Central or Paracentral Scotoma Associated with Nasal Placement of Chandelier Infusion During Vitrectomy with Fluid-Air Exchange

J. Michael Jumper MD, Sara J. Haug PhD, Arthur D. Fu MD, Robert N. Johnson MD, H. Richard McDonald MD
West Coast Retina Medical Group, California Pacific Medical Center, San Francisco, CA

The authors have no financial interest in the material presented.

Introduction
Visual field defects are a recognized complication of fluid-air exchange. These defects are often temporal or inferotemporal corresponding to the point of presumed injury from infusion. Proposed mechanisms include: 1) optic nerve injury, 2) “dehydration” injury of the retina and 3) mechanical injury from the air infusion. Air infusion pressure is strongly associated with scotoma formation. Chandelier infusion systems that combine lighting and infusion allow for binocular surgery. (Figure 1) Herein we describe four cases of central or paracentral scotoma associated with chandelier infusion placed inferonasally.

Methods
This study is a retrospective case series of suspected infusion-related central or paracentral scotoma. Patients were identified who had scotoma identified after retinal detachment repaired with vitrectomy and fluid air exchange. Patients were included in this study who had nasal placement of chandelier infusion. Clinic notes and operative reports were reviewed. The following data was recorded: patient demographics, preoperative diagnosis, extent of retinal detachment, previous procedures, pre-vitrectomy visual acuity (VA), surgical procedures, final postoperative VA, and postoperative examination findings. All ancillary testing was reviewed.

Results
- 4 patients identified
- M=3, F=1
- Mean age at presentation 49.2 (46-52 yrs)
- Presenting diagnosis: Recurrent retinal detachment (n=4)
- Previous surgeries include:
  - Pneumatic retinopexy with cryotherapy (n=3)
  - Scleral buckling with intravitreal gas injection (n=3)
- Mean pre-vitrectomy VA: 20/56 (20/25-20/125)
- Pre-vitrectomy, the macula was attached in all cases
- Surgical procedures included:
  - Scleral buckle (3/4, one previously placed)
  - 20-gauge vitrectomy w/ inferonasal chandelier infusion (4/4)
  - Lensectomy (1/4)
  - Perfluorocarbon (1/4)
  - Fluid-gas exchange with C3F8 gas (4/4)
- Mean follow-up was 17 months (14-26 months)
- Mean final postoperative VA was 20/213 (20/20, 20/32, 20/200, 20/600)
- Postoperative findings included:
  - Central or paracentral “positive” scotoma within the 1st postoperative week (4/4)
  - Optic pallor (1/4)
  - Transient CME (1/4)
  - VF testing revealed defects corresponding to the scotoma
  - Fluorescein angiography was normal
  - Photodisruption was found on SD-OCT in one patient.

Conclusions
This series of patients represents persistent central or paracentral scotoma that was obvious to the patient in the early postoperative period and is associated with nasal placement of an infusion chandelier. This likely represents infusion related injury. Nasal placement of infusion should be avoided if fluid air exchange is anticipated during vitrectomy. Small gauge surgery with valved cannula systems will likely further lower the risk of this complication.

Case report
- 51 y.o. caucasian man
- Shadow in vision for 4 days
- POHx: low myopia, phakic
- PMHx: hypercholesterolemia
- Va: RE 20/20, LE 20/25
- Initial procedure, scleral buckle/cryo
- 2 weeks later, new tears with recurrent RD (Figure 2)
- Surgical technique
  - 20-gauge vitrectomy
    - Endolaser
    - Fluid-gas exchange (16% C3F8)
    - 20-gauge infusion chandelier placed inferotemporal
- Postoperative week #1:
  - Va hand motions
  - IOP normal
  - Good gas fill
  - c/o dark central scotoma
- Postoperative month #2
  - Va 20/80
  - “Positive” scotoma remains
  - Made decision to continue infusion (Figure 3)
- Postoperative month #24 (Final f/u)
  - Va 20/32
  - “Positive” scotoma remains
  - Made decision to continue infusion

References
Materials and Methods

• Retrospective case series
• Patients were identified who had scotoma identified after retinal detachment repaired with vitrectomy and fluid air exchange
• Patients were included in this study who had nasal placement of chandelier infusion
• Recorded data:
  – Patient demographics
  – Preoperative diagnosis
  – Extent of retinal detachment
  – Previous procedures
  – Pre-vitrectomy visual acuity
  – Surgical procedures
  – Final postoperative visual acuity
  – Postoperative examination findings
  – Ancillary testing results
Results (1)

- 4 patients identified
- M=3, F=1
- Mean age at presentation 49.2 (46-52 yrs)
- Presenting dx: RRD (4/4)
- Prior surgeries
  - Pneumatic retinopexy/ cryotherapy (3/4)
  - Scleral buckle/ cryotherapy/ air bubble (1/4)
- Pre-vitrectomy Va: 20/56 (20/25-20/125)
- IOP normal in all patients
- Anterior segment
  - s/p LASIK without central K changes (1/4)
  - Sectoral cataract/ iris sphinctor abnormality (1/4)
- No optic nerve abnormalities seen
- Rhegmatogenous retinal detachment (4/4)
- Location of RD
  - Superonasal (2/4)
  - Superotemporal (1/4)
  - Inferotemporal (1/4)
- Macula attached (4/4)
- Vitreous hemorrhage (2/4)
- Procedures
  - Scleral buckle (3/4, one previously placed)
  - 20-gauge vitrectomy in all cases
    - 20-gauge chandelier infusion (4/4)
    - Inferonasal placement
  - Lenscetomy (1/4)
  - Perfluorocarbon liquid (1/4)
  - Fluid gas exchange with C$_3$F$_8$ (4/4)
Results (2)

- Mean follow-up 17 months (14-26 months)
- Mean final Va: 20/213 (20/20, 20/32, 20/200, 20/600)
- “Positive” scotoma noted within 1 week (4/4)
- Retinal reattachment
- Optic pallor 2/4
- No macular FA abnormalities
Results (3)

Case 1

Case 4