

المؤتمر السنوي الدولي للجمعية المصرية
INTERNATIONAL CONGRESS OF THE

EGYPTIAN OPHTHALMOLOGICAL SOCIETY

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Intraoperative vitrectomy complications

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The top 10

1. Insertion of infusion cannula under the CB or retina.
2. Inadequate infusion.
3. Inadequate air pressure.
4. Iatrogenic retinal breaks.
5. Retinal, subretinal & vitreous hemorrhage.
6. Choroidal hemorrhage.
7. Silicon under the retina.
8. PFCL under the retina.
9. Retinal incarceration in the sclerotomy.
10. Lens injury.

Jackson TL, Donachie PH, Sparrow JM, Johnston RL. United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery: Report 1; Case mix, complications, and cataract [published online ahead of print, March 1, 2013]. *Eye (Lond)*

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Other complications

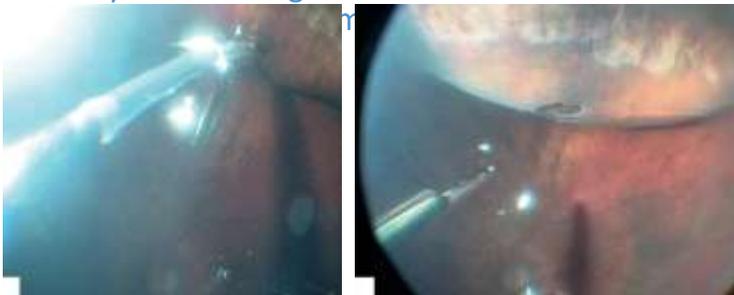
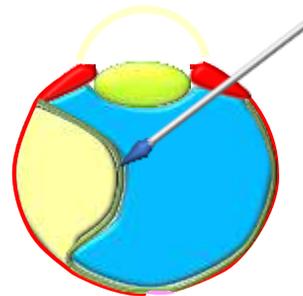
- ILM peeling complications
- Raised IOP
- Corneal complications
- Haemorrhage in Neovascular glaucoma
- Hypotony
- Dislocation of IOL
- RD under silicon oil
- Recurrent RD after silicon oil removal
- Massive fibrin formation
- Corneal decompensation
- Laser complications
- Endophthalmitis



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4. Iatrogenic retinal breaks

1. By the **MVR** during stabbing the sclera (highly elevated retina).
2. A common cause is by **the light probe or tip of vitrectomy probe** in the attached retina
3. it is important to know **where your instruments are located at all times.**
4. **.Never operate "in the dark";** one should always have the light cone directed



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During traction with forceps

- Tangential traction better than AP traction
- The frequency of iatrogenic retinal breaks during pars plana vitrectomy has been reported to range from 0 to 24 % with post-PPV retinal detachment occurring in 0–15.8 % increased to 32.45% in TRD



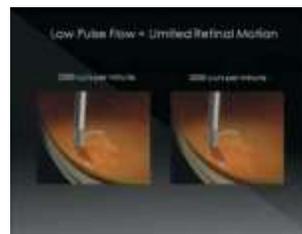
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4. Iatrogenic retinal breaks

3. By the cutting probe: (**So use Shaving mode near retina**)
 - Use small gauge vitrectomy.
 - Use the highest possible cutting rates. (5000 to 10000 cuts per minute)
 - Decrease the fluidics (vacuum <150 mmHg & AFR).
4. During membrane peeling:
 - Use **bimanual dissection** of adherent membranes.
 - **Avoid peeling of diabetic membranes (make segmentation).**



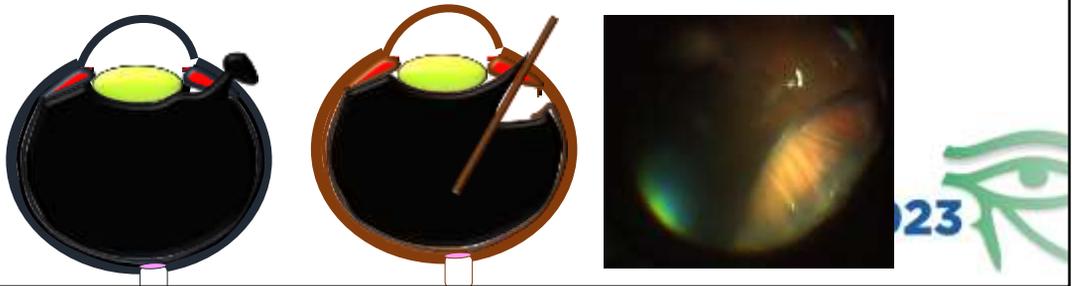
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4. Iatrogenic retinal breaks

2. Prolapse of the vitreous in the sclerotomies → traction on the vitreous during entry of the instruments (**very common breaks**):
 - Cut the prolapsing vitreous before re-entry through the sclerotomy.
 - **Always indent and examine the retina at 2 and 10 O'clock sclerotomies.**
 - **3- with PVD induction**



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PVD induction

- One must beware of "sticky vitreous" or in cases in which **induction of a posterior vitreous detachment** is less straightforward, as these are scenarios that can give rise to **subtle small retinal tears in the periphery** or small peripapillary retinal hemorrhages
- These hemorrhages normally resolve spontaneously.
- If a small break is identified during this procedure, it is advisable to mark it with endodiathermy to make it clearly visible and facilitate the treatment with argon laser at the end of the procedure.

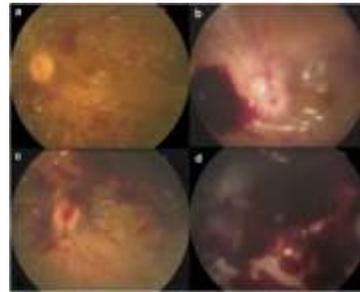
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5. Retinal bleeding

- **Causes:**

- From large retinal blood vessels during retinectomy or iatrogenic breaks → quickly trickles under the macula → **subretinal fibrosis**.
- From NVD & NVE → bleeding above retina → adherent to macula → **macular tears**.



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- **Preoperative prophylaxis:**
 - Anti VEGFs for florid NVDs & NVEs.
 - Stop aspirin and other drugs causing bleeding tendency (3-7 days) and control BP
- **Management:**
 - Increase the bottle height or IOP.
 - Diathermy.
 - Hypotensive anesthesia if possible.
 - Remove the subretinal blood through retinotomy if fesh.



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Hyphema

- Bleeding in the AC most commonly occurs in patient with **iris rubeosis** when the IOP is low during the procedure.
- **Avoiding hypotony** is therefore fundamental in patients at risk but; if this happens, the best way to proceed is performing an AC washout with **BSS** through a paracentesis. A subsequent injection of **viscoelastic** in the AC may be a good option to prevent further bleeding.



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6. Choroidal bleeding

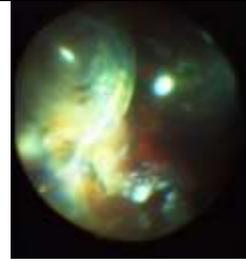
- Causes:
 - a. Iatrogenic choroidal injury.
 - b. Vascular sclerosis in old age.
 - c. Aspirin and hypertension.
- Management:
- as retinal bleeding, but sometimes it can not be stopped and may continue postoperatively.



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7. Silicon under the retina

- Occurs when the infusion cannula slips under the retina during Air / silicon exchange.
- Usually discovered after a considerable amount of silicon is injected.
- **Peripheral retinotomy** should be done → get the whole oil out of the eye → flatten the retina again → laser to the retinotomy edge.



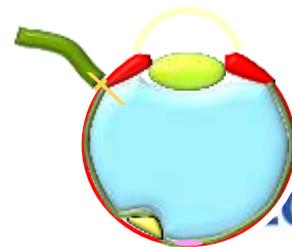
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8. PFCL under the retina

- 1- Excessive turbulence
- 2- Bad visualization
- 3- Persistent traction
- 4- PFC injection with posterior breaks esp with traction or short retina



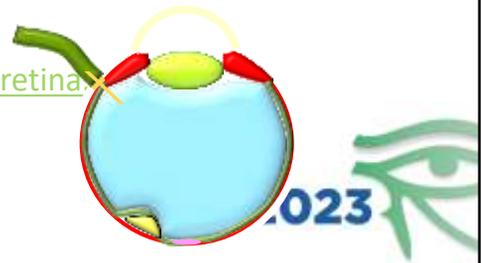
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8. PFCL under the retina

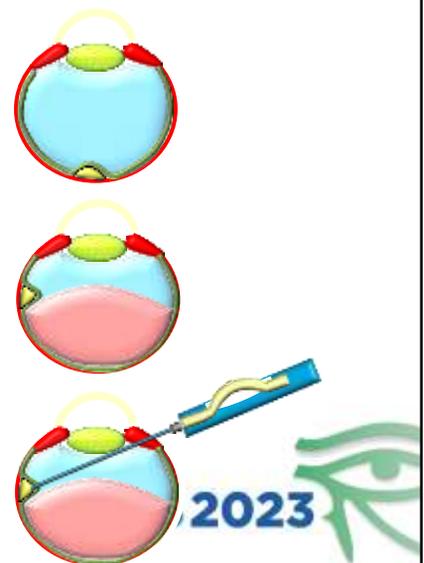
- 1-Occurs due to excessive turbulence inside the eye, especially when the break edge is not free from traction.
- It is advisable to administer perfluorocarbon liquid (PFCL) into the eye with a dual bore cannula that allows pressure release via passive egress of the intraocular fluid displaced by PFCL.
- If this cannula is not available, the surgeon should be very cautious when administering the PFCL to avoid rise in IOP during this procedure.
- Usually gravitate under the fovea.
- Usually discovered after flattening of the retina.



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8. PFCL under the retina

- Management:
 - Whatever small, a bubble **under the macula should never be left**.
 - **Re-detach the retina** → put a **large PFCL** trying to displace the submacular bubble peripherally → remove through a **retinotomy**. (juxta foveal retinotomy at the edge of pfc bubble)
 - **Small peripheral PFCL bubble** may be left (surrounded by laser reaction to limit its migration).
 - **Large peripheral bubble** → overlying **drainage retinotomy**. + Air
 - **41 gauge needle aspiration**
 - Attempted **pneumo-displacement**



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3- persistent retinal traction or short retina

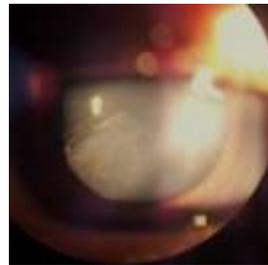
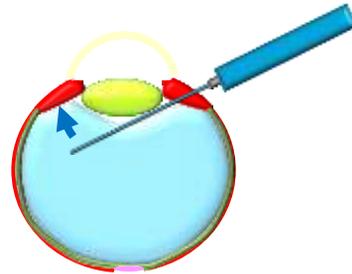
- In a patient at risk any membrane causing retinal stiffness should be carefully removed before PFCL injection as a rigid retina is more prone to cause the tamponade agent to reach the subretinal space. If this complication occurs, PFCL should be promptly aspirated from the retinal break due to the potential for toxic effects of the liquid on the retina.
- Subretinal migration of small PFCL bubbles can be subtle and can sometimes only be noticed in the postoperative period. In such cases early intervention appears to be warranted only if central vision remains at risk with subfoveally located droplets.
- retained PFCL may be missed in 1–11 % of cases and not detected until follow-up visits

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10. Lens Touch & injury

- Usually when the instruments cross the center of the eye to work in the periphery.
- If the capsule is opened → immediate lens extraction.
- If peripheral lens touch → postpone lens extraction if the opacity is not central.



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ILM Peeling You should know what you peel

- The rationale for peeling the ILM is to promote macular hole closure by relief of tangential traction and stimulation of wound healing.
- Peeling of the ILM is associated with higher rates of anatomical closure.
- **Persistent unsuccessful attempts to peel the ILM may be associated with poor visual outcome** despite anatomical closure.



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Staining complications

1-ICG

2-other

- Indocyanine green (0.125–0.5%.) and trypan blue dyes 0.06%.
- facilitate identification and dissection of the ILM.
- ICG (0.125–0.5%.) can be associated with **poorer visual outcomes** despite high rates of anatomical closure.
- Moreover, the use of ICG has been associated with the **development of irreversible peripheral nasal–visual field defects**, consistent with **retinal nerve fiber damage** involving predominantly the temporal retina.

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Indocyanine Green

- The reason for poor visual acuity and unexpected visual field defects reported in association with the use of ICG is not well understood.
- Mechanical, toxic or phototoxic mechanisms may be involved.
- The application of PFCL, viscoelastic or whole blood to the macular hole prior to ICG staining has been advocated to protect the exposed foveal RPE from possible toxic effects



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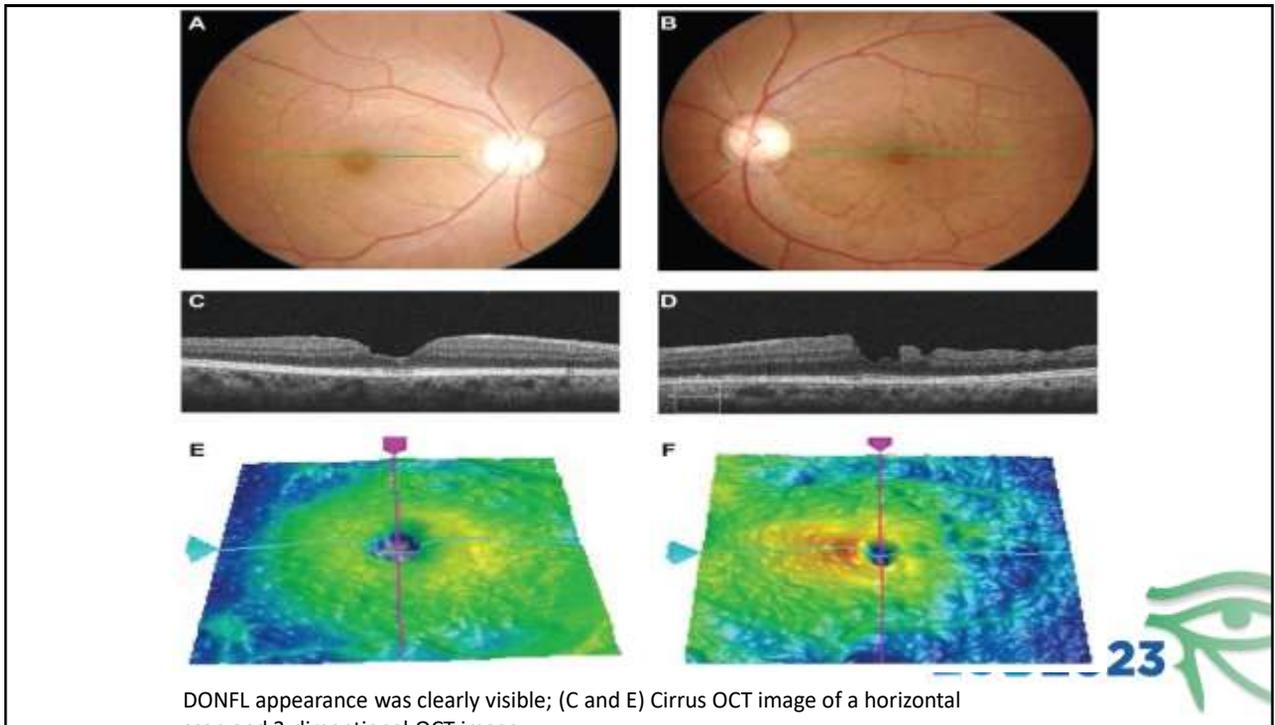
DONFL

- The DONFL (dissociated optic nerve fiber layer) appearance we refer to in this study was first described by Tadayoni et al. in 2001.
- , presumably related to ILM peeling. Using blue-filter photographs, they described the frequent feature of arcuate, slightly dark striae within the posterior pole along the course of optic nerve fibers, and they called this the DONFL appearance. The same feature was also faintly visible on red-free (OCT) revealed dimples in the retinal nerve fiber layer (RNFL) corresponding to each stria of the DONFL appearance and that the depths of all the dimples were limited to the RNFL thickness.^{9,10}
- DONFL appearance might be caused by cleavage of the optic nerve fiber bundles due to damage to the Müller cells, which are in close contact with the ILM and act to maintain the close proximity of the nerve fiber bundles.

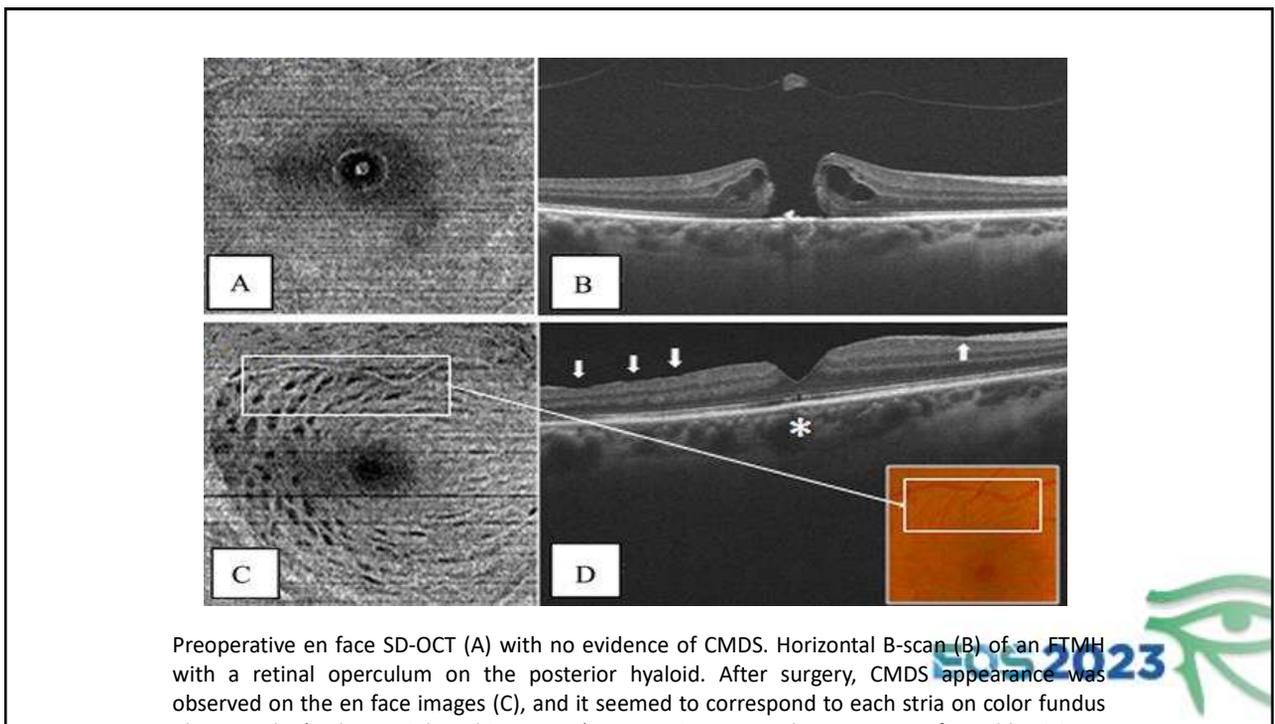
Banker AS, Freeman WR, Kim JW, Munguia D, Azen SP. Vision-threatening complications of surgery for full-thickness macular holes. Vitrectomy for Macular Hole Study Group. *Ophthalmology*. 1997;104(9):1442–1452; discussion 1452–1453



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Phototoxic Damage

- Phototoxic damage to the retina can occur because of **photothermal, photomechanical, or photochemical mechanisms**.
- **Photothermal damage** results from prolonged exposure of the retina to a light source.
- is a possibility if there is physical contact between the light **Photomechanical damage** probe and the retina.
- **Photochemical damage** results when the visible light excites endogenous or exogenous chromophores. The endogenous chromophores excitable by visible light wavelengths are the photoreceptor pigments, as well as the melanin and lipofuscin of the RPE. ICG is an example of an exogenous chromophore excitable by visible light. Chromophore excitation produces reactive oxygen species, which cause lipid peroxidation and destroy cell membranes



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Endophthalmitis

- The Post-Vitrectomy Endophthalmitis Study Group estimated the frequency of infection with 20-gauge vitrectomy at **0.07%**.
- Early migration to smaller-incision 23-25-27 gauge vitrectomy raised the question of possible increased rates of infection.
- With modifications of wound construction and surgical technique, however, follow-up studies have demonstrated **equivalent endophthalmitis rates** between 23-25-27 gauge vitrectomy and traditional 20-gauge procedures.

Cohen SM, Flynn HW Jr, Murray TG, Smiddy WE. Endophthalmitis after pars plana vitrectomy. The Postvitrectomy Endophthalmitis Study Group. *Ophthalmology*. 1995;102(5):705-712



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Minimize the risk of endophthalmitis.

- proper wound construction in 23- or 25- gauge vitrectomy is essential, including the **displacement of conjunctiva with a beveled or biplanar wound approach** to prevent straight conduits
- It is important to **prevent vitreous wicks**, which may increase the seeding of bacteria into the eye.
- The use of **air or gas tamponade** at the conclusion of 23- or 25-gauge vitrectomy may be considered to increase wound stability.
- Furthermore, the report states, **wound suturing** is always advisable if there is any suspicion of wound leakage at the end of the case.

Shah R, Gupta O. The Microsurgical Safety Task Force: guidelines for minimizing endophthalmitis with vitrectomy surgery. *Curr Opin Ophthalmol.* 2012;23(3):189-194
 Kunimoto DY, Kaiser RS. Incidence of endophthalmitis after 20- and 25-gauge vitrectomy. *Ophthalmology.* 2007;114:2133-2137



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Suprachoroidal haemorrhage

- Indication of drainage
- 1- AC shallowing
- 2- Retinal detachment
- 3-IOP ++
- 4-Kissing choroid
- 5-severe ocular pain



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- 1- periotomy -3-4 mm radial sclerotomy
- 8 mm behind limbus
- 2- trocher transcounjunctival
- Associate with PPV in RD-retinal incarceration-vit hge



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summary

- **Vitrectomy is a complex blend of highly technical microsurgery**
- Potentially many intraoperative complications can happen.
- **Following the proper techniques can avoid and manage complications**

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THANK YOU

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