



COMPARATIVE STUDY OF ROLE OF INTRAVITREAL TRIAMCINOLONE ACETONIDE V/S ANTI-VEGF (RANIBIZUMAB) TO STABILIZE DIABETIC MACULAR EDEMA DURING CATARACT SURGERY

Ophthalmology

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ABSTRACT

OBJECTIVE: To compare the effect of anti-VEGF and triamcinolone on DME in patients who were given intravitreal TA and anti-VEGF intraoperatively after cataract surgery.

METHODS AND MATERIALS: It is a non randomized, open labelled, prospective study. In this study 30 eyes were included. Patients in this study underwent cataract extraction with phacoemulsification during which one group received intra operative intravitreal triamcinolone and other group received anti-VEGF. BCVA and change in central foveal thickness was assessed at post operative 1 week, 4 weeks and 12 weeks

CONCLUSIONS: Triamcinolone is more effective in stabilizing central macular edema after cataract surgery in a diabetic for duration of 3 months as compared to ranibizumab. BCVA consistently improves in both the groups. The ranibizumab treated groups has significant reduction of CFT at 1 month and triamcinolone treated group shows a steady reduction in CFT significantly till the end of 3 months.

KEYWORDS

ranibizumab, triamcinolone, central foveal thickness, best corrected visual acuity

INTRODUCTION

Diabetic Macular Edema (DME) is manifested as retinal thickening primarily due to exudation from incompetent macular retinal capillaries. If retinal thickening is peripheral to macula it is not vision threatening. So as to standardize the severity of edema, ETDRS (Early Treatment Diabetic Retinopathy Study) coined the term CLINICALLY SIGNIFICANT MACULAR EDEMA.^(1,2)

The pathophysiological mechanisms underlying the breakdown of the blood retinal barrier are multifactorial. One of the dominant emerging themes surrounds the role of VEGF (Vascular Endothelial Growth Factor). While better known as an angiogenic stimulus up regulated by hypoxia^(3,4) VEGF is a potent permeability agent found in human diabetic retina.

The rationale for use of steroids to treat DME is compelling.^(5,6) because of anti-inflammatory effects. Intravitreal injection of triamcinolone acetonide often has a marked beneficial effect on retinal thickening in DME. Current specific anti-VEGF therapy is given Intravitreal at frequent intervals, which may blunt the effect of VEGF and lessen macular edema.

The prevalence of diabetes is increasing and so is the coexistence of cataract with diabetic retinopathy. Worsening or development of macular edema de novo after cataract surgery is one of the major reasons of subnormal visual outcome after cataract surgery. So the use of intraoperative intravitreal triamcinolone or anti-VEGF during cataract surgery, at present, is potentially the best treatment in cases of pre existing DME or high risk patients.

METHODS AND MATERIAL

It is a randomized, double blinded, prospective study conducted in a tertiary eye care center, between the period of July 2016 to October 2018. In this study 30 eyes were included.

In this study a detailed history and clinical examination were performed with necessary investigations. Pre-operatively patients were evaluated for Best Corrected Visual Acuity (BCVA), fundus examination with indirect ophthalmoscopy, intraocular pressure with a non-contact tonometer and slit lamp biomicroscopy for cataract assessment. OCT was performed preoperatively to assess and measure Central Foveal Thickness (CFT). FFA was performed to rule out proliferative DR and macular ischaemia. Patients in this study then underwent cataract extraction with phacoemulsification during which one group received intra operative intravitreal triamcinolone and other

group received anti-VEGF. BCVA was assessed at post-operative day 1 and post operative 1 week, 4 weeks and 12 weeks. OCT was performed at 1 week, 4 weeks and 12 weeks to evaluate the change in central foveal thickness after surgery. Thus, in this study anatomical and functional outcome of intravitreal triamcinolone and anti-VEGF intraoperatively during cataract surgery was evaluated by comparing the preoperative BCVA and OCT with post operative results of the same, 12 weeks after the surgery.

Retreatment criteria:

Response to treatment in form of BCVA and central foveal thickness were monitored and re treatment with macular laser, pan retinal photocoagulation or additional injection was allowed from 28 days post cataract surgery or 77 days for those requiring re-injection in triamcinolone group. Retreatment in the form of re-injection was when required patient received the same study medication and dose as at the time of their cataract surgery.

Further intravitreal injections were given if the either one of the two criteria were met:

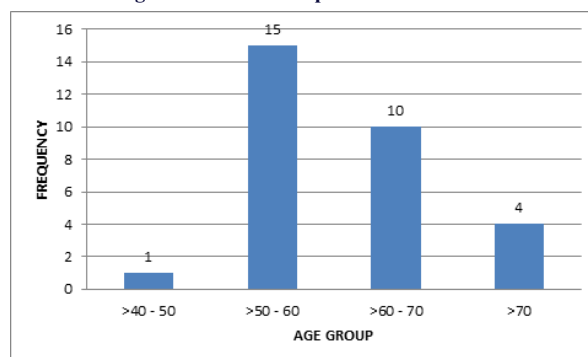
1. Increase in CFT by 40 um or more compared to the best recorded CFT
2. Decrease in BCVA by 2 lines as per Snellens chart and at least 28 days had passed since previous ranibizumab injection or at least 77 days had passed since triamcinolone injection treated group.

RESULTS

Demographic and Baseline Results:

1) Age:

Chart 1: The age distribution of 30 patients was as follows



2) Best Corrected Visual Acuity

Table 1: BCVA IN (logMAR)

	Sr. no	Pre-op	Post-op 1 week	Post-op 1 month	Post-op 3 months
RANIBIZUMAB GROUP	1	0.9	0.75	0.64	0.59
TRIAMCINOLONE GROUP	2	1.06	0.85	0.66	0.53

In the ranibizumab treated group, the mean BCVA improved from preoperative 0.9 to 0.75 after post operative week 1 (statistically significant p value=0.00765), 0.64 at post operative 1 month (statistically significant p value= 0.00005) and 0.59 at post operative 3 months (statistically significant p value=0.00016).

In the triamcinolone treated group, the mean BCVA improved from 1.06 to 0.85 at post operative week 1 (statistically significant p value= 0.0012), 0.66 at post operative 1 month (statistically significant p value =0.00004) and 0.53 at post operative 3 months (statistically significant p value=0.00004).

3) Central Foveal Thickness

Of 15 ranibizumab treated patients the CFT was a mean of 394.6 (+/- 89.0) um pre operatively and it reduced to 383.06 (+/- 94.14) um at post operative week 1 (statistically not significant p value= 0.0736), 376.73 (+/- 97.63) um at post operative 1 month (statistically significant p=0.00724) and 381.4 (+/- 100.4) at post operative 3 months (statistically not significant p value=0.22).

Of 15 triamcinolone treated patients the mean CFT which was 402.13 (+/- 81.4) um and it reduced to 391.93 (+/- 62.4) um at post operative week 1 (statistically not significant p value=0.519), 358.9 (+/- 52.6) um at post operative 1 month (statistically significant p value =0.024) and 341.26 (+/- 50.34) um at post operative 3 months (statistically significant p value=0.00513).

Table 2: MEAN CFT IN BOTH GROUPS (MICRONS)

Group	Pre op	Post op 1 week	Post op 1 month	Post op 3 months
Ranibizumab	394.6	383.06	376.73	381.4
Triamcinolone	402	391.93	358.9	341.26

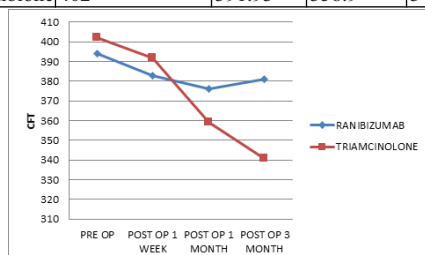


Chart 2: Mean Cft In Both Groups (microns)

So comparing both the groups the patients who received triamcinolone intraoperatively during cataract surgery showed greater reduction in post operative diabetic macular edema at the end of 3 months postoperatively.

4) Intraocular Pressure

Table 3 :MEAN OF CHANGE IN IOP OF THE GROUPS (mm of Hg)

Group	Pre op	Post op 1 week	Post op 1 month	Post op 3 months
Ranibizumab	15.7	17.15	18.5	17.21
Triamcinolone	16.18	18.13	20.5	18.5

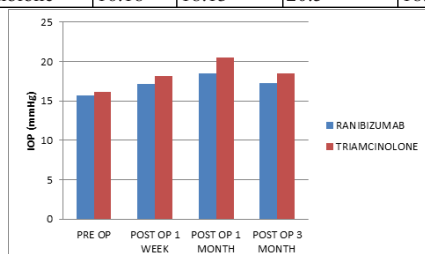


Chart 3: Mean Of Change In Iop

Thus, the postoperative complication of increased intraocular pressure is seen more with patients injected with triamcinolone.

5) Retreatment

Amongst 15 patients belonging to ranibizumab treated group 3 (20%) were given retreatment in the form of re-injection after 1 month of cataract surgery.

Amongst 15 patients belonging to triamcinolone treated group 2 (13.3%) were given re treatment in the form of re-injection after 77 days of the first injection.

DISCUSSION

With the increase in prevalence of diabetes in older population, a clinician often encounters co-existence of cataract and DR and this co-existence is expected to increase in next few decades.

Presence of post- operative macular edema after cataract extraction in diabetic patients may be related to cataract surgery itself (called pseudophakic cystoid macular edema) or underlying diabetic condition.

Pseudophakic cystoid macular edema resolves spontaneously where as diabetic macular edema persists or increases after surgery.^(7,8)

Incidence of pseudophakic cystoid macular edema post phacoemulsification in a non diabetic individual is 1-2%, where as in a diabetic individual it increases to 10-81%^(7,9,10,11) and this depends on :-

1. Diabetic retinopathy stage
2. Preoperative presence of diabetic macular edema
3. History of previous surgery
4. Level of glycated hemoglobin
5. Duration of diabetes (>10 years)

This made post cataract visual outcome in diabetic retinopathy patients unsatisfactory.

One recent large study concluded that only 53% of patients of diabetes retinopathy undergoing cataract surgery achieved a post operative BCVA of 6/12 or better while the rest has either no improvement or worse even diminution of vision.⁽¹²⁾

This study shows a significant contrast to visual outcome of a non-diabetic patients undergoing cataract surgery where 95% have post operative BCVA of 6/12 or better.⁽¹³⁾

Corticosteroids are very potent anti- inflammatory agents which inhibits release of VEGF as well as various cytokines. After a single dose of 4mg/ml of intra vitreal triamcinolone, its effect in a non-vitrectomised eye is expected to last for approximately 3 months.

In a study conducted by Takata,et al⁽¹⁴⁾ 24 eyes of 24 patients with refractory diffuse DME scheduled to undergo phacoemulsification cataract surgery were randomly assigned to receive either a 4-mg IVTA or a 40-mg Sub tenon injection of TA during cataract surgery. A significant improvement in BCVA was observed only in the IVTA group at 4 weeks, 8 weeks and 12 weeks postoperatively.

In our study there was significant improvement in BCVA at 4 weeks and 12 weeks which is comparable to the above study.

The CFT reductions after surgery in all study follow-up visits were significantly greater in the IVTA group (P< 0.05). In our study, though there was no significant reduction in CFT at 1 week, there was significant reduction at 4 weeks (p=0.024) and at 12 weeks (p=0.0513) which is comparable to the above study.

In another study conducted by Lam et al⁽¹⁵⁾ a total of 19 eyes of 15 consecutive diabetic patients with cataract and CSME were recruited. Patients underwent phacoemulsification and intraocular lens implantation with 4 mg IVTA injection and were followed up on day 1, then weekly for 1 month, and thereafter monthly until 6 months postoperatively. 58.8% showed improvement in BCVA. The peak BCVA was achieved at 4 months. In our study all the patients showed significant improvement in BCVA at 3 month consistent with the above study.

The mean CFT decreased at 2 months, with statistically significant reduction. In our study the CFT decreased at post operative 3 months,

which is statistically significant and is consistent with other study.

Intravitreal anti-VEGF when given during cataract surgery is expected to act maximally for the period of first 1 month.

One retrospective study found reduction in CFT and simultaneous improvement in BCVA up to 3 months post operatively⁽¹⁶⁾ whereas further 2 prospective study found that concurrent treatment with anti-VEGF only prevented the diabetic macular edema from worsening and actual CFT remained unchanged⁽¹⁷⁾

Akinci et al⁽¹⁸⁾ showed 31 patients who have undergone phacoemulsification with intravitreal injection of 1.25 mg bevacizumab were retrospectively evaluated. All patients were BCVA levels and CFT recorded at the first and third months after the surgery were compared with the initial values.

The BCVA level recorded was significantly higher. Our results are consistent with the above study.

The CFT recorded at the first and third months after the surgery was significantly lower. In our study, CFT recorded at 4 weeks was significantly lower.

Retreatment in the form of repeat intravitreal injection was required more in ranibizumab treated group as compared to triamcinolone treated group. None of the patients required re treatment in the form of macular laser or pan retinal photocoagulation.

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