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Short-term intraocular pressure changes after intravitreal bevacizumab injection

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ABSTRACT

Intravitreal injections of anti-vascular endothelial growth factors (anti-VEGFs) have become more popular quickly in recent years. Bevacizumab is an anti- vascular endothelial growth factor agent (anti-VEGF) used to treat choroidal neovascularization and retinal vascular disorders. Rare long lasting ocular adverse events are reported in the intravitreal injection of this drug that include intraocular inflammation, retinal tears, vitreous hemorrhage, endophtalmitis, and lens changes. One important concern about intravitreal injection of anti-VEGF drug is intraocular pressure (IOP) elevation. There are two kinds of IOP elevation. First one is an acute elevation of IOP (after few minutes) and the second is delayed IOP elevation (after few months). The prevalence of IOP elevation immediately after injection is significantly high and seems to have the potential risk for optic nerve fiber loss results in decreased vision but fortunately this IOP elevation seems to be transient in most of studies.

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Introduction

Intravitreal injections of anti-vascular endothelial growth factors (anti-VEGFs) have become more popular in recent years. Several therapeutic effects of these factors on age related macular degeneration (AMD), central retinal vein occlusion (CRVO), proliferative diabetic retinopathy (PDR) and other retinal pathologies have been reported. Three major drugs with these factors include pegaptanib (Macugen), ranibizumab (Lucentis) and bevacizumab (Avastin). Intravitreal bevacizumab injection is more popular than the other (Macugan & Lucentis); in Iran although it is a drug used

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off label for intravitreal treatment (1-5).

Bevacizumab is an anti-vascular endothelial growth factor agent (anti-VEGF) used to treat choroidal neovascularization and retinal vascular disorders. Uncommon long lasting ocular adverse events reported in the intravitreal injection of this drug include intraocular inflammation, retinal tears, vitreous hemorrhage, endophtalmitis and lens changes. Despite these few complications, intravitreal injection is commonly regarded as a safe surgical procedure (6-9).

There are two intravitreal injection techniques. Tunnelled intravitreal injection is performed at 3.5 mm to 4.0 mm to the limbus through pars plana located in the temporal superior quadrant of the eye. The injection procedure is initiated by a lamellar perforation of conjunctiva and sclera at an angle of 30 parallel to the limbus using 30 gauge needles. The needle is subsequently rotated to 90 degree angle and then advance, aiming at the posterior pole (10).

In contrast, straight intravitreal injection is performed at the same location and with the same distance to the limbus also using a 30- gauge needle but without the lamellar technique. The needle is advanced straight in the direction of posterior pole (10).

One important concern about intravitreal injection of anti-VEGF drug is intraocular pressure (IOP) elevation. There are two kinds of IOP elevation .The first is an acute elevation of IOP (after few minutes) and the second is delayed IOP elevation (after few months) (11).

Acute IOP elevation after intravitreal injection of bevacizumab has potential risk of optic nerve fiber loss, results in decreased vision so it is important to know the pattern of acute IOP elevation for making decision about decreasing elevated IOP. In this review, we are going to answer this challenge by reviewing the related articles.

Methods

We used Pubmed as the search engine. Search strategy included the terms bevacizumab, intraocular pressure, and intravitreal injection. We found 8 articles relevant to this title included 4 clinical trials and 4 cross sectional studies between 2006 to 2012.

Results

In 2006, Benz, et al. studied on acute IOP changes after intravitreal triamecinolone injection which could be compared to the bevacizumab injection. In this study patients who had vitreous reflux after injection showed no significant IOP elevation. On the other hand, patients who did not have vitreous reflux showed significantly IOP elevation which spontaneously reached to the normal condition after 30 minutes (12).

In 2007, Falkenstein, et al. published a paper about short term fluctuations of IOP after intravitreal bevacizumab injection. 70 patients who received bevacizumab because of AMD (age-related macular degeneration) were involved in this study. Mean of IOP after 3 and 10 minutes of bevacizumab injection were 36.7+/- 5.1 and 24.56+/- 5.9 respectively. 14% of patients need 15 minutes after injection to gain the IOP lowers than 30 mmHg spontaneously. Finally result of this study revealed that short term fluctuation of IOP after intravitreal bevacizumab injection is a common complication most probably due to increasing of vitrous volume and spontaneously drops below 30 mmHg after 15 minutes (11).

In 2009, Knecht, et al. published a paper about complications of intravitreal bevacizumab injection respect to the injection technique. 60 patients who received intravitreal bevacizumab injection by two different techniques (tunneled vs. straight) were studied. Results of this study

revealed that IOP rise occurs right after injection respect to the injection technique to 30.19 till 35.97 mmHg, but after 5 minutes there is no difference between two groups. So short term IOP fluctuation is a common complication but injection technique does not have a significant effect (10).

Hoang, et al. in 2011 published a paper which studied complications of intravitreal bevacizumab injection (include increasing IOP).They pointed in this paper that acute IOP rising is a common and significant complication (13).

Also several other studies assessed the short-term IOP course after intravitreal injections. In Hollands study (2007) the mean IOP values at baseline, 2, 5 and 30 minutes after injection were 14.0 mm Hg, 36.1 mm Hg, 25.7 mm Hg and 15.5 mm Hg, respectively. Three patients had an IOP of 25 mm Hg or higher at 30 minutes (14). In Falkenstein study (2007) mean of IOP before injection was 15.17 mmHg and 3 minutes post injection the IOP had risen to a mean of 36.27 +/- 5.1 mm Hg and fell spontaneously to a mean of 24.56 +/- 5.9 mm Hg at 10 minutes. Few eyes needed 15 minutes to drop below 30 mm Hg. All eyes were below 30 mm Hg at 15 minutes (15). In Mojica study (2008) mean of IOP before injection was 14.04 mmHg and 30 minutes after injection was 21.1 mmHg (16).

In Kim study (2008) mean of pre injection IOP was 14, immediately after injection was 44 but all patients had IOP below 30 mmHg 30 minutes after injection. Eyes with a history of glaucoma took longer to normalize the IOP (17).

Conclusion

The concern about acute elevation of IOP after intravitreal bevacizumab injection seems to be related to acute increase in volume inside the eye. The prevalence of IOP elevation immediately after injection is significantly high and with the potential risk for optic nerve fiber loss but fortunately this IOP elevation seems to be transient in all of studies above and not continued more than 30 minutes after injection. Injection technique seems no significant effect in IOP elevation pattern but this needs more investigation in the future. Finally although IOP elevation is transient but because of potential risk of optic nerve damage using anti glaucoma agents before injection may have some benefit.

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Conflict of Interest

The authors declare no conflict of interest.

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