Prospective study with confocal and histological confirmation of Ophthalmic Viscoelastic Device deposition in the corneal subepithelium

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RANZCO Tasmania: Cornea Unplugged

The authors declare no financial relationships or conflicts of interest
Ophthalmic Viscoelastic Devices (OVDs) are an essential component of anterior segment surgery.

Reported adverse effects of OVD include:
- Postoperative raised IOP\(^1\)
- Capsular block syndrome\(^2,3\)
- Toxic anterior segment syndrome\(^4-7\)
Corneal deposits observed near the sideport incision on day 1 following uneventful phaco

DOCS: Deposition of OVD in the Corneal Subepithelium
Fig 1A. Presumed OVD deposition within the corneal epithelium below the healed sideport region.
Fig 1B. Presumed OVD deposition within the corneal epithelium below the healed sideport region (zoomed).
To study the incidence and possible aetiopathological factors of DOCS

To confirm and assess the nature of DOCS using:
- Confocal microscopy
- Light microscopy
- Electron microscopy
- Mass spectrometry

Prospective, consecutive study
Prospective study on the ocular manifestations in inherited epidermolysis bullosa

Brendon WH Lee, Jeremy CK Tan, Melissa Radjenovic, Lien Tat, Minas T Coroneo, Dedee F Murrell

Paediatric Symposium

Reference

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Background

Aim

Methods

Result

Discussion

Conclusion

Reference

212 patients
1 excluded
Total: 211

Recruitment

Procedure

DOCS

Parameters

- Day 1
- Week 1
- Month 1

Age
Gender
Nuclear sclerosis grade
Postop complications
Duration of surgery
Preop/postop CDVA

Viscoat®
Provisc®
Injected via sideport

• Day 1
• Week 1
• Month 1

Samples harvested

DOCS: Lee, et al.
211 patients:

- Age: 71
- 64% female
- NS: 2.37 (LOCS III)
- No postoperative complications

Parameters:

- Visual Outcomes:
  - 96% (203): 6/6
  - 93% (196): 6/4

- Mean surgery duration = 37.80 minutes (8.48 SD)

DOCS:

Overall incidence: 34%

- Day 1 = 6.2%
- Week 1 = 27.5%
- Month 1 = 15.2%

DOCS: Lee, et al.
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Light microscopy of DOCS

Fig 2. Corneal epithelial specimen from left eye (H&E staining, 400x).

DOCS: Lee, et al.
Fig 3. Corneal epithelial specimen demonstrating an intact vacuole with surrounding meniscus effect of emulsified OVD.

DOCS: Lee, et al.
Confocal microscopy of probable DOCS entry pathway

Fig 4. Probable pathway of OVD ingress into corneal subepithelium, traversing between epithelial cells.
Electron microscopy

Mass spectrometry
Repeated measures ANOVA demonstrates a positive relationship between postoperative time and initial presence of DOCS on day 1: \(F_{1.81,376.20} = 12.15, p \leq 0.001\)

More DOCS at one week \((p < 0.001)\) and one month \((p = 0.001)\) than at one day.
Spearman correlation

Positive for duration of surgery and presence of DOCS but only for 2.2% of the variance ($r = 0.0148$, $p = 0.032$, $r^2 = 0.022$)

Binary logistic regression model

No further significant predictors ($p \geq 0.05$)
Historically, OVD deposition has been reported elsewhere:

- In the intrastromal cornea\textsuperscript{8-11}
- Between Descemet’s membrane and corneal stroma\textsuperscript{12-14}
- On anterior surface of posterior lens capsule\textsuperscript{15}

No previous documentation of DOCS\textsuperscript{16}
The correlation of DOCS with **duration of surgery** is likely due to:

1. More OVD used in longer, more difficult cases
2. Patients having Fuchs’ or EBM dystrophy
3. Longer phaco times\textsuperscript{17,18}

However, this correlation only explained 2.2% of cases. **Therefore**, there are likely to be other mechanisms for DOCS.

But, DOCS seems to be longstanding.
DOCS: 15.2% of 211 phaco cases at 1 month

DOCS was confirmed by confocal and light microscopy

Mechanism of DOCS is still unclear

DOCS had no adverse surgical or visual outcomes
Thank you.

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