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### RESEARCH ARTICLE

#### OBSERVATION OF INTRAOCULAR PRESSURE FOLLOWING INTRAVITREAL INJECTIONS OF ANTI-VEGF BEVACIZUMAB.

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##### Key words:-

Intraocular pressure, intravitreal injection, Bevacizumab.

#### Abstract

**Purpose** -To assess the intraocular pressure changes after intravitreal injections of anti-VEGFs (0.05ml bevacizumab)

**Methods**- It is a prospective observational study done on patients who received intravitreal injections of 0.05ml (1.25mg) of bevacizumab. Overall 32 eyes of 32 patients were injected. Intraocular pressure was measured pre-operatively, 10 min and 45min after the injection by Goldman Applanation Tonometer in sitting position. The fellow eye was taken as control.

**Results** - The mean age was 63.2 years (ranging from 48- 88 years) with 62.5% of patients being males. Treated eyes had a mean IOP before injection of bevacizumab was  $16.2 \pm 6.5$  mmHg; after 10 min of injection it was  $35.2 \pm 5.5$  mmHg ( $P < 0.001$ ) and  $19.2 \pm 6.5$  mmHg after 45 min. In control eyes, the mean IOP before injection was  $14.9 \pm 6.0$  mmHg, and after 10 min of injection, it was  $17.5 \pm 6.0$  mmHg and after 45 min the IOP was  $17.2 \pm 2.5$  mmHg.

**Conclusion**- IOP increased remarkably immediately after intravitreal injection of bevacizumab but returned to safe range within 45 min of injection. None of the patients required paracentesis. Only 2 patients required IOP lowering medications.

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#### Introduction:-

Bevacizumab (Avastin® F. Hoffmann-La Roche Ltd., Basel, Switzerland) is a humanized monoclonal antibody that inhibits endothelial growth factor, and is rapidly becoming one of the leading treatments for neovascular age-related macular degeneration (AMD)<sup>1</sup>. There is growing evidence of the benefits of bevacizumab for treating other ocular diseases associated with neovascularization, such as diabetic retinopathy<sup>2</sup>. Also, bevacizumab has been reported to cause rapid regression of anterior segment neovascularization in eyes with neovascular glaucoma<sup>3</sup>.

Given the addition of fluid into the vitreous cavity, an increase in intraocular pressure (IOP) should be expected after intravitreal anti-VEGF delivery<sup>4</sup>. This is usually transient, but occasionally, it can persist. An acute IOP rise has been shown to decrease both optic nerve head and juxtapapillary retinal blood flow proportionally to the quantitative rise in IOP<sup>5</sup>. The axonal transport to the optic nerve head has also been proved to be blocked by an acute IOP increase in animal models. Knowledge of the IOP fluctuations after intravitreal injection allows

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ophthalmologists to make a clinical judgment regarding whether a patient with glaucomatous optic nerve damage may benefit from an anterior chamber paracentesis to avoid the damage associated with repeated episodes of high IOP.

### Methods:-

It is a prospective observational study done on patients receiving intravitreal injection of bevacizumab in the ophthalmology department of Veer Surendra Sai Institute of Medical Sciences and Research, Burla between March 1, 2016 and Aug 31, 2016. The study included patients who were at least 18 years of age and who had a diagnosis of active choroidal neovascularization or macular edema with clinical criteria for antiangiogenic treatment. Patients with previous ocular surgeries, with the exception of cataract surgery, or intravitreal injections of corticosteroids within the previous 3 months were excluded. Informed consent was obtained from each patient.

Intravitreal injections were given at the operating theatre by surgeons who were familiar with the procedure and used the same technique. Intraocular pressure was measured pre-operatively and after the injection by Goldman Applanation Tonometer in sitting position. The fellow eye was taken as control.

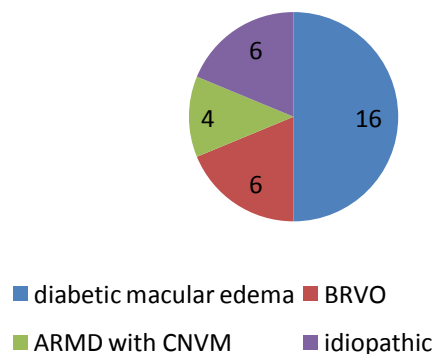
### Results:-

Overall 32 eyes of 32 patients were injected. The mean age was 63 years (ranging from 48- 88 years) with 62.5% of patients being males and 37.5% were females. 19 eyes were phakic and 4 patients had previous history of glaucoma.

**Table1:-** profile of patients

| characteristic    | frequency  | percentage |
|-------------------|------------|------------|
| Age(mean)in years | 63.2 years |            |
| Sex- male         | 20         | 62.5       |
| female            | 12         | 37.5       |
| Right eye         | 21         | 65.6       |
| Left eye          | 11         | 34.3       |
| Glaucoma present  | 4          | 12.5       |
| Glaucoma absent   | 28         | 87.5       |
| Phakic status     |            |            |
| phakic            | 19         | 59.4       |
| pseudophakic      | 13         | 40.6       |

### indications for intravitreal injection



Treated eyes had a mean IOP before injection of  $16.2 \pm 6.5$  mmHg; 10 min after injection it was  $35.2 \pm 5.5$  mmHg ( $P < 0.001$ ) and  $19.2 \pm 6.5$  after 45 min. In control eyes, the mean IOP before injection was  $14.9 \pm 6.0$  mmHg, and 10 min after injection, it was  $17.5 \pm 6.0$  mmHg and  $17.2 \pm 2.5$  mmHg after 45 min. The average increase in IOP for

eyes with glaucoma treated with Bevacizumab was 8.25 mm Hg, and without glaucoma was 4.79 mm Hg. 2 eyes with previously known glaucoma required IOP lowering agents to lower the IOP.

### Discussion:-

As intravitreal anti-VEGF injection becomes a more common treatment modality for various vitreoretinal diseases, there is increased concern regarding acute IOP elevation after intravitreal injection in relation to the acute increase in volume inside the eye. Several studies have examined post-injection IOP spikes and most revealed that IOP spikes are transient and additional intervention to lower the IOP, such as anterior chamber paracentesis, is not necessary. Kim et al investigated the short term IOP changes immediately after intravitreal injection of anti-VEGF found a higher mean IOP change of 30 mmHg from baseline<sup>7</sup>. Falkenstein et al also did similar study on 70 patients and found that in all cases IOP fell below 30 mmHg within 15 min of injection<sup>5</sup>. In a study by Abedi et al it was concluded that persistent ocular hypertension may be associated with intravitreal anti-VEGF injections so physicians should be aware of this condition and monitor their patients for persistent ocular hypertension, especially in eyes with pre-existing glaucoma<sup>8</sup>.

### Conclusion:-

Intravitreal injection of bevacizumab is safe with respect to short-term IOP changes, most of the IOP returned to a safe range (<25 mmHg) within 45 min. Elevated IOP 45 min after injection only occurs rarely, so routine prophylactic use of anti-glaucoma medication is not indicated. However additional studies addressing the possible loss of retinal ganglion cells with repeated intravitreal injections are needed.

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