The Effect of Intra-capsular Trypan Blue on the Refractive Predicability of Cataract Surgery

Ahad Mahootchi, MD
The Eye Clinic of Florida
Zephyrhills, FL
No financial interest

Background

- Many factors contribute to the variability of refractive outcomes after cataract surgery.
- Even with quality measurements of the axial length, advances in keratometry, and modern IOL formulas, many surgeons struggle to keep more than 60% of patients within +/- .5 Diopters of the intended post op refraction.
- Reducing larger errors (>3/4 D) reduces the need for enhancing Premium Lens patients.

Background

- Trypan Blue is toxic to lens epithelial cells yet safe for corneal endothelial cells[1,2].
- Remnant lens epithelial cells contribute to PCO but may play a role in individual healing that leads to variation in effective lens position or other mechanisms that affect final refraction.

Methods

- 80 consecutive cataract surgeries in treatment arm.
- 200 immediately preceding surgeries served as controls.
- Manual Refraction (standardized protocol) at 2-3 weeks post op was compared to predicted post op refraction.
- Single surgeon performed all cases with standard phaco-emulsification.

The Intervention

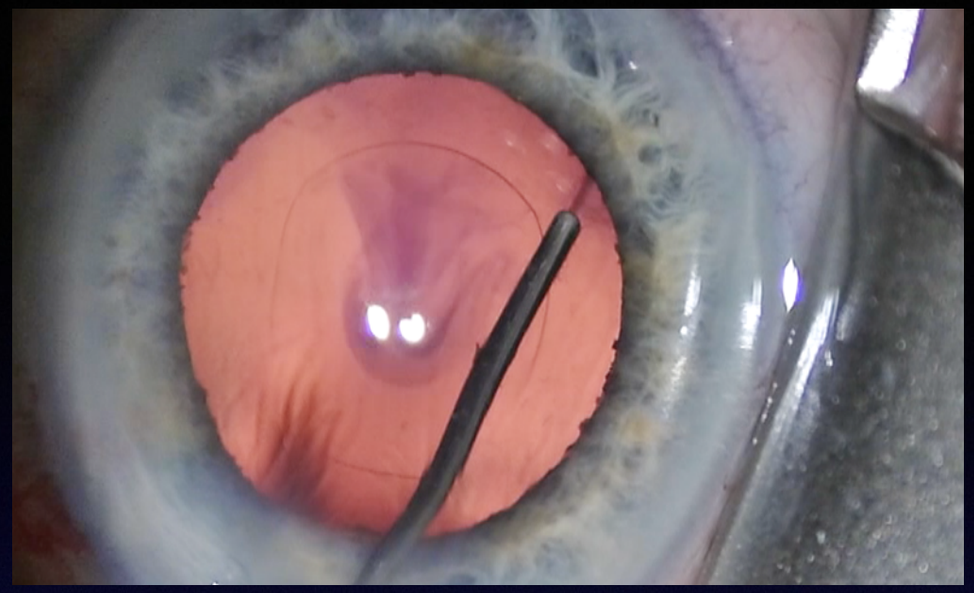
- After Phaco the capsular bag was filled with Trypan Blue for 1 minute.
- After the minute the Trypan Blue was displaced with viscoelastic. Capsule polishing and lens insertion proceeded as usual.

Methods

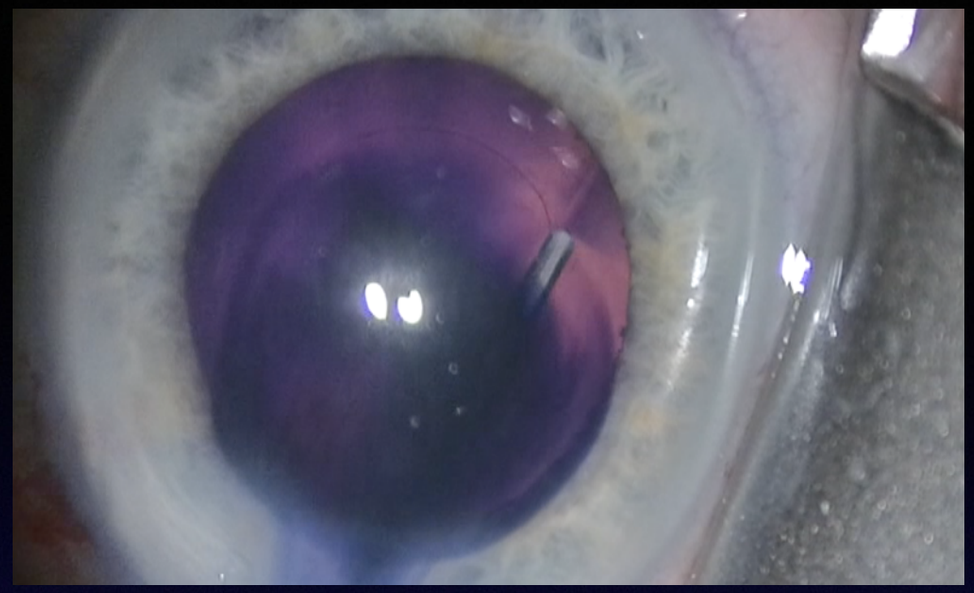
- Patients with Advanced AMD, diabetic retinopathy, and Keratoconus were excluded.
- All lens types were included (Toric, 3 piece silicone, and accommodating)
- Hoffer Q formula used for eyes under 25mm.
- SRK-T formula used for accommodating lenses and all eyes over 25 mm.
- ASCRS Calculator and Barrett Universal Formula used for post refractive surgery eyes.

Methods

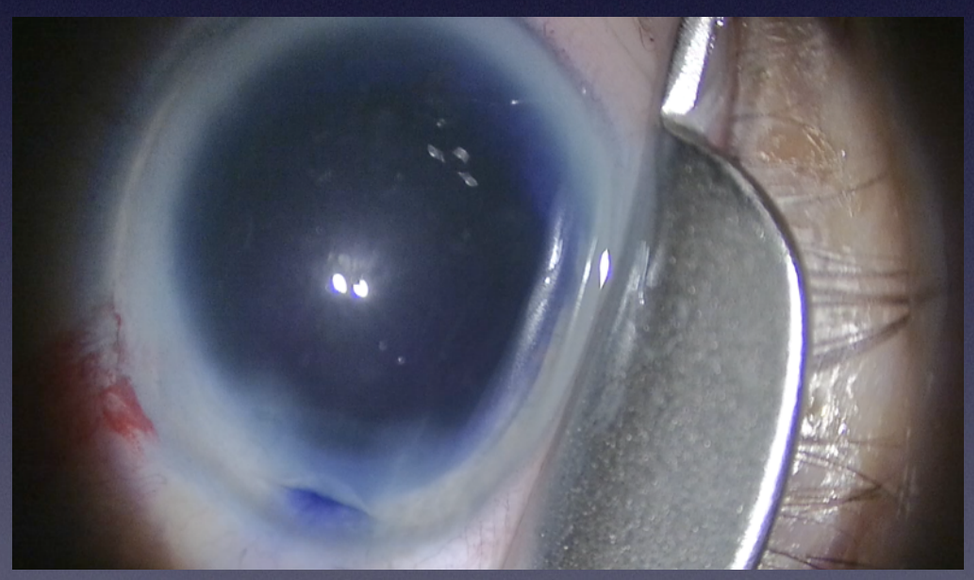
- No intra-operative aberrometry used.
- No Femtosecond Laser used.
- Variety of lens type (50% silicone 3 piece mono focal, 23% Toric, 27% accommodating)
- Patients with prior refractive surgery included.



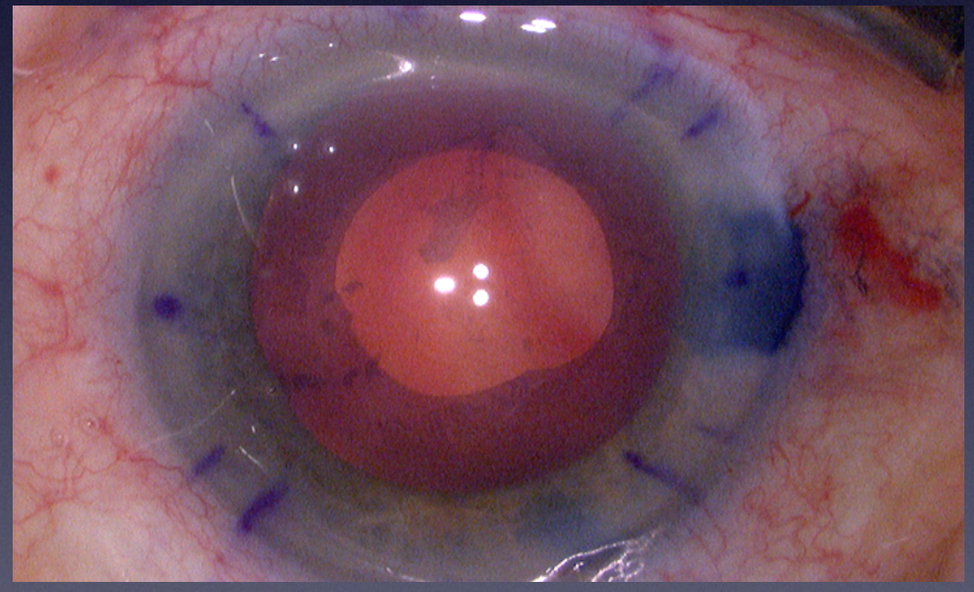
Trypan Injected Into Bag



Trypan Fills Capsular Bag



Trypan Fill for 60 seconds



Trypan Displaced by Visco

Intra-operative photos

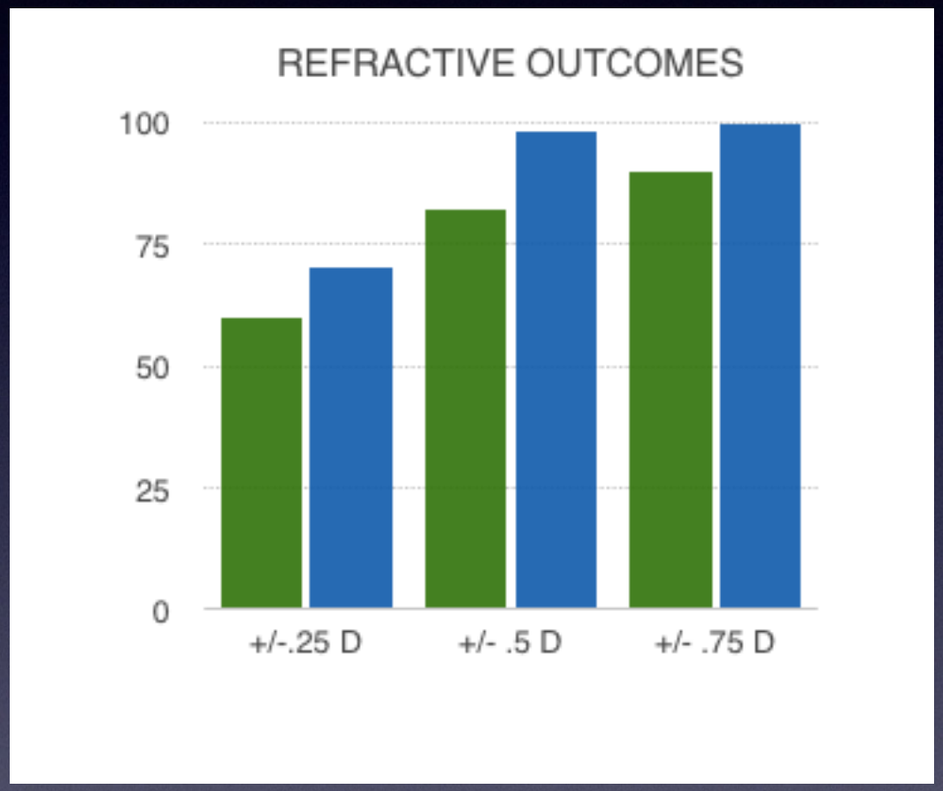
Results

PERCENT WITHIN REFRACTIVE RANGE

RANGE OF RFX	+/-.25 D	+/- .5 D	+/- .75 D
NO TRYPAN BLUE	60	82	90
TRYPAN BLUE TREATED	70	98	100

PERCENT WORSE THAN

RANGE OF RFX	1/4 D	1/2 D	3/4 D
NO TRYPAN BLUE	40	18	10
TRYPAN BLUE TREATED	30	2	0



Results

- Mean Average Prediction Error was **.35 Diopter** in the control group. It improved to **.05 Diopter** in the trypan blue treated group. (P = .02)
- % within +/-.5D improved from 81.5% to 97.5%. (P = .00021)
- % >.75 D off intended target reduced from 10% to 0%.

Discussion

- Trypan Blue applied to the inside of the lens capsule can “tighten up” the refractive outcomes of cataract surgery.

- The mechanism of action needs more study but reducing the individual variations in load of LEC’s left behind may reduce the variation in healing that lead to deviation from predicted refractive outcome.

- If our on-going studies with larger numbers of patients conclude the same result, this inexpensive technique would be a new standard. It current results are better than those of intra-operative aberrometry assisted cases.

References

1. Nanavaty, Mayank. et al. Effect of trypan blue staining on the density and viability of lens epithelial cells in white cataract. J Cataract Refract Surg 2006; 32:1483–1488 Q 2006 ASCRS and ESCRS

2. Portes, André Luís F. et al. Effect of trypan blue on lens epithelial cells in human eyes having capsulorhexis. J Cataract Refract Surg 2007; 33: 1135 - 1136