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# Comparative Incidence of Postoperative Hemorrhage in Vitreoretinal Surgery in Patients on Anti-Coagulation

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**Matt Starr, MD**  
Vitreoretinal Fellow

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# Financial Disclosures

- None



# Summary

- The use of direct oral anticoagulants does not appear to increase the immediate post-operative hemorrhagic risk in patients undergoing pars plana vitrectomy
- Pre-operative anticoagulant use may influence the type of post-operative hemorrhage

# Introduction

- DOACs were first approved by the FDA in 2010
  - Do not require routine lab monitoring<sup>1-3</sup>
  - Achieve effective anticoagulation with fewer drug interactions and a shorter half-life compared to warfarin<sup>2,3</sup>
- With warfarin, the INR is used to determine an appropriate therapeutic target
  - For patients undergoing surgery, the INR guides dose adjustments to the warfarin dose in the peri-operative period
  - In contrast, the effect of DOACs is difficult to monitor using the INR and reversal agents are lacking<sup>4,5</sup>



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# Surgeon's preference on anticoagulation

- **Vitreoretinal surgeons vary greatly in their management of pre-operative anticoagulation<sup>6-9</sup>**
  - The majority of vitreoretinal surgeons (92%) would continue aspirin pre-operatively
  - 82% would continue clopidogrel
  - 79% would continue warfarin
  - 58% would continue DOACs
  - 83% of the same surgeons were not confident in their management of DOACs
  - 24% of these surgeons reported they did not know how to manage DOACs<sup>6</sup>



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**Wills Eye Retina Service**



# Study Objectives

- Identify the proportion of patients using DOACs preoperatively
- Calculate the rate of post-operative hemorrhages
- Compare the rates of post-operative hemorrhage between DOACs to both warfarin and eyes with no history of anticoagulation use (DOACs or warfarin)



# Methods

- A panel of United States retina specialists (Vestrum Health, LLC, Naperville, IL)
  - 320 retina physicians
  - 1.8 million unique patients
  - 11 million encounters
- Detailed information on in office and outpatient pharmaceutical use
- The database is refreshed on a weekly basis



# Inclusion/Exclusion Criteria

- **Inclusion Criteria:**

- All patients who underwent a pars plana vitrectomy from Jan 2013 to May 2020
- DOAC or warfarin use documented in the chart within 3 months of surgery

- **Exclusion Criteria:**

- History of pre-operative hemorrhage
- Less than one month of post-operative care
- Other anti-thrombotic agent use
- Aspirin use allowed, but not considered an anti-coagulant

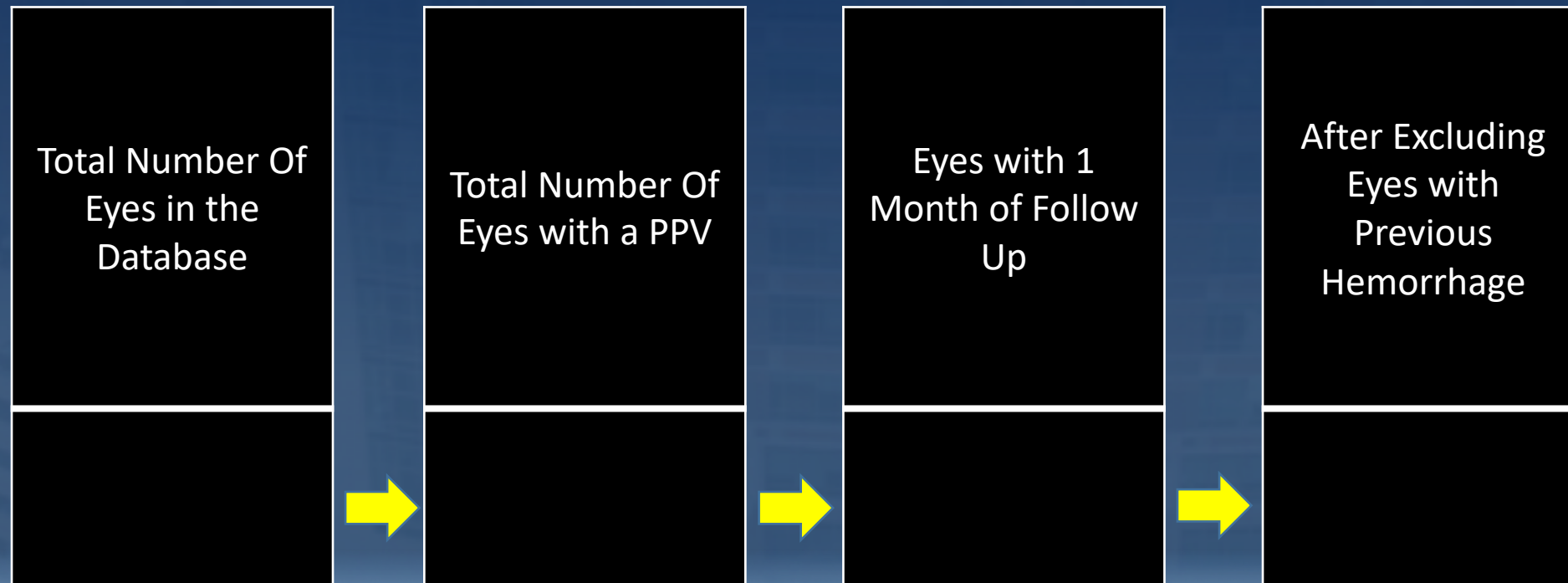


# Metrics

- Rate of post-operative hemorrhage
- Type of hemorrhage: retinal, vitreous, choroidal, hyphema
- Time from surgery to hemorrhage



# Patient Population



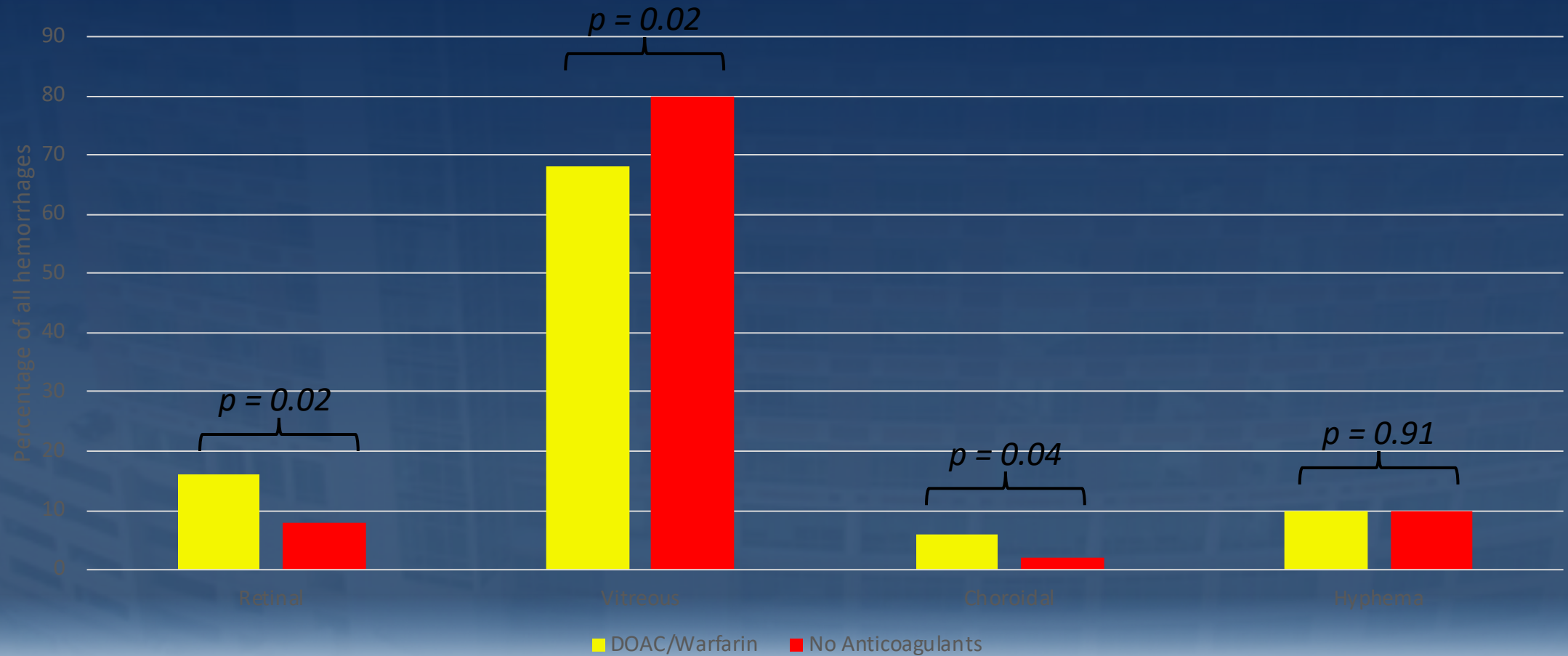
# Rate of post-operative hemorrhage

- **1,066/65,365 (1.62%)** eyes developed a post-operative hemorrhage during the study period
- **69/3531 (1.95%)** eyes had a history of DOAC or warfarin use versus **997/62,104 (1.61%)** of eyes with no prior anti-coagulant use, **p = 0.1205**
- Mean time to hemorrhage was **10.0 ± 7.0 days**

# DOACs vs Warfarin vs No Anticoagulants

- There was no difference in the rate of hemorrhage between DOACs (1.90%) vs warfarin (2.03%,  $p = 0.78$ ) or DOACs vs no anticoagulant (1.61%,  $p = 0.31$ )

# Types of post-operative hemorrhage



# Discussion

- The primary objective of the study was to characterize the real-world incidence and type of postoperative hemorrhage in patients using direct oral anticoagulants
- There was no difference in the rate of hemorrhage in patients receiving DOACs or warfarin compared to no anticoagulant use
- Patients on DOACs/warfarin had more retinal hemorrhages, choroidal hemorrhages, and hyphemas with less vitreous hemorrhages

# Limitations

- Use of a large electronic database precludes the ability to manually review each chart for accuracy of diagnoses and procedures
- A database metric to identify cessation and restarting of anticoagulation in the perioperative period was lacking
- Large databases, though, give real-world clinical data, and often add significant information to clinical trial findings<sup>10</sup>



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# Conclusions

- This study cannot confirm if stopping DOACs pre-operatively is warranted
- The use of DOACs does not appear to increase the immediate post-operative hemorrhagic risk in patients undergoing PPV
- Pre-operative anticoagulant use may influence the type of post-operative hemorrhage

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