A Different Kind of Oil Removal

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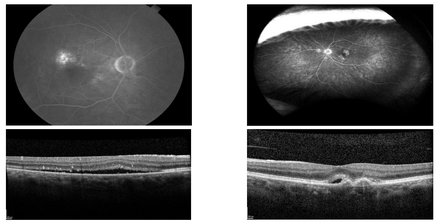
Case Presentation

73 F artist with neovascular ARMD OU



IVI series OD (145):
Bevacizumab - 15
Aflibercept - 10 & HD 1
Ranibizumab - 103
Faricimab - 16

IVI series OS (37):
Ranibizumab - 35
Aflibercept - HD 2

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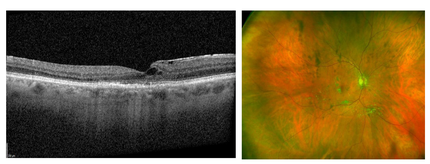
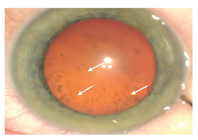
Clinical Findings



- Patient dissatisfaction from floaters (myodesopsia) OD>OS
- Visible accumulation of intravitreal SiO microdroplets OD > OS
- Declining vision OD: 20/70 OS: 20/20
- Epiretinal membrane OD
- Cataracts OU

Management

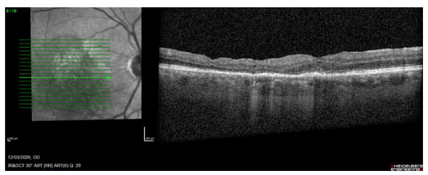
OD: Vitrectomy, cataract extraction, PCIOL implant, membrane peeling



SiO vitreal microdroplets (phakic)

SiO vitreal microdroplets (pseudophakic)

Post Surgical Outcome



- Symptoms improved
- VA OD: 20/25

Discussion

Background

- Intravitreal drug injections (IVI) are widely performed to deliver pharmaceutic agents in the management of various retinal diseases.
- In Alberta, an 85% increase in VEGF injections occurred over the last 10-years (2016: 65,815 injections, 2025: 121,990 injections).[1]
- Majority of commercially available syringes used to administer these IVI are not develop specifically for ophthalmic use, with the syringe inner surface coated with silicone oil (SiO).
- Factors leading to migration of SiO into the vitreous may include - syringe design, agitation of siliconized syringes, storage and needle used.[2,3,4]
- Side effects from SiO migration into the vitreous includes floaters, visual disturbances, inflammatory/immunological responses and elevated intraocular pressure.

Historically

- Fruend et al reported in 2006 and reinforced in 2008 by Bakri et al; noted the problematic iatrogenic and long-term effects on SiO on ocular tissues.[3]
- Ophthalmologists have traditionally relied on commercially available syringes which are not specifically designed for IVI procedures.
- In Canada, regional programs and barriers, physician preferences, lack of guidelines and standardization on injection devices (syringes/needles), compounding and vial splitting processes are further contributing issues to SiO migration.

Literature Review

- Ovid MEDLINE search with key words "*intravitreal injections*", "*silicone oil droplets*" and "*2016-present*" yielded 104 articles. 26 recent high level evidence manuscripts, including three review articles were assessed.
- All articles alluded to use of low-silicone or silicone free syringes, gentle handling and careful preparation of intravitreal injections to minimize silicone migration and maximize patient safety.

Key Literature Citations

Prevalence of Intravitreal Silicone Oil Following Intravitreal Injections: A Meta-Analysis[2]

Chavez MP, et al. Am J Ophthalmology, 2026

- Meta-analysis of 10 studies
- 1,583 eyes evaluated
- Overall prevalence of SiO droplets after IVI: 57.6%
- Device-Related Findings:
  - **Staked needles**
    SiO prevalence: 72.3%
  - **Non-staked needles:**
    SiO prevalence: 17.1%

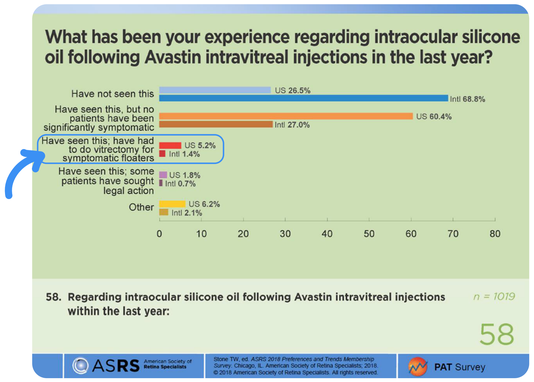
Silicone Oil Migration During Intravitreal Anti-VEGF Injections: A Review of Clinical Evidence and Factors Related to Transmission[3]

Rahmani K, et al, Retina (published ahead of print), 2026

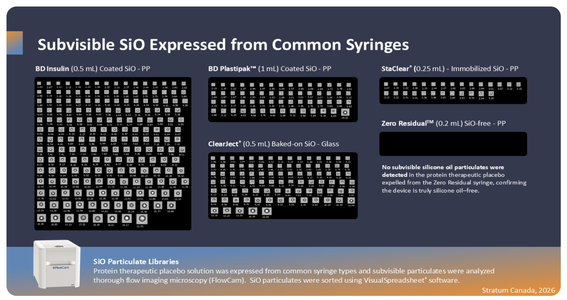
- Systematic review of 15 studies
- High prevalence of SiO in chronically injection eyes
- Contributing factors included syringe batches, technique, freeze-thaw cycles, mechanical agitation, siliconized low dead space syringes and improper plunger handling
- Silicone-free or low silicone syringes, meticulous procedural protocols, including strict storage and gentle handling, enhance safety and clinical outcomes of IVI therapy
- Underrecognized and preventable
- Uncertain long-term risks (inflammation/glaucoma)

Preferences and Trends Membership Survey, ASRS, 2018[5]

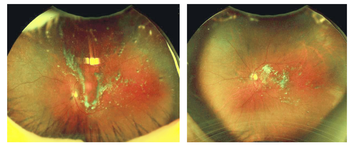
(adapted with permission)



SiO Quantified!

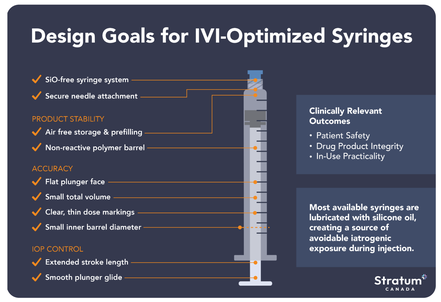


Two More Examples



Courtesy of:
Khola Bilal
Dr. Michael Butler

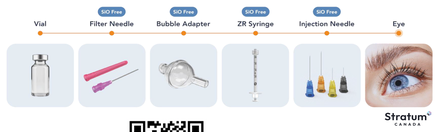
Recommendations: Silicone Free System



Furthermore...

- Choose attachable needles over staked-on designs
- Avoid agitating syringes as it increases silicone release
- Ensure proper storage conditions (avoid free-thaw cycles)
- Prime syringes carefully without excessive manipulation
- Gentle, smooth plunger depression during injection

An example of silicone-free system:



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Conclusion

- Chronic intravitreal anti-VEGF injections may lead to clinically significant accumulation of SiO microdroplets in the vitreous.
- A *SiO free system from vial to eye* is imperative to minimize patient morbidity.

References

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