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ANATOMICAL AND FUNCTIONAL OUTCOMES FOLLOWING INTRAVITREAL BEVACIZUMAB (AVASTIN) INJECTION FOR DIABETIC MACULAR EDEMA AT PRINCE RASHID BIN AL-HASSAN MILITARY HOSPITAL

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ABSTRACT

Aim: To assess the anatomical and functional outcomes of intravitreal Bevacizumab injections in patients with Diabetic Macular Edema treated at Prince Rashid Bin Al-Hassan Military Hospital over a one-year period. **Methods:** This is a retrospective. The medical records of patients diagnosed with center-involving DME at the ophthalmology clinic in Prince Rashid Bin Al-Hassan Military Hospital who received at least three loading doses of intravitreal Bevacizumab between January 2023 and January 2026 will be reviewed. Data regarding patient demographics, baseline characteristics, best corrected visual acuity (BCVA), and central macular thickness (CMT) using Optical Coherence Tomography (OCT) will be analyzed before treatment and at one month after completing the three loading doses. **Results:** 150 patients (200 eyes) with a mean age of 61.4 years were included in this study. Male accounted for (54.7%) of Patients with a mean duration of 14.0 years. The mean baseline best-corrected visual acuity (BCVA) was 20/80 Snellen, and the mean central macular thickness (CMT) was 415.8 µm. Significant improvement in BCVA was found after completing the loading doses when compared to baseline ($p = 0.001$). The mean visual improvement after treatment was (+13.4 letters) which was maintained at 3 months (+12.6 letters). 59.5% of eyes achieved improvement of more than 10 ETDRS. At baseline, the mean CMT was 415.8 µm, after giving the loading doses of intravitreal bevacizumab injections, marked and significant improvement in CMT was noted at follow-up visits ($p < 0.001$) when compared with baseline levels. The greatest mean reduction occurred at month 2 (-148.2 µm), and this improvement was maintained at month 3 (-142.5 µm) as well. Complete anatomical resolution of DME was obtained in 59.0% of eyes at 2 months and 55.5% at 3months. **Conclusion:** Intravitreal bevacizumab loading doses demonstrated significant functional and anatomical improvement in patients with diabetic macular edema with an excellent safety profile.

KEYWORDS: Bevacizumab, diabetic macular edema.

INTRODUCTION

Diabetic macular edema (DME) is considered the main cause of visual loss among adults in the world. The main pathology is attributed to the breakdown of the blood-retinal barrier and increased vascular permeability as a result of chronic hyperglycemia.[1] The pathogenesis of DME is results from elevated levels of vascular endothelial growth factor (VEGF), which enhances endothelial cell proliferation, increased vascular permeability, and subsequent macular edema.[2] The use of anti VEGF and Bevacizumab started in 2004 which resulted in both anatomical and functional significant improvements of the macula.[3]

In Middle East region particularly Jordan, diabetes and its ocular complications is found to be at high rates when compared to global countries at 17.6%. In addition, the number and prevalence of adults (20-79 years) having diabetes in Jordan has markedly increased from 291,600 in 2011 to 1.1 million in 2024, with a prevalence of 20.5%. In addition, the prevalence of diabetic retinopathy (DR) is highly prevalent among Jordanian

diabetics at 28.2%. Furthermore, the rate of DR and diabetic macular edema among newly diagnosed diabetes in Jordan were 7.9% and 40% respectively. In addition, the patients awareness of of DR remains limited; while 98% of Jordanian diabetics were aware that diabetes could affect the eyes, only 17.3% were encouraged to perform eye exam and 40% were not aware of the treatment options.

Among anti-VEGF agents, intravitreal bevacizumab (Avastin) has emerged as the first anti VEGF used for the treatment of DME, especially when the cost remains a major issue. Bevacizumab is a full-length humanized monoclonal antibody which bind and inactivate the VEGF. A lot of global studies found that Bevacizumab was non-inferior to other more expensive anti-VEGF agents like ranibizumab and aflibercept in improving visual acuity in DME patients.[4,5,6] Bevacizumab is preferred mainly in the public sector to minimize the financial burden on the health care so as to achieve the greatest benefit to a large number of patients.[7,8]

Although numerous studies demonstrated the efficacy of bevacizumab for the treatment of DME, In the north of Jordan data regarding the anatomical and functional outcomes of intravitreal bevacizumab for DME is still limited. Therefore, this study aimed to assess the improvement of visual acuity and central macular thickness following intravitreal bevacizumab injection for DME.

METHODS

This retrospective was conducted at the ophthalmology clinic in Prince Rashid Bin Al-Hassan Military Hospital between January 2023 and January 2026. All diabetic patients aged 18 years and above and diagnosed with center-involving DME with a macular thickness of more than 325µm were enrolled in the study. All patients received three loading doses of intravitreal Bevacizumab. Data regarding patient demographics, baseline visual acuity (BCVA), and central macular thickness (CMT) using Optical Coherence Tomography (OCT) were recorded before treatment and at one month after completing the three loading doses. Patients with previous treatment with laser PRP, or intraocular or periocular steroids or other anti-VEGF agents within 6 months prior to the first Bevacizumab injection in the study period. In addition, patients with history of other macular pathology like wet AMD, retinal vein occlusion, and macular dystrophy were excluded as well.

RESULTS

150 patients (200 eyes) with a mean age of 61.4 years were included in this study. Males accounted for 54.7% of the study population with a mean duration of 14.0 years. The mean baseline best-corrected visual acuity (BCVA) was 20/80 Snellen, and the mean central macular thickness (CMT) was 415.8 µm. significant improvement in BCVA was found after completing the loading doses when compared to baseline ($p = 0.001$). The mean visual improvement after treatment was (+13.4 letters) which was maintained at 3 months (+12.6 letters). 59.5% of eyes achieved improvement of more than 10 ETDRS letters at 3 months after treatment. The results are summarized in table 1.

Table 1: Best-Corrected Visual Acuity (ETDRS Letters) Over 3 Months.

Time	BCVA (letters)	Visual improvement	P value	Proportion with ≥10-letter gain (%)
Baseline	55.4 ± 12.1	------	-------	-------
1 month	64.8 ± 11.3	+9.4	<0.001	42.5% (85/200)
2 months	68.8 ± 10.9	+13.4	<0.001	63.0% (126/200)
3 months	68.0 ± 11.5	+12.6	<0.001	59.5% (119/200)

Significant number of eyes (58.5%) showed a gain of ≥ 10 ETDRS letters, with 25.0% of eyes gained ≥ 15 letters. Stable vision (± 4 letters) was found in 13.0% of eyes. Notably, 5.0% of eyes experienced loss of ≥ 5 letters, and no eye showed a loss of ≥ 15 letters.

Table 2: Distribution of Visual Acuity Gain at 3 Months.

Changes in BCVA (ETRDS letters)	Number of eyes	percentages
Gain of ≥ 15 letters (≥ 3 lines)	50	25.0%
Gain of 10–14 letters (2–3 lines)	67	33.5%
Gain of 5–9 letters (1–2 lines)	45	22.5%
Stable (± 4 letters)	26	13.0%
Loss of 5–14 letters (1–3 lines)	10	5.0%
Loss of ≥ 15 letters (≥ 3 lines)	2	1.0%

At baseline, the mean CMT was 415.8 µm, after giving the loading doses of intravitreal bevacizumab injections, marked and significant improvement in CMT was noted at follow-up visits ($p < 0.001$) when compared with baseline levels. The greatest mean reduction occurred at month 2 (-148.2 µm), and this improvement was maintained at month 3 (-142.5 µm) as well. Complete anatomical resolution of DME was obtained in 59.0% of eyes at 2 months and 55.5% at 3months. The results are summarized in table3.

Table 3: Central Macular Thickness Over 3 Months.

Time	Mean CMT (µm) ± SD	Mean Reduction from Baseline (µm)	P value	Proportion with complete fluid resolution (%)
Baseline	415.8 ± 89.4	------	-------	-------
1 month	299.1 ± 64.2	-116.7	<0.001	35.5% (71/200)
2 months	267.6 ± 58.1	-148.2	<0.001	59.0% (118/200)
3 months	| 273.3 ± 62.5	-142.5	<0.001	55.5% (111/200)

Regarding the adverse events which occurred during or after giving the three loading doses of intra vitreal bevacizumab injections, No cases of endophthalmitis, retinal detachment, or severe uveitis were encountered. However, subconjunctival hemorrhage (11.8% of eyes) was the most commonly seen, mild ocular discomfort occurred in 8.9% of injections, both of which resolved spontaneously without sequelae. In addition, transient elevation in intra ocular pressure occurred in 5% of eyes. No systemic adverse events that can be attributed to anti-VEGF therapy, like stroke and myocardial infarction were reported in this sample of patients.

DISCUSSION

This study showed that three intravitreal bevacizumab loading doses resulted in significant functional and anatomical improvement in eyes with diabetic macular edema (DME). The study included 150 patients (200 eyes) with a mean age of 61.4 years and a relatively long duration of diabetes. Those results express the chronicity of diabetic retinal disease which was reported to be highly prevalent among Jordanian population. Baseline visual acuity and central macular thickness were comparable to those reported in major international anti-VEGF studies involving DME patients.[9]

Significant and marked improvement in BCVA was achieved after three loading doses, with a mean gain of +13.4 ETDRS letters at 2 months, which continued to be stable at 3 months (+12.6 letters). These findings are comparable to what was reported in numerous clinical trials evaluating Bevacizumab therapy for DME. For example, in the BOLT study, where intravitreal bevacizumab was used for persistent DME, the visual gain at one year was 8-9 ETDRS letters.[10] Multiple global studies have shown the effectiveness of anti-VEGF in the management of DME. For instance, RISE and RIDE trials evaluated ranibizumab and reported gains of 10-12 ETDRS letters after one year of treatment[11]; similarly, the VIVID and VISTA studies assessed aflibercept in DME and reported mean gains of approximately 10-12 letters.[12] In this study, greater visual improvement was achieved earlier due to intensive dosing and the poorer baseline visual acuity level.

59.5% of eyes in our study showed a gain of ≥10 ETDRS letters by month 3, and 25% gained ≥15 letters. These rates were consistent whith what was reported by other studies, where about 30–45% of eyes achieved gains of ≥15 letters after anti-VEGF therapy. The relatively high proportion of good response in this study may suggests that bevacizumab was more effective in treatment of DME in naïve eyes. Despite that only 5% of eyes lost ≥5 letters, there was no vision loss of ≥15 letters, supporting excellent visual outcome.

Regarding the anatomical response, the mean CMT decreased from 415.8 µm at baseline to 267.6 µm at month 2, representing a mean reduction of 148.2 µm. This rate of improvement was closed to that of previously published studies in the DRCR.net Protocol T study and other major anti-VEGF studies, where CMT reductions was at a level between 120 and 170 µm after the loading doses.[13] Complete fluid resolution was achieved at months 2 and 3 in more than half of the treated eyes. Those results suggesting the strong anatomical efficacy of bevacizumab in reducing retinal edema.

Both visual and anatomical improvements reached it maximum effect at month 2 and this effect were maintained at month 3. This finding supports the importance of the extensive administration of initial loading doses which may result in rapid improvement in CMT and visual acuity.

Regarding safety, intravitreal bevacizumab was well tolerated in this study. No serious adverse ocular complications such as endophthalmitis, retinal detachment, or uveitis were encountered among all patients. However, non-serious complication was seen like subconjunctival hemorrhage, temporary ocular discomfort, and transient and self-limiting elevation of intraocular pressure. These findings went along side with the well-documented safety profile of bevacizumab reported in the international studies.[14] In addition, no systemic life-threatening events were reported during the study period. However, larger studies with longer follow-up are necessary for better assessment.

Overall, the findings of the present study demonstrated the effectiveness and safety of intravitreal bevacizumab for treatment of DME, with reasonable and less cost. The visual and anatomical outcomes achieved in this study were comparable to those reported in other international clinical trials using other and more expensive anti VEGF. This is particularly important in developing countries like Jordan, where diabetic macular edema is highly prevalent in the population and access to other expensive anti-VEGF agents may be very limited.

Limitations of the study

The relatively short follow-up duration and the absence of a comparative control group to compare the safety and

efficacy with other anti-VEGF agents limits direct comparison of efficacy were the main limitations of this study. However, prospective randomized studies with longer follow-up are recommended to better assessment.

CONCLUSION

Intravitreal bevacizumab loading doses demonstrated significant functional and anatomical improvement in patients with diabetic macular edema with an excellent safety profile. The improvement started early after the first injection which was maintained after three months. Serious ocular or systemic adverse events were not reported.

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