treatable with PPV, retina specialists have classically been reluctant to perform the surgery due to concern for complications, including retinal tears, retinal detachments, cataracts, and endophthalmitis. However, due to recent advances in small gauge surgical instrumentation, with proper patient selection, the risks of performing PPV for vitreous opacities could be minimized.

Methods:
This was a retrospective, multi-centered study assessing 825 eyes that underwent PPV for symptomatic vitreous opacities. Patients that underwent surgery were carefully selected based on surgeon criteria as well as objective and subjective findings, and documentation of symptomatic floaters for at least 6 months. Patients were then monitored for six months following PPV for any complications. Main outcome measures were any complications that occurred either during surgery or during the post-operative period.

Results:
Of the 825 eyes (mean age 69.9 ± 7.6 years), 19% required intraoperative laser treatment for retinal pathologies discovered during surgery. During the postoperative period (mean follow up 5.39 ± 3.14 months), we found that 92% of cases did not demonstrate any surgical complications. Of the 8% of eyes with complications during the post-operative period, the most common were: new onset or progression of epiretinal membrane, cystoid macular edema, and post-operative inflammation. There were no cases of endophthalmitis and the retinal detachment rate was less than 0.5% in pseudophakic patients with a PVD, with rates rising to 2% in patients without a PVD.

Conclusion:
This large case series demonstrates that PPV for symptomatic vitreous opacities is safe and efficacious with a similar risk profile to other ophthalmic surgical procedures. Risks vary depending on patient selection criteria. As a result, vitrectomy should be considered for patients with persistent (>6 months) symptoms that affect ADLs.

IRB APPROVAL Yes

7/14/2022 01:30 pm

Surgery Symposium 2

Epiretinal Human Amniotic Membrane Grafting for Complex Surgical Macular Pathologies

- Tongalp Tezel, MD
- Aliaa Abdelhakim, MD, PhD

Objective:
To describe the surgical technique of epiretinal human amniotic membrane grafting and present the early results of its application to treat complex surgical macular pathologies.

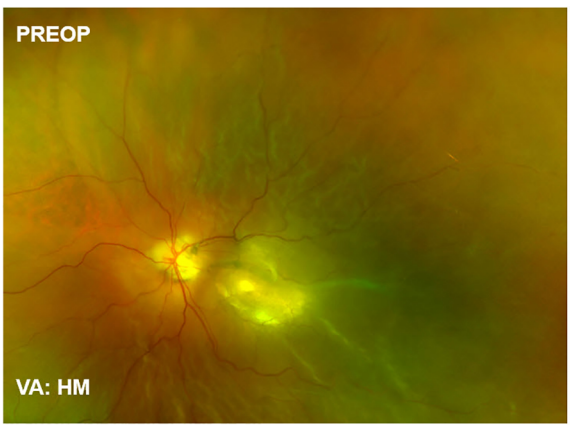
Purpose:
To report the use of epiretinal human amniotic membrane transplants as an adjuvant to surgical treatment of complex macular pathologies.

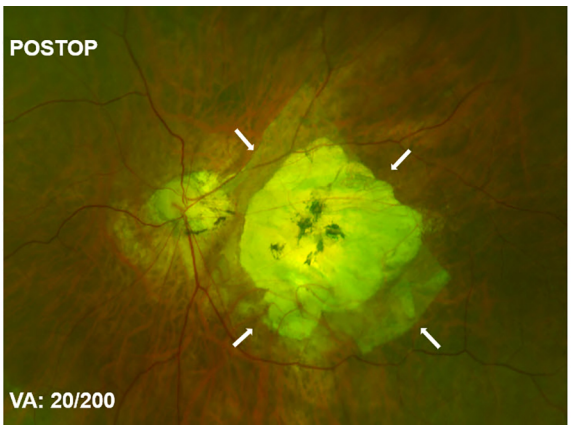
Methods:
Twelve patients with failed chronic macular holes (n=5), degenerative myopia and retinal detachment with multiple macular holes (n=4), and degenerative myopia with progressive foveoschisis and lamellar holes (n=3) operated with standard vitrectomy coupled with epiretinal human amniotic membrane grafting. Clinical exam, fundus photography, and OCT scans were used to determine the functional and anatomical outcome of the surgical technique.

Results:
Twelve eyes (OD:6/OS:6) of 12 patients (8F/6M) were enrolled in the study. The average age of the patients was 72 ± 11 (50-86) years. Silicone oil (n=6) and SF6 gas (n=6) were used as a tamponade. At the time this abstract was submitted the average follow-up was 7.7 ± 7.5 (1-20) months. Amniotic membrane grafts remain in place in all patients. No inflammation or periretinal scar formation occurred. The anatomical benefit was observed in all patients. Significant visual gains were obtained in 8 (66.7%) patients whereas visual acuity remained the same in 3 (25%) patients and deteriorated in only 1 (8.3%) patient partially because of the silicone oil tamponade. Average visual acuity improved from a preoperative level of 20/514 ± 20/74 (20/100-20/4000) to 20/240 ± 20/53 (20/50-20/1600) (p=0.024).

Conclusion:
The use of epiretinal human amniotic membrane grafting as an adjunct may increase the anatomical and functional outcomes of surgeries for complex macular pathologies. The safety and the ease of obtaining a human amniotic membrane make it a preferable choice for the treatment of failed macular holes and macular complications of degenerative myopia.

IRB APPROVAL Yes





hAM to treat RD due to multiple (7) macular holes in degenerative myopia

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Surgery Symposium 2

Scleral Imbrication and Fovea-Sparing ILM Peel as a Treatment for Myopic Foveoschisis

- Fong May Chew, FRCOphth, MBBS, BSc
- David Chow, MD, FRCS(C)
- David Wong, MD, FRCS(C), FASRS

Objective:
To investigate the role scleral imbrication combined with foveal sparing ILM peel in treating myopic foveoschisis

Purpose:
To determine the anatomical success rate of combined scleral imbrication and fovea sparing ILM peel in myopic foveoschisis

Methods:
A retrospective case review of two vitreoretinal surgeons who had combined scleral imbrication and combined vitrectomy and fovea sparing ILM peel from 2016 to 2022 were analysed. Case notes for 13 patients who had a diagnosis of myopic foveoschisis who then subsequently underwent combined scleral imbrication, pars plana vitrectomy and fovea sparing ILM peel were analysed. Visual acuity, axial length, refraction status before and after surgery was analysed.

Results:
This study shows a mean visual acuity improvement in post operative visual acuity of -0.02 Logmar ($p<0.05$). The mean reduction in axial length was -0.18mm (range -0.73 to 0.38), and the mean change in refraction was +0.25 DS (range -1.00 DS to +1.00 DS). The anatomical success rate for combined scleral imbrication and pars plana vitrectomy and fovea spearing ILM peel was 76.9% (n=10)

Conclusion:
This study shows that combined scleral imbrication with pars plana vitrectomy has a good rate of anatomical success in patients with myopic foveoschisis.

IRB APPROVAL No - no IRB or exemption

7/14/2022 01:50 pm

Surgery Symposium 2

Endophthalmitis After Pars Plana Vitrectomy Without Postoperative Topical Antibiotics

- Tahsin Khundkar, MD
- Abdhish Bhavsar, MD FASRS
- Geoffrey Emerson, MD, PhD, FASRS
- Michael Emerson, MD
- Jacob Jones, MD, PhD

Objective:
Is topical antibiotics required following pars plana vitrectomy (PPV) surgery?

Purpose:
To report the incidence of endophthalmitis after PPV without post-operative topical antibiotics.

Methods:
Design: Retrospective, claims analysis of cases by multiple surgeons at a single institution.

Claims analysis of consecutive cases of PPV without post-operative topical antibiotics performed by four retina surgeons at a single institution from 1997 to 2021. PPV performed as a treatment for endophthalmitis as the primary indication for surgery were excluded. Routine preoperative povidone iodine scrub of eyelashes and periorbital skin along with 5% povidone iodine conjunctival irrigation was performed prior to the start of each case. All cases concluded with injection of subconjunctival antibiotics, and steroid. No antibiotics were added to the infusion fluid. There were no topical antibiotic medications given in the days after the surgery.

Results:
16,999 (8,065 males (M), 8,933 females (F), 1 unknown) PPV surgeries were performed. 300 (159 M, 141 F) cases where PPV was used to treat endophthalmitis as the primary indication for surgery were excluded. Of the 16,699 consecutive cases (age range 9mo – 104 years) of PPV without postoperative topical antibiotics, two cases of post-operative endophthalmitis were identified.

Conclusion:
Performing PPV with standard preoperative preparation and subconjunctival injection of antibiotics without the use of post-operative topical antibiotics did not lead to an increase in incidence of post-operative endophthalmitis.

IRB APPROVAL Yes

7/14/2022 01:54 pm

Surgery Symposium 2

Biodistribution of Suprachoroidal Drug and Viral Vector Delivery Across Animal Models and Human Trials

- Glenn Yiu, MD, PhD
- Shelley Hancock
- Thomas Ciulla, MD, MBA, FASRS

Objective:
To evaluate biodistribution after suprachoroidal injection of drugs and viral vectors to understand the potential effectiveness and safety of this mode of delivery.

Purpose:
Injection of drugs and viral vectors into the suprachoroidal space (SCS) using microneedles enables targeted delivery to retinal and choroidal tissues while minimizing impact on anterior segment structures. Here, we examine biodistribution after suprachoroidal injection of dyes, drugs, and viral vectors using ex vivo eyes and in vivo ocular imaging across preclinical animal studies and human clinical trials to provide insight into biodistribution after suprachoroidal delivery.

Methods:
We compared the biodistribution of fluorescent and India ink dye injected into ex vivo porcine and human cadaver eyes between suprachoroidal versus intravitreal delivery. Pharmacokinetics of dextrans, fluorescently-labeled microparticles, and different pharmacologic agents suprachoroidally injected into rabbit eyes were compared up to 3 months or longer. We then examined in vivo fluorescent scanning laser ophthalmoscopy (SLO) images from rhesus macaque eyes after intravitreal, subretinal, and suprachoroidal delivery of an AAV8 vector expressing green fluorescent protein (GFP) under a ubiquitous cytomegalovirus (CMV) promoter, followed by histological analyses *ex vivo*. Finally, we compare SCS changes in human subjects using anterior and posterior segment OCT images obtained after suprachoroidal triamcinolone acetonide injections in the phase 1/2 HULK study of eyes with diabetic macular edema (DME) and phase 2 TANZANITE study of eyes with retinal vein occlusion (RVO)-related macular edema.

Results:
Suprachoroidal dye injections in porcine eyes showed posterior distribution with no visible dye around the cornea, lens, or vitreous cavity, while intravitreal injection led to visible dye around the lens and as a bolus within the vitreous. Larger particle size and small molecule suspensions, demonstrated greater retention in chorioretinal tissues up to 3 months or longer in rabbit eyes. Suprachoroidal injection of AAV8 expressing GFP in macaque eyes produced diffuse, circumferential GFP expression as seen on SLO, as compared to subretinal injections which enabled focal transgene expression, and intravitreal delivery which yielded minimal transduction. Immunohistochemistry revealed GFP transduction of both retinal and scleral tissues after suprachoroidal AAV injection, and only retinal tissues after subretinal and intravitreal delivery. Expansion of the SCS was observed from anterior segment OCT immediately after suprachoroidal CLS-TA injection in DME eyes in the HULK study, and up to 3 months on enhanced-depth OCT in eyes with RVO-related macular edema in TANZANITE.

Conclusion:
Suprachoroidal injections enable widespread distribution of drugs and viral vectors to posterior segment tissues across animal and human studies, with larger particles exhibiting greater retention and durability.

IRB APPROVAL Yes

7/14/2022 02:00 pm

Surgery Symposium 2

Vitreoretinal Biopsy Techniques and the Role of Retinal Biopsy in Vitreoretinal Lymphoma: Single-Institution Experience

- Sunil Srivastava, MD
- Danny Mammo, MD
- Abel Hamdan, MD
- Kimberly Baynes, BSN, RN, COA
- Arun Singh, MD
- Sumit Sharma, MD

Objective:
To determine the utility of subretinal biopsy vs vitreous biopsy in patients with suspected lymphoma

Purpose:
Vitreoretinal lymphoma (VRL) is a clinical diagnostic challenge. The fragility of lymphoma cells and the difficulty of distinguishing malignant cells from inflammatory cells also makes the cytopathologic diagnosis difficult. Since many patients with vitreoretinal lymphoma are at high risk for concurrent or subsequent central nervous system lymphoma, timely diagnosis is critical in order to begin life-prolonging treatment. Diagnostic vitrectomies with cytology and/or flow cytometry analysis are still the most widely used method to confirm diagnosis and guide treatment.. This study highlights a single institution's diagnostic vitrectomy experience for vitreoretinal lymphoma.

Methods:
A single-center retrospective chart review of all diagnostic vitrectomies performed for suspicion of VRL between January 2015-August 2021 was performed. All cases were performed by one of two vitreoretinal uveitis specialists (SS, SKS). Undiluted vitreous specimens were collected and sent in CytoLyt ® fixative for cytology analysis. Diluted vitreous specimens were collected in Roswell Park Memorial Institute (RPMI) Medium and sent for flow cytometry. Decision to perform a retinal and/or subretinal tissue biopsy (RSRB) was at the discretion of the operating surgeon.

Results:
51 diagnostic vitrectomies were performed and 39 (76.5%) yielded positive results for VRL from 35 patients. Average age was 67.3. Of the 39 positive intraocular biopsies, 14 patients had RSRB. 13 of the 14 (92%) were positive. 10 eyes had a positive RSRB but negative vitreous biopsy (25%). 21 patients had retinal, subretinal, and/or subRPE lesions on initial visit and 13 of these 21 (62%) had a negative vitreous biopsy. Average months from symptom onset to diagnosis was 7.45 months (range 0.27 – 32.73). Subgroup analysis demonstrated an average months from symptom onset to diagnosis of 8.65 months in the RSRB + / vit – group and 5.07 months in the vitreous + group ($p = 0.002$). There was no difference in vitreous haze scores between the two groups (Vitreous + (2.14); RSRB + / Vitreous – (2.02), $p = 0.42$). Two retinal detachments (both RSRB group) occurred. Average final follow-up after biopsy was 24.9 months.

Conclusion:
Diagnostic vitrectomy with cytology and flow cytometry analysis is an effective method to diagnose vitreoretinal lymphoma. In our series of positive cases, 25% of cases had a negative vitreous biopsy but positive RSRB. RSRB only positive patients presented at a later time course than patients with positive vitreous biopsies, possibly due to these patients having undergone multiple courses of steroid treatments with continual lysis of vitreous lymphocyte cells, making the cytopathology diagnosis more difficult. If a patient presented with a posterior segment lesion, 62% of vitreous biopsies were negative. RSRB should be considered in select cases at time of primary diagnostic vitrectomy in order to expedite diagnosis and lead to more timely treatment.

IRB APPROVAL Yes

7/14/2022 02:06 pm

Surgery Symposium 2

State of Pediatric Retinal Detachment Surgery in the United States: An Aggregated Electronic Health Record Analysis of 2200 Children

- Yoshihiro Yonekawa, MD, FASRS
- Matthew Starr, MD
- Taku Wakabayashi, MD
- Chakshu Sharma
- Nick Boucher
- Michael Klufas, MD
- Marc Spirn, MD

Objective:
For the first time, to examine retinal detachment in children at the national level, by presenting big-data analyses of demographics, ocular co-morbidities, treatment modality choice of retina surgeons, and visual outcomes.

Purpose:
To identify the demographics of retinal detachment in children in the United States, and to report the treatment modalities and visual outcomes.

Methods:
This study is a multicenter cohort analysis of aggregated electronic health records of all children (1-17 years) with rhegmatogenous retinal detachment (RRD), as identified by ICD and CPT codes, between January 2015 and August 2021 in the Vestrum Database. Demographic, comorbidity, visual acuity, and treatment modality data were analyzed.

Results:
A total of 2200 children with RRD were identified. Mean age was 12.0 years, and 62% were male. Ninety were 1-3 years of age, 122 were 4-6, 234 were 7-9, 399 were 10-12, 434 were 13-15, and 921 were 16-17. The prevalence of RRD increased with age (P =0.009). The geographic distribution was 27.3% Northeast, 27.1% Southeast, 21.7% West, 12.5% Southwest, and 11.3% Midwest. Associated ocular co-morbidities included myopia (34.6%), ocular trauma (15.0%), and history of prematurity (11.5%). Intervention was performed within 1 week in 55.4%, at 1-2 weeks in 15.8%, 2-3 weeks in 10.5%, and 1-2 months in 7.5%. Laser retinopexy alone was used as the initial treatment modality in 23.3%, primary vitrectomy in 21.5%, primary scleral buckle in 33.3%, and vitrectomy with scleral buckle in 21.7%. Mean presenting visual acuity was 20/100, and mean visual acuity at 1 year of follow-up after intervention was 20/80. Mean visual acuity at 1 year was best after laser retinopexy (20/32), followed by primary scleral buckle (20/63), and then primary vitrectomy (20/200) and vitrectomy with scleral buckle (20/200).

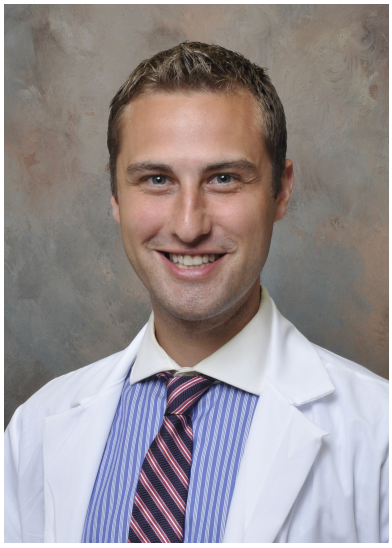
Conclusion:
Retinal detachment in children increased with age. Myopia, trauma, and history of retinopathy were common underlying risk factors. Treatment techniques varied throughout the country, but the incisional surgical intervention with the best visual outcome was primary scleral buckling.

IRB APPROVAL No - exempt

7/14/2022 02:12 pm

Surgery Symposium 2

Cutter-Based vs Forceps-Based Membrane Peeling for Removal of Epimacular Membranes



- Scott Walter, MD, MSc

Objective:
Is cutter-based membrane peeling (MP) a feasible, efficient, safe, and effective alternative to forceps-based MP for the removal of epimacular membranes?

Purpose:
The vitreous cutter is a multifunctional instrument. Vitreoretinal surgeons have previously reported cutter-based removal of epiretinal membrane (ERM) and internal limiting membrane (ILM) tissue from the macular surface, without the use of forceps. However, the feasibility, efficiency, safety, and effectiveness of this MP technique have not been rigorously studied.

Methods:
Consecutive case series of 96 patients undergoing vitrectomy with ERM and/or ILM peeling. All operations were performed by a single surgeon at an ambulatory surgical center between March 1st, 2020 and May 15th, 2021. During the study period, the surgeon's technique for MP evolved from a forceps-based method (initially) to a cutter-based method (July 2nd, 2020 onward). Primary outcome measures included MP method, surgical time (case start to finish), intraoperative complications, anatomic success at 3 months, mean change in visual acuity, macular volume, and central subfield thickness (pre-op vs. 3 months post-op). Outcomes were analyzed separately for "routine" (CPT code 67042, e.g. macular holes and ERMs) and "complex" (CPT code 67113, e.g. retinal detachment with MP) cases.

Results:
Of 58 patients undergoing routine ILM peeling, 10 cases (17%) were performed with forceps-based MP and 48 cases (83%) were performed with cutter-based MP. Mean surgery time was significantly shorter for cutter-based MP (21.3 min vs. 30.6 min, p=0.0003). Of 37 patients undergoing complex retinal detachment repair with MP, 18 cases (49%) were performed with forceps-based MP and 19 cases (51%) with cutter-based MP. Mean surgery time was also significantly shorter for cutter-based MP in this context (35.9 min vs. 61.2 min, p=0.002). Anatomic success was achieved in all cases and there were no intraoperative complications reported in either group. Based on preliminary analyses, there were no significant differences in post-operative visual acuity (p=0.98), macular volume (p=0.3), or central subfield thickness (p=0.7).

Conclusion:
Most cases of routine MP, and certain cases of complex MP, are feasible using a cutter-based MP method (without forceps). Cutter-based MP appears significantly faster than forceps-based MP for both routine and complex indications. The two techniques appear to have equivalent efficacy and safety. Efficiencies of the cutter-based MP technique may include fewer instrument exchanges, more efficient engagement of membranes, as well as the ability to simultaneously peel and remove membranes via the cutter.

IRB APPROVAL No - no IRB or exemption