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To Compare Safety and Efficacy of Two Methods, Smith and Nozik Method and Cannula Method of Posterior Subtenon Triamcinolone Acetonide

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ABSTRACT

Background-Many methods for posterior sub-tenon steroid injection have been described for management of uveitis.We aimed to compare safety and efficacy of two methods of posterior subtenon Triamcinolone acetonide injection in patients of uveitis.

Methodology- This was a prospective interventional study conducted on patients with uveitis at tertiary care hospital. All the patients were subjectedto clinical history and ocular examination. Patients were randomly assigned into two groups and Posterior subtenon Triamcinolone steroid injection was given. All the patients were followed up to12th weeks.

Results- 30 cases were given the injection via Smith and Nozik method whereas 30 cases were managed with the help of Cannula method. We observed no significant difference in mean visual acuity, IOP and CMT between the patients of two groups at each follow up ($p>0.05$).IOP was found to be raised at 6 weeks in 6 out of 30 patients in Smith and Nozik method ($p<0.05$), for which temporary IOP lowering drugs were given and then the IOP came to baseline value on 12th week follow-up. Though both the methods were effective in reducing the anterior chamber cells and vitritis, two groups were equally effective ($p>0.05$).Adverse effects were subconjunctival hemorrhage and ptosis, which were comparable between two groups ($p>0.05$).

Conclusion-Our study suggests that the cannula method is an equally efficacious alternative to the more widely used Smith and Nozik method and may be safer, as a sharp needle is avoided after the initial entry done under visualization.

Keywords-Posterior subtenon injection, Triamcinolone acetonide, Uveitis, steroid, visual acuity, vitritis

INTRODUCTION-

Uveitis treated mainly with steroid. The principal effects of steroids are stabilization of the blood retina barrier, resorption of exudation, and downregulation of inflammatory stimuli. Steroid mainly Posterior subtenon injection (PST) of corticosteroids is widely used as the treatment for reducing the impact of inflammation in patients of uveitis.Posterior subtenon injection works by decreasing host immune response against uveitis and hence reduces ocular complications and visual morbidity.[3]

Different modes of delivering steroid included topical steroid in which Prednisolone or dexamethasone is commonly utilized as 1st choice.[4]Subconjunctival steroid can be administered in severe cases or to patients in whom poorcompliance is likely. Side effect is mainly subconjunctival haemorrhage. Localized deposition of corticosteroid with a periocular injection has the benefit of more consistent intraocular drug delivery and higher intraocular drug concentration than corticosteroid drop therapy, while minimizing systemic absorption and associated side effects of oral corticosteroid therapy.[5,6]

Many methods for posterior sub-tenon steroid injection have been described, we are using 2 out of them, The cannula method & The Smith and Nozik method. Cannula Method of posterior subtenon injection as described by Venkatesh *et al*. has been found to be more safe and effective method and reduces the chances of globe perforation.[4] In 1972 Smith and Nozik Method of periocular injection of corticosteroids for the management of uveitis described by Nozik.[6]The aim of our study was to compare safety and efficacy of two methods, Smith and Nozik and cannula method of posterior subtenon Triamcinolone acetonide injection in patients of uveitis.

METHODOLOGY

This was a prospective interventional study conducted on patients with uveitis attending the Department of Ophthalmology, Shyam Shah Medical College and associated during the period from January 2021-September2022. Patients with acute anterior uveitis, recurrent anterior uveitis, intermediate uveitis with cystoid macular edema, Chronic

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uveitis, panuveitis & posterior uveitis were included whereas patients with glaucoma or ocular hypertension, diabetic macular edema, post-operative macular edema, retinal vascular occlusive disorder and other cause of macular edema were excluded from the study.

After taking consent, a detailed clinical history was recorded. A comprehensive eye examination was performed in all the study subjects. Assessment of visual acuity was done using self-illuminated Snellen's chart. IOP was measured by calibrated Goldmann Applanation tonometer. Examination of anterior segment was performed using Zeiss Slit-lamp biomicroscope.Anterior chamber cells were assessed and grading was performed by examining the number of cells in a 1mm by 1mm slit beam field.Aqueous flare was assessed by a point beam light passed obliquely to the plane of iris and graded.

The pupils of all subjects were dilated using a combination of 0.75% tropicamide and 2.5% phenylephrine eyedrops. Vitreous cells were graded by observing the retrolental space in a dilated eye using the slit-lamp biomicroscope and 1×0.5 mm beam and graded.

Slit lamp indirect ophthalmoscopy was done using Volk +90D lens to assess the presence or absence macular oedema. Spectral Domain Optical Coherence Tomography was used to record cystoid macular edema. Patients were randomly assigned into two groups and Posterior subtenon Triamcinolone steroid injection was given by either method.

1. Smith and Nozik method- Conjunctiva was anesthetized with proparacaine drops. Wire speculum is placed and patient was asked to look at inferonasal side. Conjunctiva was lifted with help of blunt serrated forceps. Syringe filled with 1 mL (40 mg) of triamcinolone and fitted with 26-gauge needle was advanced with bevel facing toward the globe, superotemporally along the curve of the globe till the hub touches the conjunctiva The needle was then swept circumferentially to ensure thatsclera was not engaged, and corticosteroid was slowly injected. Special care was taken to place the depot deeply in the posterior subtenon space. Plunger was slightly withdrawn to rule out injecting steroids within a vessel. 0.5 mL of triamcinolone was injected and needle was withdrawn. Antibiotic drops were then instilledinto the eye.[4]

2. Cannula Method- Conjunctiva was anesthetized with proparacaine drops and a wire speculum was placed. Patient was asked to look at inferonasal side. Conjunctiva and tenon was lifted about 10mm away from the limbus using a blunt serrated forceps in the superotemporal quadrant. Entry was made into the episcleral space using the stellate of a 22- gauge, 0.9/25-mm intravenous cannula made of polytetrafluoroethylene. The stellate (with bevel up) and cannula were advanced together for about 3mm within the episcleral space under direct visualization. The cannula was furtheradvanced simultaneously with withdrawal of stellate with rotatory movement of fingers. When the cannula was advancedabout 12–14mm posteriorly in subtenon space, the stellate was completely withdrawn and a syringe loaded with triamcinolone was attached to the cannula and 1 mL (40 mg) triamcinolone was injected. The cannula was slowly withdrawn and a cotton swab stick is applied to the site of injection for few seconds and then antibiotic drops were instilled into the eye.[4]

All adults received an injection of 40 mg (1ml) of triamcinolone acetonide. Children younger than 13 years were given 20 mg (0.5 ml) of the drug.Follow-up for each initial injection was continued up to 12th weeks. At each follow-up, we assessed the efficacy of PSTI in terms of improvement of visual acuity, decreasing number of cells in AC (anterior chamber) and improvement in vitritis and reduction in central macular edema (CME).

Statistical analysis- Data was compiled using MsExcel and analysis was done using IBM SPSS software version 20. Categorical data was expressed as frequency and proportion whereas continuous data was expressed as mean and SD. Two groups were compared using chi square test (for categorical variables) or independent t test (for continuous variables). P value of less than 0.05 was considered statistically significant.

RESULTS-

This study included 60 cases with uveitis requiring posterior subtenon Triamcinolone acetonide injection; of them, 30 cases were given the injection via Smith and Nozik method whereas 30 cases were managed with the help of Cannula method. Mean age of patients managed using Smith and Nozik method was 40.9±12.89 years whereas mean age of patients of Cannula method group was 46.6±12.4 years. About 53.3% and 60% cases in Smith and Nozik group and Cannula method group were males.Majority of cases were diagnosed with acute anterior uveitis, 53.3% cases of Smith and Nozik group and 46.7% cases of Cannula method group had acute anterior uveitis. Two groups were comparable with respect to age, sex and diagnosis ($p>0.05$).

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Table 1- Comparison of ophthalmic examination between patients of two groups

Ophthalmic examination		Smith and Nozik method (n=30)		Cannula method (n=30)		P value
		Mean	SD	Mean	SD	
Visual acuity (logMar)	Baseline	0.64	0.28	0.62	0.30	0.793
	1 week	0.48	0.21	0.48	0.20	1
	2 weeks	0.307	0.15	0.29	0.14	0.837
	6 weeks	0.247	0.11	0.193	0.07	0.375
	12 weeks	0.193	0.08	0.18	0.04	0.820
IOP	Baseline	13.76	3.99	15.24	4.4	0.18
	1 week	17.87	5.906	16.87	3.298	0.421
	2 weeks	17.00	3.913	16.93	2.559	0.938
	6 weeks	17.87	4.577	17.60	4.399	0.82
	12 weeks	17.67	6.110	16.17	3.3	0.24
Central macular thickness	Baseline	558.67	87.91	488.00	136.55	0.188
	1 week	463.33	105.96	426.86	122.59	0.515
	2 weeks	371.33	142.62	359.71	69.77	0.855
	6 weeks	345.00	120.58	283.00	57.94	0.275
	12 weeks	275.33	35.44	246.50	14.06	0.105

We observed no significant difference in visual acuity between the patients of two groups at each follow up ($p>0.05$).Two groups were comparable with respect to IOP at baseline. However, we reported no significant difference inIOP and CMT between two treatments groups at various follow-ups ($p>0.05$).IOP was found to be raised at 6 weeks in 6 out of 30 patients in Smith and Nozik method ($p<0.05$), for which temporary IOP lowering drugs were given and then theIOP came to baseline value on 12th week follow-up. CMT was found to be raised in 8(26.7%) patients and 12(40%) patients in Smith and Nozik method and Cannula method group respectively.

Table 2- Comparison of two treatment groups with respect to anterior chamber cells and vitritis at various follow ups

AC cells and vitritis			Smith and Nozik method (n=30)		Cannula method (n=30)		P value
			n	%	n	%	
AC cells	Baseline	1+	0	0	0	0	0.47
		2+	10	33.3	10	33.3	
		3+	8	26.7	10	33.3	
		4+	6	20	2	6.7	
	1 week	1+	10	33.3	4	13.3	0.12
		2+	9	30	8	26.7	
		3+	0	0	0	0	
		4+	1	3.2	0	0	
	2 weeks	1+	4	13.3	8	26.7	0.07
		2+	4	13.3	0	0	
	6 weeks	1+	0	0	0	0	0.15
		2+	2	6.7	0	0	
	12weeks	1+	0	0	0	0	NA
Vitritis	Baseline	1+	0	0	0	0	0.21
		2+	0	0	0	0	
		3+	6	20	10	33.3	
		4+	2	6.7	0	0	
	1 weeks	1+	2	6.7	8	26.7	0.06
		2+	6	20	2	6.7	
	2 weeks	1+	4	13.3	2	6.7	0.39
	6 weeks	1+	0	0	2	6.7	0.15
	12 weeks	1+	0	0	0	0	NA

Though both the methods were effective in reducing the anterior chamber cells and vitritis over the follow up period of 12 weeks, we observed no significant difference in AC cells and vitritis between two groups ($p>0.05$).

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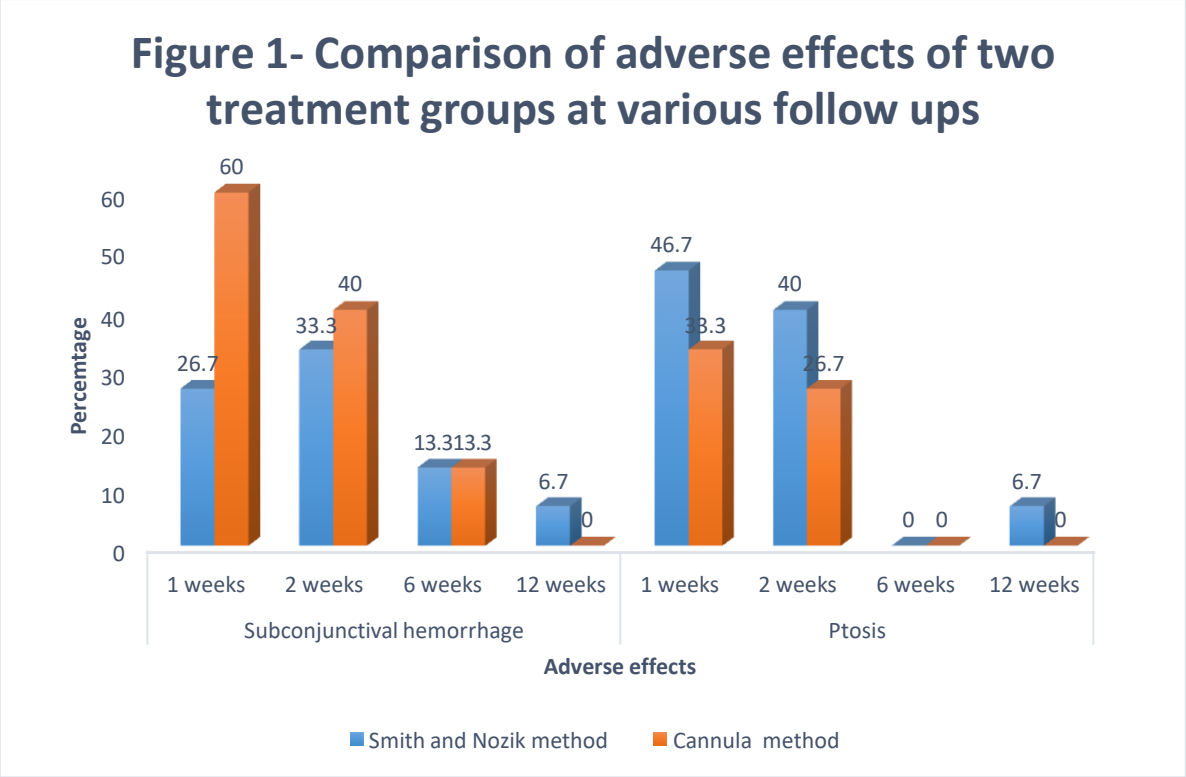

Adverse effects noted following posterior subtenon injection were subconjunctival hemorrhage and ptosis. We reported no significant difference in ptosis as well as subconjunctival hemorrhage between the patients of two groups ($p>0.05$) at various follow up.

DISCUSSION-

Posterior sub-Tenon's injection of steroid allows a high concentration of drug to be delivered to the posterior segment of the eye for the treatment of intraocular inflammation, with a minimal risk of systemic side effects. The potent aqueous suspension of triamcinolone would seem to offer a better suited to most clinical situations. For this reason, triamcinolone acetonide was the steroid preparation used in this study.[5]The study was conducted on 60 cases with uveitis and of them, 30 patients were given injection via Cannula method whereas remaining 30 cases were given via Smith and Nozik method.

Injection of triamcinolone acetonide appeared to be beneficial in treating visual loss in our study by both the methods. Tanner *et al*[5]achieved 2-line increase in Snellen acuity in 43% and 84% cases within 2 and 12 weeks respectively after initial injection. Lafranco *et al*[7] observed highly significant increase of VA from 0.40 to 0.71 at short term follow-up. Venkatesh *et al*[4]observed statistically significant improvement in visual acuity in group 1 from .25+/-0.08 to 0.75+/- 0.24, in group 2 from 0.29+/-0.12 to 0.78+/-0.23, and in group 3 from 0.24+/-0.10 to 0.72+/-0.27**.**

In our study, IOP was found to be raisedat 6week in 6 patients in Smith and Nozik method, for which temporary IOP lowering drugs were given and then the IOP came to baseline value. After 12 weeks in our study no significant changes were found in both groups.Helms *et al*[8]observed increased intraocular pressure in 6 patients (30%), with onset at a median of 3 weeks after initial injection.Jonas *et al*[9]observed an IOP of 24 mmHg or higher in 26 of 115 eyes during the12-month follow-up period after PST A injection and of them, 23 eyes needed treatment with antiglaucoma medication tocontrol IOP**.** Interestingly, the amount of IOP elevation after 2nd injection was significantly greater than that after 1st injection when the interval between the 2 was 6 months or less. These suggest that the accumulation of TA in the subtenon capsule might amplify the side effects on IOP.

In our study Central macular thickness at baseline in Smith and Nozik method group was 558.67±87.91 whereas that in Cannula method group was 488±136.55 and the observed difference was statistically insignificant ($p>0.05$). Though CMT reduced in both the treatment group with each follow-up, we reported no significant difference in mean CMT between two treatment groups at any follow up ($p>0.05$) CMT was raised in 8 (26.7%) patients and 12 (40%) patients in those PSTI of TA given by Smith and Nozik method and Cannula method respectively.

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Tanner *et al*[5]demonstrated that PSTI of TA significantly decreases macular thickness, Venkatesh *et al*[4] deliveredPSTI of TA via three methods, they observed statistically significant decrease in OCT central macular thickness 43.97% in group1, 32.46% in group2, and 29.75% in group 3 that was noted at 12 weeks, however, the difference between individual groups at each visit did not reach statistically significant. However, the cannula method achieves the greatest quantitative reduction in macular oedema secondary to intermediate uveitis.Lafranco *et al*[7]reported significant decrease of aqueous flare following PSTI of TA from 29.6+/-3.5 to 13.6+/-2.2 photons/ms. A 50% decrease in mean flare values was seen already at short-term follow-up and persisted to the long- term follow-up.Similarly, we observed significant reduction in anterior chamber cells in both groups, but no significant difference seen between both group in each follow- up.

We observed no difference in complications and adverse effect between two methods. None of our case had globe perforation. Alike our study, other studies of Helm *et al*[8]observed steroid delivery mode related complications like mild ptosis, subconjunctival haemorrhage, chemosis and globe perforation to be rare.But from time to time there are cases in which inadvertent globe perforation is noted with the Smith and Nozik method. This is related to a sharp-tipped needle being used for the injection and also because the needle is advanced up to the hub without any visualization of its tip.Lafranco *et al*[7], Chandravanshi *et al*[10], Mawatari *et al*[9] observed partial ptosis as the adverse effect.

CONCLUSION

Both the techniques are effective in improving the visual acuity, reducing the inflammatory process as well as edema but the difference in outcome at any followup between both the groups was insignificant. The macular thickness decreased in both the Smith and Nozik method and the cannula method as closer placement of drug probably occurs in both of these methods. However, the incidence of glaucoma in Smith and Nozik method at 6week was higher as compared to Cannula method, which can be managed safely with temporary antiglaucoma medication. Our study suggests that the cannula method is an equally efficacious alternative to the more widely used Smith and Nozik method and may be safer, as a sharp needle is avoided after the initial entry done under visualization.

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Conflicts of Interest- There is no conflict of Interest

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