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TO COMPARE THE EFFICACY, SAFETY AND DURATION OF ACTION OF INTRAVITREAL DEXAMETHASONE IMPLANT AND ANTI-VEGF (RANIBIZUMAB) IN TREATMENT OF MACULAR OEDEMA FOLLOWING BRANCH RETINAL VEIN OCCLUSION

Ophthalmology

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ABSTRACT

Introduction: Branch retinal vein occlusion (BRVO) is second-most common retinal vascular disease following diabetic retinopathy. Currently, two treatment options have been approved by the US Food and Drug Administration (FDA) for the management of macular edema secondary to BRVO which include Dexamethasone Intravitreal implant (Ozurdex) and anti-VEGF Ranibizumab (Lucentis). **Objectives:** To compare the efficacy, safety and duration of action of Dexamethasone intravitreal implant and anti VEGF (Ranibizumab) in patients with macular oedema caused by branch retinal vein occlusion (BRVO). **Methodology:** This was a prospective, interventional, safety/efficacy study with primary purpose of treatment conducted on adults with BRVO attending the Department of Ophthalmology at BASE HOSPITAL Delhi Cantt. One group received 0.3 mg intravitreal ranibizumab (Lucentis) given as PRN doses while the other group received a single dose of 0.7 mg intravitreal dexamethasone implant (Ozurdex). **Results:** The maximum reduction in CMT was noted in the after 1 week follow-up in the ranibizumab group and in the 2-month follow-up in the dexamethasone implant group. There was statistically significant difference between the two groups with respect to the mean reduction in CMT ($p < 0.001$). Both the drugs were effective in improvement of BCVA over 4 months and each group had statistically significant fall in mean logMAR values ($p < 0.0001$). The maximum reduction in logMAR value was noted in the 4-month follow-up in the group treated with the ranibizumab group and in the 3-month follow-up in the dexamethasone implant. **Conclusion:** This study recommends the use of intra-vitreal ranibizumab as a first-line therapy for macular oedema following BRVO. The dexamethasone implant is an additional pharmacologic agent that is best suited for patients who are pseudophakic and have significant bleeding and simple branch retinal vein occlusions that are associated with macular edema.

KEYWORDS

Branch retinal vein occlusion, Ranizumab, Dexamethasone implant

INTRODUCTION

Branch retinal vein occlusion (BRVO) is second-most common retinal vascular disease [1] following diabetic retinopathy. It is usually seen between the ages of 60 -70 years [2]with the prevalence increasing as one ages[3,4]. Literature indicates that this disease does not have any racial or gender predilection[2]. According to the Beaver Dam Study, 2.3% of populations had a cumulative 15-year incidence of retinal vein occlusions, with 78% of these cases being BRVO.[5]

The arteriovenous (AV) crossing is the most frequent site of occurrence of BRVO [6-8]. T is most commonly observed in the superotemporal branch (52.3%) [9], followed by inferotemporal branch (38.5%)[9] and nasal branch (9.2%) time [10]. Due to the higher number of AV crossings in this quadrant, superotemporal are the most common. A restricted occlusion affecting tiny veins that drain only a section of the macula is also possible and accounts for 17% of all BRVOs[11]. There is about 5-10% risk of development of BRVO in the contralateral eye [1,6,12].

Various systemic conditions such as hypertension [1–5], diabetes mellitus, hyperlipidemia, hyperhomocysteinemia, and hematological disorders [13] have been identified as risk factors for BRVO. BRVO may result from degenerative changes in the artery wall, aberrant hematological variables, and compression of the vein at the arteriovenous (A/V) crossing [6–8]. As demonstrated by Jefferies et al.,thrombus development may be the cause of blockage in BRVO patients' venous lumen at the A/V crossing.[14]Seitz suggested the alteration of venous endothelium & intima media as root cause of BRVO [15] which was well supported by Frangeih et al [16].

Retinal exudates, macular edema in the afflicted section of the retina, flame and dot-blot hemorrhages in a fan-shaped distribution issuing from the site of occlusion, and a dilated and convoluted vein upstream of the AV crossing site are among the ophthalmoscopic findings of BRVOs. If it is not covered with blood, the blockage site in BRVO can be found close to the bleeding area's apex. When nonperfused occlusion occurs, retinal hemorrhages are more severe and may be linked to cotton-wool spots. There cannot be any macular involvement or visual complaints if the blockage is peripheral to the tributary veins draining the macula.[11]

In the acute phase of BRVO, fluorescein angiography may only detect a blocking defect that corresponds to the bleeding location or a delayed vein filling time.[17,18] Macular edema and capillary non-perfusion are typically seen if the macula is affected by retinal vein blockage. Petalloid leakage from cystoid macular edema is often visualized in the late images. Collateral capillaries may appear after the hemorrhages start to clear, and they usually show little to no leakage.

In the acute stage of BRVO, optical coherence tomography (OCT) demonstrates outer retinal swelling and macular edema with cystic changes. Both the above techniques allow better evaluation of the macular edema along with anatomic and ischemic changes of whole retina. Following BRVO, the extent of central vision loss varies. Seventy percent of patients gain two or more lines of vision in the first year after BRVO, and between one-third and half of untreated individuals return to 20/40 or greater vision within six months. [6,19] Just 20% of eyes with macular BRVO spontaneously improve their visual acuity by two lines. At a 2-year follow-up, it was observed that the mean visual acuity in BRVO cases had improved from 20/50 to 20/30.[20] Complications of BRVO include: macular edema, capillary non-perfusion, retinal neovascularization, vitreous hemorrhage, and tractional retinal detachments [6]

The treatment in BRVO aims at reducing the macular edema as well as preventing neovasularisation brought about by retinal ischemia. Earlier, grid-pattern laser photocoagulation was the only treatment option available for either condition. However, recently, newer therapies have emerged on the horizon. These include intraocular injections of steroids and anti-vascular endothelial growth factor agents, sustained drug release devices, vitrectomy, and sheathotomy. Currently, two treatment options have been approved by the US Food and Drug Administration (FDA) for the management of macular edema secondary to BRVO. These are Dexamethasone Intravitreal implant (Ozurdex) and anti-VEGF Ranibizumab (Lucentis).

Aims And Objectives Of Study

This study will compare the efficacy, safety and duration of action of Dexamethasone intravitreal implant and anti VEGF (Ranibizumab) in patients with macular oedema caused by BRVO.

Methodology

This was a prospective, interventional, safety/efficacy study with primary purpose of treatment carried out among adults with BRVO attending the Department of Ophthalmology at BASE HOSPITAL Delhi Cantt during the study period. The study was conducted for a duration of 24 months (April 2015 to April 2017). Sample size calculation was done using the following formula:

$n = 2(\sigma)^2 (Z_{1-\alpha/2} + Z_{1-\beta})^2 / \Delta^2$

σ = standard deviation of CMT in diabetics with macular edema ($\approx$ 120; most studies report a baseline CMT standard deviation of around 115 to 125)

$Z_{1-\alpha/2} = Z_{0.975} = 1.96$ (for $\alpha = 0.05$)

$Z_{1-\beta} = Z_{0.80} = 0.84$ (for $\beta = 0.2$)

We accepted a standard 5% (p = 0.05) chance of false-positive result and 80% study power. Z values were calculated using Z score tables.

$\Delta = 30$ (assuming an effect size of about 0.5 of S.D)

$n = 32.8$.

The required sample size in each arm was calculated as approximately 35 each. Thus, assuming a 10% drop out rate, the total sample size in both arms of drug in this study is 90.

The study was conducted after obtaining consent from the Institutional ethical committee. All the patients were explained about the nature of treatment they would be offered, potential risks, benefits, adverse effects, alternative treatment options and possible treatment outcomes. Informed consent was obtained for the same. The cost of all treatments (including the cost of ranibizumab or dexamethasone injections) given to the patients, was financed by the institution.

Each participant was subjected to the following examinations:

1. Visual acuity testing by Snellen's chart which was later converted to logarithmic values for statistical analysis,
2. Intraocular pressure measurement by applanation tonometry,
3. Amsler Grid assessment,
4. Slit-lamp examination and biomicroscopy after pupillary dilatation using +90 diopter (D) lens,
5. Direct ophthalmoscopy
6. Indirect ophthalmoscopy.

A complete medical and surgical history for any of the following disorders amongst others was also obtained: diabetes mellitus, renal disease, hypertension, coronary artery disease, cerebro-vascular disease, systemic or ocular corticosteroid use, coagulability disorder, substance abuse, previous ocular surgery or trauma.

Inclusion Criteria For Selection Of Patients:

1. Diagnosis of BRVO with CME in one eye.
2. Best Corrected Visual acuity (BCVA) < 6/12.
3. Age >21 years .
4. On OCT central macular thickness > 350µ

Exclusion Criteria:

1. Patients unwilling to give consent.
2. Patients with any other ocular illness including Glaucoma or raised IOP or systemic illnesses like CVA.
3. Any ocular surgery or trauma within last 3 months.
4. Receiving any local or systemic steroids.
5. Active eye infection.
6. Anti VEGF treatment in either eye within 3 months or systemic steroid treatment within 6 months.
7. Any known drug allergy to injectable (ranibizumab or dexamethasone).

The guidelines of Drug Controller General of India (DGCI) for using Anti VEGF preparations (ranibizumab) / intravitreal dexamethasone implant were followed.

Computer generated randomization was done. The Statistician was blinded. Central macular thickness (CMT) measured by spectral domain OCT was considered as the primary outcome while Best corrected visual acuity was the secondary outcome. Participants were free to withdraw anytime from the study, however, premature stopping of trial was not anticipated since both are established techniques.

Procedure

Patients with BRVO with cystoid macular oedema underwent Spectral Domain Optical coherence tomography (OCT) to measure the CMT. The pupils were dilated prior to the FFA procedure with mydriatics. The procedure was done after four hours of fasting. Stereoscopic colour fundus photograph was first taken using the Carl Zeiss fundus camera FF450. An intracath was put in the arm and 3 ml of 20% sodium fluorescein was injected rapidly over 2 seconds which delivers high concentration of sodium fluorescein in blood stream. None of the patients experienced any kind of serious adverse effects of dye (except one male patients who complained of nausea immediately after a bolus of dye, the procedure was postponed for them and carried out subsequently). The serial stereoscopic photographs were taken rapidly.

Procedure of Intraviteral Injection/Implant

After informed consent for the intervention, all patients were instructed to instill E/D Moxifloxacin 0.5% 6 times one day prior to the intervention. In all patients, the intravitreal injection of Ranibizumab / intravitreal dexamethasone implant was given in the operation theater under complete aseptic conditions. Proparacaine 0.5% topical eye drops were instilled followed by scrubbing of eyelids by 5% povidone-iodine and conjunctiva instilled with 5% povidone-iodine several minutes before the procedure. A sterile eyelid speculum was inserted. Topical proparacaine was instilled at the site of injection in the preferred site (more commonly in supero-nasal quadrant). Inj Ranibizumab/ intravitreal dexamethasone implant was injected through the pars plana 3.5 - 4.0 mm posterior to the surgical limbus, depending upon the phakic status.

Post-injection, a sterile cotton swab was placed at the site of injection to prevent reflux of vitreous or drug. Topical antibiotic drop was instilled. Thereafter a sterile eye pad was placed that was removed in the evening. Patients were instructed to apply topical antibiotic drops 4 times a day for 5 days. Post injection follow-up included repeated clinical examination. Patients were assessed for adverse events including elevated intraocular pressure, cataract progression, retinal detachment, post-injection inflammation and endophthalmitis.

All the patients included in the study (n=90) were divided into two groups A and B.

Group A (n=46): intravitreal injections of Ranibizumab (Lucentis) 0.3 mg in 0.05 mL

Group B (n=44): single dose of intravitreal injection dexamethasone implant (ozurdex) 0.7 mg

Postoperative follow up was done for 4 months which comprised atleast six visits as follows: 1st , 2nd, 3rd ,4th, 5th and 6th visit was on the 1st day, 1st week,1st month,2nd month ,3rd month and 4th month after injection respectively.

All assessors were masked to the group of patients they were to follow up. Visual acuity and assessment of CMT using Spectral Domain OCT at the macular region was performed for each patient at each follow-up visit. Repeat injections (of the same drug as the initial one, at the same dose) were given to any patient who would show CMT >350 µm after the initial injection in either group or a fall in BCVA by 2 lines on Snellen chart. Data collected was entered into an excelsheet and analysed using SAS 9.2, SPSS 16.0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1. Microsoft word and Excel were used to generate graphs, tables etc**.**

RESULTS

Baseline patient characteristics

A total of 96 patients were enrolled in this trial based on the inclusion and exclusion criteria. There were 59 males (61.46%) and 37 females (38.54%). The mean age of all the patients was 63.29 years. 48 patients each were enrolled in each arm of the study. Baseline demographics and disease or study eye characteristics of the two treatment groups were similar (Table 1).

A total of 90 patients (90.0%) were followed up through the entire duration (4 months) of this study. 46 out of 48 (95.83%) patients in the Ranibizumab group (Lucentis) and 44 out of 48 (91.67%) patients in the Dexamethasone implant group (Ozurdex) were followed up for 4 months. The reason for early discontinuation from the study of 2 in the ranibizumab group and 4 patients in the dexamethasone implant group was non-ocular.

The baseline mean BCVA (in logMAR) in the ranibizumab group was 0.92 ± 0.35 while in the dexamethasone implant group, it was 0.89 ± 0.35 which is equivalent to 44 ETDRS letters in ranibizumab group and 45.5 ETDRS letters dexamethasone implant group and there is no statistical difference (P=0.702) in groups. The baseline mean CMT (in microns) in the ranibizumab group was 392.15 ± 58.41 while in the dexamethasone implant group, it was 380.36 ± 46.64. The baseline mean IOP (in mmHg) in the ranibizumab group was 13.7 ± 2.80 and in the dexamethasone implant group, it was 14.45 ± 2.19. The difference of means in both the groups at baseline were statistically insignificant.

Table 1: Baseline Characteristics of patients of Both Drug Groups

	RANIBIZUMAB (LUCENTIS)	DEXAMETHASONE IMPLANT (OZURDEX)	TOTAL
Total	48	48	96
Males	30	29	59
Females	18	19	37
Number Of Patient Followed Up Till 4 Months	46	44	90
Males	31	26	57
Females	15	18	33
Right Eye	37	32	69
Left Eye	33	38	71
COMORBIDITIES			
Hypertension	9	8	17
CKD & Hypertension	2	0	2
Coronary Artery Disease & Hypertension	2	1	3
Dyslipidaemia	0	3	3
Diebeties	3	2	5
Hyperhomocysteinemia	8	3	11
No other co-morbidities.	22	27	49
BASELINE PARAMETERS			
VISION Mean ± SD	0.92 ± 0.35	0.89 ±0.31	P=0.702
IOP Mean ± S.D	13.70 ± 2.80	14.45 ± 2.19	P=0.157
OCT	392.15 ± 58.41	380.36 ± 46.64	P=0.294

Primary Outcome Measure

The mean CMT reduced from 392.15 ± 58.41 microns to 277.37 ± 64.11 microns in the Ranibizumab group. The mean CMT reduced from 380.36 ± 46.64 microns to 344.07 ± 80.41 microns in the Dexamethasone group. Both the drugs were effective in reduction of CMT over 4 months but a statistically significant reduction was seen only in the Ranibizumab group ($p < 0.0001$). The maximum reduction in CMT was noted in the after 1 week follow-up in the ranibizumab group and in the 2-month follow-up in the dexamethasone implant group. There was statistically significant difference between the two groups with respect to the mean reduction in CMT ($p < 0.001$). The mean duration of action was lower in the Ranibizumab group (18.74 ± 18.09 days) compared to the Dexamethasone implant group (68.20 ± 20.75 days).

Table 2: Mean CMT measurements at each follow-up (in microns) in both drug groups

	Ranibizumab Group (Mean ± S.D)	Dexamethasone Implant Group (Mean ± S.D)
Baseline	392.15 ± 58.41	380.36 ± 46.64
Post injection day 1	336.11 ± 74.48	378.48 ± 104.36
Post injection day 7	287.04 ± 75.53	378.36 ± 95.69
1 month follow-up	310.20 ± 107.38	365.57 ± 92.99
2-month follow-up	299.20 ± 80.69	287.41 ± 60.60
3-month follow-up	305.15 ± 70.51	298.34 ± 67.26
4-month follow-up	277.37 ± 64.11	344.07 ± 80.41

Secondary Outcome Measure

The mean logMAR value reduced from 0.92 ± 0.35 to 0.60 ± 0.35 in the group which received ranibizumab injections (Lucentis), while it reduced from 0.89 ± 0.31 to 0.59 ± 0.32 in the dexamethasone implant group. Both the drugs were effective in improvement of BCVA over 4 months and each group had statistically significant fall in mean logMAR values ($p < 0.0001$). The maximum reduction in logMAR value was noted in the 4-month follow-up in the group treated with the ranibizumab group and in the 3-month follow-up in the dexamethasone implant. There was a statistically significant difference between the two groups with respect to the mean reduction in BCVA ($p < 0.0001$)

Table 3: Mean logMAR values at various follow up in both drug groups

	Ranibizumab Group (Mean ± S.D)	Dexamethasone Implant Group (Mean ± S.D)
Baseline	0.92 ± 0.35	0.89 ± 0.31
Post injection day 1	0.78 ± 0.34	0.89 ± 0.31
Post injection day 7	0.65 ± 0.37	0.88 ± 0.31
1 month follow-up	0.62 ± 0.37	0.79 ± 0.30
2-month follow-up	0.61 ± 0.35	0.58 ± 0.32
3-month follow-up	0.63 ± 0.33	0.57 ± 0.31
4-month follow-up	0.60 ± 0.35	0.59 ± 0.32

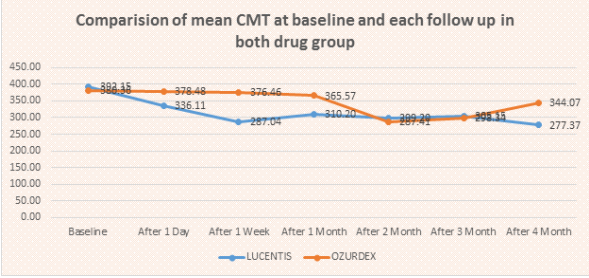

Chart no. 01: Comparison of mean CMT at baseline and each follow up in both the drug groups

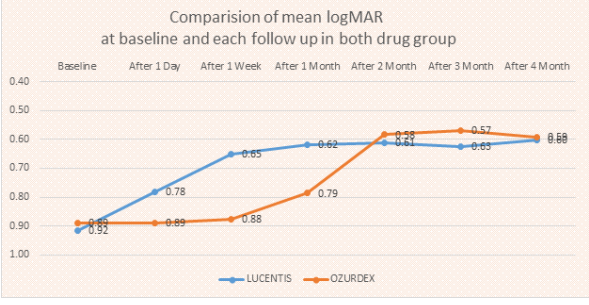

Chart no. 02: Comparison of mean logMAR at baseline and each follow up in both drug group

DISCUSSION

Branch retinal vein occlusion (BRVO) produces various symptoms such as a gradual, painless loss of vision that may cause serious ocular issues, including blindness. Usually occurring unilaterally, it manifests clinically as several retinal hemorrhages affecting a quadrant of the retina as a result of a retinal vein branch becoming obstructed. This is usually seen at the arteriovenous crossing [1,21,22]

Both the genders show equal predilection and the prevalence of branch retinal vein blockage in participants over 80 years of age was seven times higher than in young patients in their forties.[23] Venous blockage resulting from age-related retinal arterial stiffness compresses the underlying vein at the arteriovenous crossing.[21] In the current study, the male to female ratio was 1.73:1, however this difference is not statistically significant. In this study, the overall affected mean age was 63.29 years (Ranibizumab group - 62.22 years, and Dexamethasone implant group- 64.41 years). Gender inequality can be explained by a number of factors, including a higher incidence of tobacco addiction in men and a higher rate of illiteracy, ignorance, and limited access to health care services among rural women.

In cases with BRVO, the superotemporal quadrant is recognized as the most frequently implicated quadrant.[24] Given that 57.78% of our patients had superotemporal quadrant involvement, our study further corroborates the facts presented. Research on the relationship between BRVO and other systemic diseases has revealed a correlation between

BRVO and metabolic disorders such as diabetes mellitus as well as systemic vascular diseases such as, hyperhomocysteinema.[25,26] ,hypertension[27] and dyslipidemia[27,28.] In our study, we found that there was a comparable split in both medication groups amongst patients with hypertension (24.44%), hyperhomocysteinemia (12.22%), diabetes mellitus (5.55%), and dyslipidemia (3.33%). Studies have also implicated smoking [29] as a risk factor for BRVO.

A total of 90 patients were followed up through the entire duration (4 months) of this study. Around 92% and 88% patients in the Ranibizumab group (Lucentis) and Dexamethasone implant group (Ozurdex) were followed up for 4 months. The most prevalent and frequent cause of visual loss in BRVO patients is macular oedema. In this study, the baseline mean BCVA (in logMAR) in the ranibizumab group was 0.92 ± 0.35 and in the dexamethasone implant group, it was 0.89 ± 0.35 which is equivalent to 44 ETDRS letters in ranibizumab group and 45.5 ETDRS letters dexamethasone implant group. This difference was not statistically significant. In this study, mean CMT reduced from 392.15 ± 58.41 microns to 277.37 ± 64.11 microns in the Ranibizumab group. In BRAVO study the mean CMT reduced from 520.5 microns to 345.2 micros in 6 months.[30] In a study done by Singer et al the CMT reduced from 564.8 ± 43.5 microns to 277 ± 11.1 microns at 2 months and 252.4 ± 10.5 microns at 6 months.[31] In HORIZON RVO trial the mean reduction in CMT was 360.7 microns at 12 months.[32] The present study also follows the PRN regime of ranibizumab and has similar results as previous studies.

In the dexamethasone group, the mean CMT reduced from 380.36 ± 46.64 microns to 344.07 ± 80.41 microns. In the KKESH International Collaborative Retina Study Group, the baseline CMT was 490.86 ± 133.9 microns which reduced to 259.00 ± 37.56, 340.29 ± 112.93, 387.64 ± 187.64 microns at 1 month, 3 months and 6 months respectively.[33] Similar results have also been obtained in this study. In a study, Hallar et al found reduction of mean 206 microns CMT by 3 months.[34]

In this study, duration of action was analyzed based on the reduction in CMT, to maintain reduced macular thickness duration and reappearance of macular oedema. The mean duration of action was lower in the Ranibizumab group (18.74 ± 18.09 days) compared to the Dexamethasone implant group (68.20 ± 20.75 days). Kuppermann et al in their study found the medium duration of response in relation to Dexamethasone implant to be 57.5 - 91 days on the basis of more than 15 letter improvement from baseline.[35]

In this study, mean logMAR value reduced from 0.92 ± 0.35 to 0.60 ± 0.35 in the ranibizumab group which meant a gain of 16 letters on the ETDRS chart. In this group, 43.47% patients had more than 15 ETDRS letter gain at 4 month follow up. In BRAVO study 61.1% had a gain of more than 15 ETDRS letter at 6 months.[30] Singer et al observed a mean baseline logMAR value of 0.89 ± 0.1 which decreased to 0.58 ± 0.1 at 2 months and 0.49 ± 0.07 at 6 month follow up .[31] In BRIGHTER study base line BCVA was 57.7 ETDRS letter which increased to 68.0, 70.2, 71.9, 73.1and 73.2 ETDRS letter at 8th day, 1 month, 2 months, 3 months and 4 months follow up. In addition, 65.6 % patients had more than 15 ETDRS letter gain at 6 months.[36]

In this study, mean logMAR value reduced from 0.89 ± 0.31 to 0.59 ± 0.32 in the Dexamethasone implant which meant a gain of 15 ETDRS letters. In this group 34.09% patients had more than 15 ETDRS letter gain at 4 month follow up. In the KKESH International Collaborative Retina Study Group study, the baseline BCVA mean logMAR value of 0.62 ± 0.39 reduced to 0.57 ± 0.40 at 1 month, 0.49 ± 0.35 at 3 months and 0.65 ± 0.33 at 6 months.[33] In the SOLO study, Bezatis et al observed that the baseline BCVA of 0.6 logMAR reduced to 0.4 logMAR at 1 month , 0.3 logMAR at 2 months, 0.4 logMAR at 3 months and 0.5 logMAR at 4 months follow up.[37]

In this study, both the drugs were effective in improving BCVA over 4 months and each group had statistically significant fall in mean logMAR values ($p < 0.0001$). The maximum reduction in logMAR value was noted in the 4-month follow-up in the ranibizumab group and in the 3-month follow-up in the dexamethasone implant group. There was a statistically significant difference between the two groups with respect to the mean reduction in BCVA ($p< 0.0001$). The total number of injections administered in ranibizumab group was 1.80 ± 0.91 through 4 months in comparison to dexamethasone implant group in which only one injection was administered at baseline.

We also observed that 18.18% participants in the dexamethasone implant group had a rise in the intraocular pressure (IOP) of ≥ 10 from the baseline. The timing of pressure rise typically coincided with the 2nd month post injection. This rise of IOP was easily managed by topical IOP lowering drugs. No patient had to undergo incisional glaucoma surgery for lowering the IOP. No patient was found to have an increase in IOP of ≥ 10 from the baseline in the ranibizumab group.

Similarly, Gallego-Pinazo et al in their research observed an IOP peak between 4-15 week following dexamethasone implant.[38] Mayer et al found >5 mm hg rise of IOP in 37.5% patients in dexamethasone implant.[39] Haller et al observed that IOP rise is common at 60 day following dexamethasone implant and in 12.6% patient it is >10 mm hg at 60th day follow up.[34] The Bayesian network meta-analysis confirmed the superiority of ranibizumab monotherapy over dexamethasone implant or laser for the treatment of macular oedema secondary to BRVO.[40]

Recommendations

1. This study recommends the use of intra-vitreal ranibizumab as a first-line therapy for macular oedema following BRVO. The dexamethasone implant is an additional pharmacologic agent that is best suited for patients who are pseudophakic and have significant bleeding and simple branch retinal vein occlusions that are associated with macular edema. Additionally, these patients may not be able to tolerate the more frequent intravitreal injections required for anti-VEGF therapy, or they may have edema that has proven to be intolerable or resistant to anti-VEGF therapy.

Limitations

The study is not without limitations. This was a hospital based study with a small sample size, thus, sample related bias is possible in results. This study was a four-month comparative analysis. This brief period of time was insufficient to give definitive proof of the advantages of ranibizumab over dexamethasone implants, particularly as the latter were only administered once in this trial and their effects began to wear off after two months. This study did not compare the two drugs across different age groups because in younger age groups, BRVO is mostly caused by inflammation, and steroids appear to have a more advantageous effect than anti-VEGF.

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