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STUDY OF MACULAR THICKNESS EVALUATION PRE AND POST 2MG/0.05ML INTRAVITREAL TRIAMCINOLONE ACETONIDE (IVTA) IN PATIENTS WITH DIABETIC MACULAR EDEMA.

Ophthalmology

KEYWORDS: Diabetic Macular edema, Macular thickness, OCT, Intra Vitreal Triamcinolone Acetonide (IVTA).

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ABSTRACT

Aim: To study the improvement in the macular edema, visual acuity after a single dose of 2mg IVTA with various other factors affecting the outcome. Methods: This is a prospective hospital based interventional study carried on 50 eyes of the patients having diabetic macular edema. 2mg/0.05ml IVTA injection was given and Follow up examination of each patient was done on 1st day, after 1 week, after 1 month .Results: Average macular thickness was 440.1 µm and 357.4 µm before and after IVTA respectively.Out of 33 patients of NPDR 26(78.8%) patients shows improvement and 7(21.2%) patients didn't while in case of PDR out of total 17 patients 7(41.1%) patients shows improvement and 10(58.9%) patients didn't shows improvement in the visual acuity/macular thickness. Average macular thickness changes after IVTA in NPDR patients was 167 µm decrease and in PDR patients 43 µm decrease on 1 month follow up. Similarly 62 %(31) of patients having uncontrolled diabetes 61 µm decrease and 38 %(19) patients having controlled diabetes 130 µm decrease in macular thickness. Conclusions: Study shows improvement in the macular thickness and visual acuity after 1 month post IVTA in most cases. The improvement was more in patients with NPDR compared to PDR and in patients with controlled diabetes compared to uncontrolled diabetes irrespective of duration of diabetes.

Introduction:

Diabetic Retinopathy (DR) is the leading cause of vision loss in adults aged 20–74 years [1]. It is noted that 6.81% (6.74–6.89) of people with diabetes may have DME [2] and incidence is high up to 29% if the duration of diabetes is more than or equal to 20 years [3]. DME is responsible for most of the visual loss in patients with diabetes as it is the major cause of vision loss in type 2 diabetes and is invariably present in patients with type 2 diabetes with PDR [4, 5]. Various treatment modalities are available for the DME one of them it is the use of intravitreal steroid but it shows that complications associated [6, 7] with the procedure make it less popular which is more commonly associated with high dose of treatment [8], so in this study we see the effect of low dose of IVTA (2mg/0.05ml) on macular thickness/visual acuity, complications and various other factors affecting the outcome.

Methods:

This is a prospective hospital based interventional study carried on 50 eyes of the patients having diabetic macular edema, selected by non-probability convenient sampling .The clinical profile of this patients is evaluated in Department of Ophthalmology, P. D. U. Govt. Medical College, Rajkot and underwent detail assessment during period of November 2014 to April 2016.

A patient with any other ocular pathology were excluded from the study like, Macular edema due to other aetiologies like Branch Retinal Vein Occlusion, Central Retinal Vein Occlusion, Post-surgical, Posterior Uveitis, ARMD etc., Poor compliance, Hazy media, H/O optic nerve pathology/Glaucoma/ocular hypertension, Vitreous Hemorrhage and Retinal Detachment.

Each of the patients with diabetic macular edema was assessed in detail about:

Written Informed consent of the patients is taken. The assessment included a detailed history about diabetes and any other systemic illness. Patient's visual acuity and best corrected visual acuity were recorded with each eye separately, using well illuminated Snellen's visual acuity chart with patient sitting at distance of 6 meters. A detailed fundus examination was done to rule out any posterior segment pathology with the help of by direct and indirect ophthalmoscopy and intraocular pressure measurement by Goldman Applanation tonometer. Optical coherence tomography (ZEISS CIRRUS photo 800) evaluation is done pre and post IVTA treatment. 2mg/0.05ml Intravitreal Triancinolone acetonide (AUROCORT -Triamcinolone acetonide 40mg/ml- The Preservative-Free Intravitreal Injection, Aurolab) injection was given under meticulous aseptic precautions in the operating room under topical anaesthesia. Follow up examination of each patient was done on 1st post op day, after 1 week, after 1 month for assessment of visual acuity, macular thickness, intra ocular pressure and complications associated with the procedure.

Results

Average age of presentation was 61.4 ±10.9 years and duration of diabetes was 10.3 ± 4.3 years. Out of total 50 patients 33 (66%) patients in this study were males and 17(34%) were females. In our study RE (28) 56% is more affected than LE (22) 44% by DME. Patients with pseudophakia 34(68%) are more affected by DME than phakic patients 16(32%) in our study.

Table 1: Distribution according to type of diabetes and diabetic status in patients with DME.

Diabetic status	Type of diabetes		Total
	NPDR	PDR	
Controlled	13	03	16
Uncontrolled	20	14	34
Total	33	17	50

The incidence of DME is more in NPDR 33 (66%) with compare to PDR 17 (34%) patients in our study. 34(68%) patients having uncontrolled diabetes which were more affected by DME compared to 16(34%) patients having controlled diabetes (table1). However the distribution of the patients is equally in all group irrespective of treatment modality which suggest it is not affected by type of treatment. Out of 50 patients 2 patients were not taking any treatment.

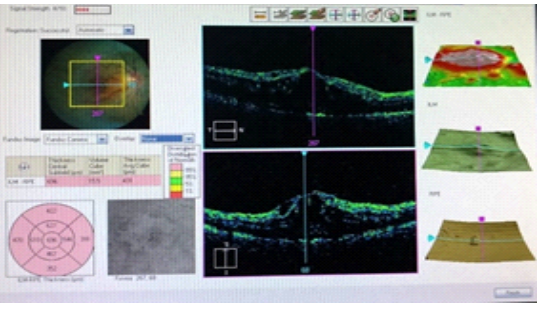


Figure (1): OCT image of patient before IVTA

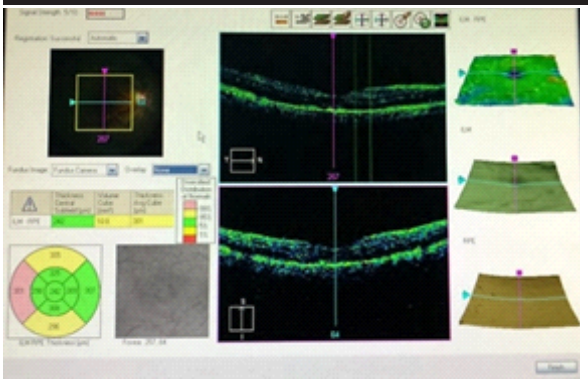


Figure (2): OCT image of patient after IVTA

Out of 33 patients of NPDR 26(78.8%) patients' shows improvement in the visual acuity/macular thickness and 7(21.2%) patients shows no improvement, while in case of PDR out of total 17 patients 7(41.1%) patients shows improvement and 10(58.9%) patients shows no improvement at all. So, in PDR patients there is less improvement as compared to NPDR patients, Out of not improving cases of DME associated factor was found like ERM, VMT, Uncontrolled diabetes and Macular ischemia. Changes in macular thickness between pre and post IVTA after 1 month in NPDR patients (average 412 µm to 245 µm =167 µm decrease) is higher than the PDR patients (average 508 µm to 465 µm =43 µm decrease).Initially before IVTA macular thickness in pseudophakic patients was (average macular thickness 446 µm) slightly high compare to phakic patients (average macular thickness 434 µm) but after IVTA 1 month follow up macular thickness was found to be almost equal(average macular thickness 356 µm) in both groups(figure 3).On the basis of diabetes control , before IVTA average macular thickness in uncontrolled diabetic patients was (468 µm) higher than the patients with controlled diabetes (380 µm) and changes in macular thickness after 1month post IVTA in patients with controlled diabetes (average 380 µm to 250 µm =130 µm decrease) is higher than the patients with uncontrolled diabetes (average 468 µm to 407 µm =61 µm decrease) ,same was noted in visual acuity also. On the basis of duration of diabetes, average macular thickness changes pre and post IVTA in 1 to 5 years of diabetic patients was (415 µm to 321 µm=94 µm decrease), in 6 to 10 years of diabetic patients was (458 µm to 394 µm=64 µm decrease), in 11 to 15 years of diabetic patients was (471 µm to 460 µm=11 µm decrease) and in 15 to 20 years of diabetic patients was (618 µm to 581 µm=37 µm decrease) Suggest that chances of improvement are more if the duration of diabetes is less.

IOP was increased in 14 (28%) of case and out of that 2(4%) patients had IOP more than 21 mmHg which require treatment for that. Other than rise in the IOP we didn't notice any other complications in our patients.

Discussion

Triamcinolone acetonide has been reported to be effective in the management of macular edema. It suppresses inflammation, reduces extravasation of fluid from leaking blood vessels, inhibits fibro vascular proliferation, and down-regulates production of VEGF [9].After depot injection, corticosteroid action peaks at 1 week, with residual activity persisting for 3 to 6 months.

Various studies done with 4mg/0.1ml IVTA shows improvement in the macular thickness from 127 µm to 202 µm decrease and visual acuity improvement from 10 to 40 %[10,11,12,13], in our study the improvement in macular thickness was 102 µm decrease and 40 % of patients shows 2 or more line improvement in the visual acuity with the dose of 2mg/0.05ml after 1 month post IVTA . We also noticed less improvement in the macular thickness and visual acuity as the duration of diabetes is more as suggested by other studies also. After 1 month post IVTA rise in the IOP is varies from 21% to 40% as shown by various studies and out of that requirement of medications or surgery to control the IOP in 1 % to 15% in patients [10, 11, 13]. As suggested by study higher the dose of IVTA higher the chances of rise in IOP [14], In our study 28% shows rise in IOP and out of that only 4% require antiglaucoma medications for IOP control, while the other complications associated with the procedure like cataract, endophthalmitis, vitreous hemorrhage, retinal detachment as shown by various studies are nil in our study. Good clinical outcome and less complications with low dose of IVTA make it relatively safer for the long term use for the patients with diabetic macular edema.

Conclusion

After giving IVTA there is improvement in the macular thickness and visual acuity after 1 month in most cases(figure 1 ,figure 2), except only those cases with associated adverse factors like macular ischemia, VMT, ERM, uncontrolled diabetes it will not improve much. We noticed that improvement is more in NPDR patients compared to PDR patients may be because of long duration of diabetes or associated adverse factors which are more common in PDR. Duration of diabetes had inverse relation with improvement in macular thickness after IVTA more the duration less the chances of improvement after IVTA. We also noticed that irrespective of type and duration of diabetes more improvement were noticed in patients with controlled diabetes rather than the patients with uncontrolled diabetes, so diabetic control is more important than type and duration of diabetes for prognosis. Modalities of treatment (insulin, OHA, both) had no role in prognosis after IVTA, they showed similar results after IVTA. Low dose of IVTA didn't cause much rise in IOP and very less patients require treatment for that also the other complications associated with the procedure are very less, so it is safer than the usual 4mg dose.

List of abbreviation

DME-diabetic macular edema
OCT- optical coherence tomography
IVTA- intravitreal triamcinolone acetonide
NPDR- non proliferative diabetic retinopathy
PDR- proliferative diabetic retinopathy
IOP- intraocular pressure
OHA-oral hypoglycemic agents
VMT- vitreomacular traction
ERM- epiretinal membrane

References

1. Hammes HP, Welp R, Kempe HP, Wagner C, Siegel E, Holl RW, Network DI. Risk Factors for Retinopathy and DME in Type 2 Diabetes—Results from the German/Austrian DPV Database. PloS one. 2015 Jul 15;10(7):e0132492.
2. Yau JW, Rogers SL, Kawasaki R, Lamoureux EL, Kowalski JW, Bek T, Chen SJ, Dekker JM, Fletcher A, Grauslund J, Haffner S. Global prevalence and major risk factors of diabetic retinopathy. Diabetes care. 2012 Mar 1;35(3):556-64.
3. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy: IV. Diabetic macular edema. Ophthalmology. 1984 Dec 31;91(12):1464-74.
4. Sasi SP. Layer-by-Layer Technology and Its Implications in the Field of Glucose Nanobiosensors. Handbook of Research on Diverse Applications of Nanotechnology in Biomedicine, Chemistry, and Engineering. 2014 Aug 31:400.
5. Tong L, Vernon SA, Kiel W, Sung V, Orr GM. Association of macular involvement with proliferative retinopathy in type 2 diabetes. Diabetic Medicine. 2001 May 1;18(5):388-94.
6. Sonmez K, Ozturk F. Complications of intravitreal triamcinolone acetonide for macular edema and predictive factors for intraocular pressure elevation. International journal of ophthalmology. 2012;5(6):719.
7. Moshfeghi DM, Kaiser PK, Scott IU, Sears JE, Benz M, Sinesterra JP, Kaiser RS, Bakri SJ, Maturi RK, Belmont J, Beer PM. Acute endophthalmitis following intravitreal triamcinolone acetonide injection. American journal of ophthalmology. 2003 Nov 30;136(5):791-6.
8. Aref AA, Scott IU, Oden NL, Ip MS, Blodi BA, VanVeldhuisen PC. Incidence, risk factors, and timing of elevated intraocular pressure after intravitreal triamcinolone acetonide injection for macular edema secondary to retinal vein occlusion: SCORE Study Report 15. JAMA ophthalmology. 2015 Sep 1;133(9):1022-9.
9. Brooks HL, Caballero S, Newell CK, Steinmetz RL, Watson D, Segal MS, Harrison JK, Scott EW, Grant MB. Vitreous Levels of Vascular Endothelial Growth Factor and Stromal-Derived Factor 1 in Patients with Diabetic Retinopathy and Cystoid Macular Edema Before and After Intraocular Injection of Triamcinolone. Archives of Ophthalmology. 2004 Dec 1;122(12):1801-7.
10. Chung EJ, Freeman WR, Azen SP, Lee H, Koh HJ. Comparison of combination posterior sub-tenon triamcinolone and modified grid laser treatment with intravitreal triamcinolone treatment in patients with diffuse diabetic macular edema. Yonsei medical journal. 2008 Dec 31;49(6):955-64.
11. Luo D, Zhu B, Zheng Z, Zhou H, Sun X, Xu X. Subtenon Vs Intravitreal Triamcinolone injection in Diabetic Macular Edema, A prospective study in Chinese population.

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Pakistan journal of medical sciences. 2014 Jul;30(4):749.
12. Vinten M, Larsen M, Lund Andersen H, Sander B, La Cour M. Short term effects of intravitreal triamcinolone on retinal vascular leakage and trunk vessel diameters in diabetic macular oedema. Acta Ophthalmologica Scandinavica. 2007 Feb 1;85(1):21-6.
13. Adiel Barak MD, Michael Regenbogen MD, Michaella Goldstein MD, Anat Loewenstein MD. Intravitreal triamcinolone injection for diffuse diabetic macular edema with foveal cystoid changes. I-MAJ. 2006;8(2):83-7.
14. Bae JS, Park SJ, Ham I, Lee TG. Dose dependent effects of intravitreal triamcinolone acetonide on diffuse diabetic macular edema. Korean Journal of Ophthalmology. 2009 Jun 1;23(2):80-5.