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STEROID INDUCED OCULAR HYPERTENSION AFTER PTERYGIUM EXCISION: A PROSPECTIVE COMPARATIVE INTERVENTIONAL STUDY

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ABSTRACT **PURPOSE:** To compare Intra Ocular Pressure (IOP) and recurrence rate following pterygium excision using various topical steroids and antibiotic drops in control group. **METHOD:** Eighty patients of post pterygium excision with conjunctival limbal autograft (CLAG), randomly divided into 4 groups of 20 patients each were prescribed with topical dexamethasone 0.5% (Group A), loteprednol 0.5% (Group B), and fluorometholone (FML) 0.1% (Group C). All drugs were instilled in tapering regimen for 6 weeks. Topical moxifloxacin 0.1% (group D) used 6 times/day for 6 weeks. Recurrence and IOP was measured at 2nd, 4th, 6th week and at 6 months postoperatively. **RESULT:** In present study, after 2 weeks of post-operative period it was observed a rise in IOP of > 21 mmHg in 2 (10%) eyes in the Dexamethasone group and 1 (5%) eye in the each Loteprednol and FML group. The mean IOP increased to 17.9 mmHg (ranges, 14 to 28mmHg), in dexamethasone groups which is the highest among steroids and least increase in mean IOP was seen in FML group. Steroid-induced ocular hypertension was more evident 2 weeks after prescription of steroids eye drops. The IOP rise was significantly different between groups in the 2nd and 4th postoperative weeks (P< 0.05) however, the difference was not statistically significant at 6 weeks. No recurrence was seen with Group A (dexamethasone) and Group B (loteprednol) patients. Recurrence was noted in one (5%) from Group C (FML) and 2 (10%) from group D (control group). **CONCLUSION:** For postoperative inflammation after pterygium excision with CLAG use of steroids with moderate potency has good control on inflammation and it effectively reduces the recurrence. It was crucial to monitor IOP during 2nd to 4th week post - operative period to prevent steroids induced ocular hypertension.

KEYWORDS : Intra ocular pressure, Recurrence, Conjunctival limbal autograft (CLAG), Steroid induced ocular hypertension.

INTRODUCTION

Pterygium is a degenerative subconjunctival tissue that proliferates as vascularized granulation tissue to invade the cornea, destroying the superficial layers of the stroma and Bowman's membrane.[1] Currently, the definitive management of a patient with pterygium is surgical excision if the cornea is significantly involved causing cosmetic blemish, visual impairment and ocular discomfort. Surgical excision with conjunctival limbal autografting is a good technique as it is effective in reducing recurrences (<2%)[2]. In any case of surgery, post operatively steroid eye drops were widely used for suppression of ocular inflammation. Topical steroid after pterygium excision help to prevent a number of complications associated with post-operative ocular inflammation. The recurrence rate was higher in patients who received inadequate post-operative topical corticosteroid treatment [3]. However, long term use of topical corticosteroids associated with side effects, such as increased intraocular pressure (IOP) that may progress to secondary glaucoma and delayed wound healing [4]. Three steroids that was studied to evaluate their various effect after pterygium excision are as follows :(1) Dexamethasone (2) Loteprednol (3) Flourometholone (FML).

Corticosteroids known to suppress the phagocytic activity of endothelial cells of trabecular meshwork, Glycosaminoglycan's present in the trabecular meshwork cannot depolymerized, it also inhibits synthesis of prostaglandin E and F, all these lead to increase IOP.[5]

AIMS AND OBJECTIE: To evaluate steroid induced ocular hypertension and recurrence rate after pterygium excision using various topical steroids.

METHOD: This prospective, randomized, interventional study was conducted on 80 patients with grade II & III pterygium were selected and enrolled. Detailed history was obtained regarding onset, duration, socioeconomic status and occupation. Thorough Ophthalmic examination including grading of pterygium and measurement of IOP was done. After obtaining informed consent, patients were taken for elective surgery: Pterygium excision with conjunctival limbal autograft technique was done under peribulbar and facial anesthesia. On first postoperative day, patients were examined for graft condition and any other complications and patients were randomly assigned into 4 groups on the basis of instillation of topical drops viz. Group A (Dexamethasone 0.5%), B (Loteprednol 0.5%), C (Fluorometholone 0.1%) and D (Antibiotic). All steroid drops were prescribed as per scheduled dosages i.e.QID for 2 weeks, BD for next 2 weeks and OD another 2 weeks. Follow up done at end of 1st, 2nd, 4th and 6th week to look for graft inflammation, recurrence and other complications due to pterygium surgery. Last follow up was done at 6 months postoperative period to look for recurrence. Intra Ocular Pressure was measured by Goldman applanation tonometer at the end of 2nd, 4th and 6th post-operative period. Rise in intraocular pressure is a common problem in steroid use, especially with topical steroid. Significant rise in IOP is defined as rising in IOP from preoperative baseline at least 10 mmHg.

On the basis of conjunctival tissue proliferation and episcleral vessels recurrence is graded as [6]:

Grade 1: appearance showing normal structure.

Grade 2: appearance showing the presence of thin episcleral vessels in the excised area extending up to but not beyond the limbus and without any fibrous tissue.

Grade 3: appearance showing fibrous tissue that did not invade the cornea.

Grade 4: appearance showing frank recurrence with fibrous tissue invade the cornea.

OBSERVATION AND RESULT

Table 1. Gender, occupation and residence profile of patients:

SEX		OCCUPATION		RESIDENCE	
MALE	FEMALE	OUTDOOR	INDOOR	RURAL	URBAN
51 (63.75%)	29 (36.25%)	67 (83.75%)	13 (16.25%)	61 (76.25%)	19 (23.75%)

TABLE 2: Intra ocular pressure changes with time in various groups:

POST-OPERATIVE	DEXA (A)	LOTE (B)	FML (C)	CONTROL (D)	F	P Value
Pre op Mean ± SD Median (range)	14±1.89 14(10-18)	14.1±2.40 16(10-18)	14.4±1.85 14(12-18	14.2±2.08 14(10-18)	0.129	0.943
2w post op Mean ± SD Median (range)	17.9±3.31 18(14-28)	17.4±2.69 18(14-26)	16.9±3.19 16(12-28)	14.5±1.98 14(12-20)	5.328	0.002

4w post op Mean ± SD Median (range)	17.1±2.56 16(14-24)	16.6±3.23 16(10-24)	16.7±2.38 16(12-24)	14.9±1.72 16(12-18)	2.804	0.045
6w post op Mean ± SD Median (range)	16.1±2.09 16(14-20)	15.3±2.30 16(10-20)	15.6±2.24 16(12-20)	14.7±2.21 14(10-18)	1.261	0.294

Table 3: P value comparing 2 by 2 test- preoperative

	A	B	C	D
A	-	0.999	0.933	0.991
B	0.999	-	0.970	0.999
C	0.933	0.970	-	0.991
D	0.991	0.999	0.991	-

Table 4: P value comparing 2 by 2 test- post operative

	2nd week post op				4th week post op				6th week post op			
	A	B	C	D	A	B	C	D	A	B	C	D
A	-	0.948	0.701	0.002	-	0.929	0.962	0.044	-	0.700	0.903	0.237
B	0.948	-	0.948	0.013	0.929	-	0.999	0.174	0.700	-	0.977	0.848
C	0.701	0.948	-	0.053	0.962	0.999	-	0.136	0.905	0.977	-	0.616
D	**0.002**	**0.013**	0.053	-	**0.044**	0.174	0.136	-	0.237	0.848	0.616	-

Table 5: Magnitude of rise in intraocular pressure from baseline: at 2 weeks postoperative:

	A	B	C	D
< 6 mmHg	16	17	18	20
6-10mmHg	2	2	1	0
>10 mmHg	2	1	1	0

Table 6: Recurrence

GROUPS	RECURRENCE		
	N (%)	Mean age	Mean time
A	0 (0%)	-	-
B	0 (0%)	-	
C	1 (5%)	41 year	3 month
D	2 (10%)	40 year	2 month
TOTAL	3	42 year	3.66 month

DISCUSSION

In the present study, among total of 80 patients, it was observed that 51(63.75%) male and 29(34.25%) female patients. The mean age of the patients was 49.95 years with a standard deviation of 13.39 years, 76.25% patients were from rural area and 23.75% patients were from urban area. In the study out of 80 patients 67(83.75%) having outdoor occupation and 13 (12.25%) patients having indoor occupation. Majority of the patients belonged to rural area. Rural area and low socioeconomic status are associated with more amount of outdoor work and hence more UV exposure. These people have low level of education and may not be aware of the harmful effect of the UV light and thus don't adopt protective measures such as hats and sunglasses.

In present study, preoperative mean IOP was not significantly different between groups. After 2 weeks of post-operative period it was observed a rise in IOP of > 21 mmHg in 2 (10%) eyes in the Dexamethasone group and 1 (5%) eye in the each Loteprednol and FML group. The mean IOP increased to 17.9 mmHg (ranges, 14 to 28mmHg), in dexamethasone group which is the highest among steroids and least increase in mean IOP was seen in FML group. In 4th week post-operative, there was gradual decrease in mean IOP in all groups but in the Dexamethasone group 1 eye had IOP equal to 22 mmHg in the study. At 6 weeks there was gradual decrease in mean IOP and it reduce to nearly at baseline IOP, which is comparable with study done by **B. K. Khatri and H Ton [7],** they also observed the similar pattern of lowering of IOP to nearly baseline values, few weeks after pterygium excision.

The study documented that Steroid-induced ocular hypertension was more evident 2 weeks after prescription of steroids eye drops. The IOP rise was significantly different between groups in the 2nd and 4th postoperative weeks **(P< 0.05)** however, the difference was not statistically significant at 6 weeks.

The IOP rise was not statistically significant on comparing these three drugs that is the dexamethasone, loteprednol and FML groups in any visit. When comparing the dexamethasone and control group the IOP was statistically significant **(P < 0.002)** in the dexamethasone group on 2nd and 4th post-operatively. When comparing the loteprednol and control groups, the IOP was statistically significant **(P<0.013)** in the loteprednol group on 2nd weeks after surgery, the difference was not significant at the 6th week. **Novack et al. [8]** showed that loteprednol had minimal effect on IOP when compared to prednisolone used for long term. **Lane and Holland [9]** showed that mean change in IOP was higher with prednisolone compared to loteprednol.

Based on the magnitude of IOP rise from the baseline value we also classified eyes in to 3 groups: Group I- < 6 mmHg; Group II- ≥ 6 but <10 mmHg; and Group III- ≥10 mmHg. At 2nd week, in dexamethasone group, 2 eyes were in group III, 2 eyes in group II and other were in group I. In loteprednol group, 1 eye was in group III, 2 eyes in group II and other were in group I. In FML group, 1 eye was in group III, 1 eye in group II and other were in group I. In moxifloxacin group, all eyes were in group I.

The present study analyse that the rise of mean IOP was maximum with Dexamethasone and least with FML. A similar result was documented by **Cantrill et al [10]**, they noted that dexamethasone 0.1% caused the maximum increase in IOP among various topical steroids. **Holland et al [11]** evaluated that with Dexamethasone increase in the IOP was seen in 7.48% patients compare to Loteprednol in which increase in the IOP was seen in 1.92 % patients.

Pradhnya Sen at. al [12] also reported similar results that mean IOP (43.1 mm Hg) was highest in group A (dexamethasone, betamethasone) followed by group D (Unknown drugs), and the prevalence of steroid induce ocular hypertension was 3.30%.

In present study overall percentage of steroids induced ocular hypertension is 20% which is comparable with study done by **B. K. Khatri and H Ton [7]** in which Ocular hypertension developed in 47 (23.27 %) eyes and the study done by **Marcus Ang et al [13]** that study showed 28.3% patients of VKC were steroid responder. **Makornwattana M, Suphachearaphan W [14]** reported a lower incidence of 9.68% of steroid responder as compared to our study that can be attributed to different study population. **E. Morrison and D. B. Archer [15]** reported that FML had a much less pronounced ocular hypertensive effect compare to dexamethasone as compared to our study.

RECURRENCE: In present study, recurrence of pterygium was noted in 3.75% cases (n=3), mean age of recurrence was 42 years and mean duration was 4.66 months.

No recurrence was seen with Group A (dexamethasone) and Group B(loteprednol) patients. Recurrence was observed in one (5%) from Group C (FML) and 2 (10%) from group D (control group). From above result we observed that younger age can be a risk factor for recurrence besides this individual surgeon's skill had also be taken into consideration and technique or procedure of securing graft at host bed. Previous studies provide evidence that post-operative topical corticosteroids appear to play a role in reducing the pterygium recurrence rate [3] . A lower recurrence rate as compared to our study, was observed in the study conducted by **Ashok Sharma et al [2]** and **Dhakhwa K et al [16]** as the recurrence rate of 1.25%.

CONCLUSION: The study analyse that topical Dexamethasone is most effective in controlling inflammation as well as recurrence as compared to other groups but rise in IOP was most prevalent in dexamethasone group. Timing of the peak IOP mostly occurred at 2nd week post-operative and it reduce to nearly at baseline on 6th week postoperatively. To summarise, for postoperative inflammation after pterygium excision with CLAG use of steroids with moderate potency has good control on inflammation and it effectively reduces the recurrence.

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