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INCIDENCE RATES OF ENDOPHTHALMITIS AFTER VARIOUS PHARMACEUTICAL INTRAVITREAL INJECTIONS

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Abstract

Introduction: The purpose of this study is to analyze incidence rates of endophthalmitis after intravitreal injection(s) of bevacizumab (BEVA), brolucizumab (BROL), aflibercept (AFL), ranibizumab (RAN), dexamethasone implant (DEXA), and triamcinolone acetonide (TRIA).

Methods: In this retrospective cohort study data was collected from patients who received intravitreal injections from January 2020 through November 2021, of AFL, BEVA, BROL, DEXA, TRIA and RAN. Data collected includes patient identification number, injection dates, medication injected, and procedure codes. Endophthalmitis rates were compared amongst medications and total percentage tabulated.

Result: From January 2020 through November 2021, 109,202 injections were administered. Of the 109,202 injections administered: 66,095 were aflibercept, 28,762 bevacizumab, 8,650 ranibizumab, 3,010 brolucizumab, 1,958 dexamethasone implant, and 95 triamcinolone acetonide. Thirty-nine (0.036%) endophthalmitis cases occurred. Of the 39 endophthalmitis cases, 22 of the cases occurred (0.033% of total aflibercept injections) after aflibercept injection(s), 5 (0.688% of total triamcinolone acetonide injections) after triamcinolone acetonide injection(s), 5 (0.03% of total bevacizumab injections) after bevacizumab injection(s), 3 (0.153% of total dexamethasone implants) after dexamethasone implantation(s), 2 (0.066% of total brolucizumab injections) after brolucizumab injection(s), 2 (0.023% of total ranibizumab injections) after ranibizumab injection(s).(Table 1) Using a student's t-test, the rate of endophthalmitis for TRIA versus all other medications was statistically significant with a p-value of 0.00152.

Conclusion: Results show an endophthalmitis incidence rate of 0.036% after intravitreal injection(s) administration. This review suggests triamcinolone acetonide (TRIA) yielded a significantly higher incidence rate of endophthalmitis as compared to the other medications.

Keywords: Endophthalmitis, Intravitreal Injection, Retina, Ophthalmology

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INTRODUCTION

Intravitreal injections are a widely used treatment in retinal ophthalmology to treat various retinal diseases and conditions. With intravitreal injections comes a risk of developing endophthalmitis. Incidence of endophthalmitis from intravitreal injections ranges from 0.095% to as low as 0.0053% .[1,2,3] However, due to the number of intravitreal injections performed yearly, many patients are affected and/or at risk. Ophthalmologists can use the findings of this study to improve treatment and reduce the chances of endophthalmitis occurring in patients requiring intravitreal injections.

The purpose of this study is to analyze incidence rates of endophthalmitis after intravitreal injection(s) of the following medications: bevacizumab (BEVA), brolucizumab (BROL), aflibercept (AFL), ranibizumab (RAN), dexamethasone implant (DEXA), and triamcinolone acetonide (TRIA).

METHODS

A retrospective cohort study was performed at a single private retinal specialty practice in Ohio. The Institutional Review Board granted a waiver of authorization for this study. All data was collected through the practice management software of Retina Associates of Cleveland, Inc. Data was collected from patients who received injections over a 2-year period, January 2020 through November 2021, of AFL, BEVA, BROL, DEXA, TRIA and RAN. Patient data collected includes patient identification number, injection service dates, intravitreal drug injected, and procedure codes. Primary diagnosis was not followed A variety of physicians administered the injections, each with their own method of injection. All patients had at least 2 drops of tetracaine, 2 drops of betadine (allowed to dry for 30 seconds), and a lid speculum used to administer the injection Each patient had at least 1 month between injections. Endophthalmitis rates were compared amongst the different intravitreal medications administered and total percentage was tabulated. This study was approved by Sterling Institutional Review Board (IRB). Using a student's t-test, the rate of endophthalmitis for TRIA versus all other medications was assessed for statistical significance.

RESULT

From January 2020 through November 2021, 109,202 injections were administered. Of the 109,202 injections: 66,095 were aflibercept, 28,762 bevacizumab, 8,650 ranibizumab, 3,010 brolucizumab, 1,958 dexamethasone implant, and 95 triamcinolone acetonide. Of the 109,202 injections, 39 (0.036%) cases of endophthalmitis occurred. Of the 39 endophthalmitis cases, 22 of the cases occurred (0.033% of total aflibercept injections) after aflibercept injection(s), 5 (0.688% of total triamcinolone acetonide injections) after triamcinolone acetonide injection(s), 5 (0.03% of total bevacizumab injections) after bevacizumab injection(s), 3 (0.153% of total dexamethasone implants) after dexamethasone implantation(s), 2 (0.066% of total brolucizumab injections) after brolucizumab injection(s), 2 (0.023% of total ranibizumab injections) after ranibizumab injection(s).(Table 1) Using a student's t-test, the rate of endophthalmitis for TRIA versus all other medications was statistically significant with a p-value of 0.00152.

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Table 1. Total medications injected and number of endophthalmitis cases per medication.

Medication	Injections 20-21	Number of Endophthalmitis Cases
Bevacizumab	28762	5
Brolucizumab	3010	2
Alfibercept	66095	22
Ranibizumab	8650	2
Dexamethasone Implant	1958	3
Triesence	95	5
Total	109297	39

DISCUSSION

The results of the study show a total incidence rate of 0.036% of endophthalmitis after administration of intravitreal injection(s). This review suggests that triamcinolone acetonide (TRIA) yielded a significantly higher incidence rate of endophthalmitis as compared to the other medications. Other studies have yielded similar results. Mishra et.al. found higher rates of endophthalmitis caused by intravitreal injections of triamcinolone acetonide than bevacizumab, with the lowest incidence rate in ranbizumab.[4] Another study of 922 eyes treated with intravitreal injection of triamcinolone acetonide was associated with an endophthalmitis incidence rate of 0.87%.[5] In a study completed by Ozkiris et al., an endophthalmitis rate of 0.5% was found in a population of 212 eyes.[6] In this study, it is speculated that the higher incidence rate of endophthalmitis in the triamcinolone acetonide group could be due to several factors such as: medication preparation, drug composition or medication administration.

Medication preparation prior to injection is a vital step. Intravitreal injections either come in prefilled syringes or must be drawn out of a vial. Injections of triamcinolone are drawn up individually, after proper sterile technique, and put into syringes prior to injection. This is not a necessary step for prefilled syringe medications. This additional preparation needed for triamcinolone appears to increase the risk of contamination. A study that compared rates of endophthalmitis between a prefilled syringe of ranibizumab versus conventional preparation of ranibizumab found that rates of suspected endophthalmitis were 0.015% in the prefilled group and 0.026% in the conventional group.[7]

The composition of triamcinolone and the other medications differ. Triamcinolone is a synthetic steroid of the glucocorticoid family.[8] This steroid down-regulates several inflammatory stimuli including intercellular adhesion molecule – 1 and matrix metalloproteinase.[9] The subsequent decrease in inflammatory stimuli could make the eye more

susceptible to smaller quantities of infectious organisms.

Medication administration also varies between intravitreal injection medications. Data collected from the private retina practice, found that triamcinolone was injected through a 27-gauge needle, while the other medications were injected using a 32- or 30-gauge needle. One study compared rates of contamination between 27-gauge and 30-gauge needles used for intravitreal injection and concluded that the gauge did not seem to increase the risk of contamination. An additional study also did not find a significant difference when comparing rates of endophthalmitis between 30-gauge needles and 32-gauge needles.[10-11] Given the results of previously completed literature, it appears this difference should not account for a statistically significant difference between endophthalmitis rates. This topic should be further investigated.

Study limitations include it its structure as a retrospective study with data from one private retinal practice and small sample sizes for some medications. Further studies may be warranted to explore trends of endophthalmitis between an intravitreal injection vs. an intravitreal implant, trends between physician competency, and severity of symptoms among those who developed endophthalmitis following intravitreal injection.

The large sample size of 109,202 injections can help clinicians anticipate and observe trends in which intravitreal injection medications correlate with higher rates of endophthalmitis.

CONCLUSION

Results show an endophthalmitis incidence rate of 0.036% after intravitreal injection(s) administration. This review suggests triamcinolone acetonide (TRIA) yielded a significantly higher incidence rate of endophthalmitis as compared to the other medications.

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