

شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلو

بسم الله الرحمن الرحيم





MONA MAGHRABY



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلو



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



MONA MAGHRABY



شبكة المعلومات الجامعية التوثيق الإلكترونى والميكروفيلم

جامعة عين شمس التوثيق الإلكتروني والميكروفيلم قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



MONA MAGHRABY



Comparative Efficacy of Intravitreal Aflibercept, Bevacizumab and Ranibizumab for Treatment of Macular Oedema Secondary to Central Retinal Vein Occlusion

Systematic Review

For Partial Fulfillment of Master Degree in Ophthalmology

By

Noura Hashem Hashem

Bachelor of medicine and surgery Ain shams University

Supervised By

Prof. Dr. Abd El Rahman Gaber Salman

Professor of Ophthalmology Faculty of Medicine Ain Shams University

Dr. Weam Mohamed Ebeid

Assistant Professor of Ophthalmology Faculty of Medicine Ain Shams University

Dr. Noureldin Hussein Abozeid

Lecturer of Ophthalmology Faculty of Medicine Ain Shams University

> Faculty of Medicine Ain Shams University 2021



سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Abd El Rahman Gaber Salman**, Professor of Ophthalmology, Faculty of Medicine Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.

I am also delighted to express my deepest gratitude and thanks to **Dr. Weam Mohamed Ebeid**, Assistant Professor of Ophthalmology, Faculty of Medicine Ain Shams University, for her kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.

I am deeply thankful to **Dr. Moureldin Hussein**Abozeid, Lecturer of Ophthalmology, Faculty of Medicine Ain

Shams University, for his great help, active participation and guidance.

Noura Hashem

List of Contents

| Title | Page No. |
|-----------------------|----------|
| List of Abbreviations | i |
| List of Tables | iii |
| List of Figures | v |
| Introduction | 1 |
| Aim of the Study | 2 |
| Review of Literature | 3 |
| Methodology | 39 |
| Results | 44 |
| Discussion | 74 |
| Summary | 80 |
| Conclusion | |
| References | 84 |
| Arabic Summary | |

List of Abbreviations

| Abb. | Full term |
|-----------|---|
| AMD | Age related macular degeneration |
| Ang-2 | Angiopoietin-2 |
| Anti-VEGF | Antivascular endothelial growth factor |
| BCVA | Bestcorrected visual acuity |
| BRVO | Branch retinal vein occlusion |
| CRA | Central retinal artery |
| CRT | Central retinal thickness |
| CRV | Central retinal vein |
| CRVO | Central retinal vein occlusion |
| DCP | Deep capillary plexus |
| DME | Diabetic macular edema |
| DRIL | Disorganization of the retinal inner layers |
| ETDRS | Early Treatment Diabetic Retinopathy Study |
| EZ | · · |
| | Fluorescein angiography |
| | Fovea avascular zone |
| FcRn | Neonatal Fc Receptor |
| FDA | Food and Drug Administration |
| IL | Interleukin |
| ILM | Inner limiting membrane |
| ME | Macular edema |
| n-AMD | Neovascular age related macular |
| | degeneration |
| NPAS | Non-perfusion areas |
| NVD | Neovascolarization of the disc |
| NVE | Neovascularization elsewhere |

List of Abbreviations Cont...

| Abb. | Full term |
|--------|--|
| OCT | Optical coherence tomography |
| | |
| | Optical coherence tomography angiography |
| OVCS | Optic disc venous collaterals |
| PIGF | Placenta growth factor |
| PK | Population pharmacokinetic |
| PRN | Pro re nata |
| PRISMA | Preferred Reporting Items for Systematic |
| | Reviews and Meta-analyses |
| RCT | Randomized control trials |
| RVO | Retinal vein occlusion |
| SAES | Serious adverse events |
| SCP | Superficial capillary plexus |
| VA | Visual acuity |
| VEGF | Vascular endothelial growth factor |

List of Tables

| Table No. | Title | Page No. |
|--------------------|--|-----------|
| Table (1): | Number of eyes and study character | ristics45 |
| Table (2): | Summary of patient's characteristics | s46 |
| Table (3): | Summary of baseline characteristics | - |
| Table (4): | Summary of efficacy treatment out all studies | |
| Table (5): | Summary of safety treatment outcall studies | |
| Table (6): | Meta-analysis of (average BC Aflibercept group vs Control group difference | – Mean |
| Table (7): | Meta-analysis of (average CRT decr Aflibercept group vs Control group difference | – Mean |
| Table (8): | Meta-analysis of (recurrence r Aflibercept group vs Control group Ratio | o - Odds |
| Table (9): | Meta-analysis of (complications : Aflibercept group vs Control group Ratio | o - Odds |
| Table (10): | Meta-analysis of (average BC Bevacizumab group vs Control Mean difference | group – |
| Table (11): | Meta-analysis of (average CRT decrements Bevacizumab group vs control group difference | o – Mean |
| Table (12): | Meta-analysis of (complications : Bevacizumab group vs Control grou Ratio | p - Odds |

List of Tables Cont...

| Table No. | Title | Page No. |
|--------------------|--|------------|
| Table (13): | Meta-analysis of (average B Ranibizumab group vs Control Mean difference | group – |
| Table (14): | Meta-analysis of (average CRT de Ranibizumab group vs control group difference | up – Mean |
| Table (15): | Meta-analysis of (complications Ranibizumab group vs Control gro Ratio | oup - Odds |
| Table (16): | Multiple regression model for the affecting BCVA improvement using method | g Forward |
| Table (17): | Multiple regression model for the affecting CRT improvement using method | g Forward |

List of Figures

| Fig. No | o. Title | Page No. |
|-----------|---|-----------------------------------|
| Fig. (1): | Ophthalmoscopic view of the no | ormal retina3 |
| Fig. (2): | Topographic Anatomy of Norma | al Macula5 |
| Fig. (3): | : Histological Layering of the Ma | acula6 |
| Fig. (4): | Vertical Section of Human Fove | ea 6 |
| Fig. (5) | Fundus photograph showin imaging of the major arteries normal human right eye retina | and veins in a |
| Fig. (6): | Macular edema in a 75-year-ol | |
| Fig. (7): | e OCT map (650 × 325) in a cretinal vein occlusion | |
| Fig. (8): | Fluorescein angiogram of a nonischemic central retinal v showing staining of dilated with leakage into macula in a c | vein occlusion, tortuous veins |
| Fig. (9) | Fluorescein angiogram of the s in previous image, showi capillary leakage in a cystoid phases of angiogram | ng perifoveal pattern in late |
| Fig. (10 | same patient as in previous in cystoid pattern of leakage fi dilated leaking capillary network | mage, showing rom perifoveal |
| Fig. (11 |): Arteriovenous phase of angiograph showing perifor leakage in a patient with nonis retinal vein occlusion | schemic central |
| Fig. (12 |): OCTA of the retina and Histolo the retina showing the retinal la | _ |

List of Figures Cont...

| Fig. No. | Title | Page No. |
|------------|---|-----------|
| Fig. (13): | OCTA (3 × 3 mm) in a case of CRVO | 22 |
| Fig. (14): | PRISMA flow chart for study selection | |
| Fig. (15): | Forest plot of (BCVA) on Aflibercept Control group - Mean difference | group vs |
| Fig. (16): | Funnel plot of (BCVA) on Afliberce vs Control group - Mean d (publication bias was non-significant) | ifference |
| Fig. (17): | Forest plot of (CRT decrease) on Afgroup vs Control group - Mean differe | - |
| Fig. (18): | Funnel plot of (CRT decrease) on Afgroup vs Control group - Mean d (publication bias was significant) | ifference |
| Fig. (19): | Forest plot of (recurrence rate) on Afgroup vs Control group – Odds Ratio. | _ |
| Fig. (20): | Funnel plot of (recurrence ra Aflibercept group vs Control group Ratio (publication bias was non-signif | - Odds |
| Fig. (21): | Forest plot of (complications randflibercept group vs Control group Ratio | - Odds |
| Fig. (22): | Funnel plot of (complications r Aflibercept group vs Control group Ratio (publication bias was significan | - Odds |
| Fig. (23): | Forest plot of (BCVA) on Bevacizuma vs Control group - Mean difference | · - |
| Fig. (24): | Funnel plot of (BCVA) on Bevacizuma vs Control group - Mean d (publication bias was significant) | ifference |

| Fig. (25): | Forest plot of (CRT decrease) on Bevacizumab group vs Control group - Mean difference | 63 |
|------------|---|-------------|
| | List of Figures Cont | |
| Fig. No. | Title Page N | J o. |
| Fig. (26): | Funnel plot of (CRT decrease) on Bevacizumab group vs Control group - Mean difference (publication bias was non- significant). | 63 |
| Fig. (27): | Forest plot of (complications rate) on Bevacizumab group vs Control group – Odds Ratio. | 65 |
| Fig. (28): | Funnel plot of (complications rate) on Bevacizumab group vs Control group – Odds Ratio (publication bias was non-significant) | 65 |
| Fig. (29): | Forest plot of (BCVA) on Ranibizumab group vs Control group - Mean difference. | 67 |
| Fig. (30): | Funnel plot of (BCVA) on Ranibizumab group vs Control group - Mean difference (publication bias was significant) | 67 |
| Fig. (31): | Forest plot of (CRT decrease) on Ranibizumab group vs Control group - Mean difference | 69 |
| Fig. (32): | Funnel plot of (CRT decrease) on Ranibizumab group vs Control group - Mean difference (publication bias was significant) | 69 |
| Fig. (33): | Forest plot of (complications rate) on Ranibizumab group vs Control group – Odds Ratio. | 71 |
| Fig. (34): | Funnel plot of (complications rate) on Ranibizumab group vs Control group – Odds Ratio (publication bias was non-significant) | 71 |

