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Effect Of Subconjunctival Dexamethasone-Assisted Conjunctival Autograft Harvesting Versus Normal Saline During Sutureless Pterygium Surgery

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Abstract
Background: *Pterygium excision with conjunctival autografting is the standard surgical treatment for primary pterygium. Subconjunctival dexamethasone-assisted conjunctival autograft harvesting has been proposed to improve postoperative outcomes by reducing inflammation during graft dissection.*
Aim: *To compare the effect of subconjunctival dexamethasone-assisted conjunctival autograft harvesting versus normal saline on postoperative inflammation, lid oedema, and pain following sutureless pterygium surgery.*
Materials and Methods: *This single-blind randomized controlled trial was conducted in the Department of Ophthalmology at a tertiary care hospital. Sixty-eight patients with primary pterygium were randomly allocated into two groups: Group I (Dexamethasone, n=34) and Group II (Normal Saline, n=34). All patients underwent pterygium excision with conjunctival autograft using the autologous blood technique. Host-site inflammation, donor-site inflammation, lid oedema, and postoperative pain were assessed on postoperative days 1, 2, 7, and 21 using standardized grading systems.*
Results: *The dexamethasone group demonstrated significantly lower host-site and donor-site inflammation on postoperative days 1, 2, and 7 compared with the normal saline group ($p<0.001$). Lid oedema was also significantly less severe in the dexamethasone group during the early postoperative period. Mean pain scores were significantly lower in the dexamethasone group on postoperative day 1 (4.74±1.19 vs. 6.91±1.55), day 2 (3.82±0.99 vs. 6.00±1.65), and day 7 (1.32±2.11 vs. 2.21±0.95) (all $p<0.001$). By postoperative day 21, inflammation, oedema, and pain had resolved in almost all patients in both groups.*
Conclusion: *Subconjunctival dexamethasone-assisted conjunctival autograft harvesting significantly reduces postoperative inflammation, lid oedema, and pain compared with normal saline, resulting in faster recovery and improved patient comfort following sutureless pterygium surgery.*
Keywords: *Pterygium, conjunctival autograft, subconjunctival dexamethasone, normal saline, inflammation, pain, lid oedema.*

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I. Introduction

Pterygium is one of the most common ocular surface disorders derived from two Greek words, the word "pterygium" has been derived: (pteryx) meaning wing and (pterygion) meaning fin. Sushruta was the first to describe it in 1000 BC, the first recorded ophthalmic surgeon.[1] Pterygium is a triangular fibrovascular subepithelial ingrowth of degenerative bulbar conjunctival tissue over the limbus onto the cornea.[2] The various known risk factors for the occurrence of pterygium are immune mechanism, genetic predisposition, and chronic environmental irritation, which include damage to limbal stem cells by UV (ultraviolet) rays, hot and dry weather, wind, dusty atmosphere, and the period of exposure to such conditions. However, the most common is the increased time of exposure to UV rays of the sunlight, followed by chronic eye irritation from dry and dusty conditions.[3]

If left untreated, it may result in corneal scarring, chronic ocular surface inflammation, irregular astigmatism, and restriction of ocular movement. The gold standard for treatment of primary pterygium is surgical excision with conjunctival autograft (CAG) or conjunctival limbal autograft (CLAG) with equally good results[4]. CAG/ CLAG may be anchored to the sclera by either using sutures, fibrin glue, or autologous blood coagulum.[5] The patient most commonly complains of ocular discomfort, watering and pain post operatively. Ocular pain in these patients is one of the most common postoperative complaints causing discomfort.[6,7]

Various treatment modalities like eye patching8, therapeutic contact lenses8, viscous lidocaine[7], sub tenon bupivacaine[9], topical cyclopentolate6, autologous serum eye drops[10] and topical sodium hyaluronate[11]have been tried to reduce the pain postoperatively. However, these modalities have more or less failed to address the

ocular surface inflammation, which is a major cause of ocular discomfort post-pterygium surgery. Our study was conducted to investigate the effectiveness of administration of subconjunctival dexamethasone for conjunctival autograft harvesting during pterygium surgery and compare it with the control group (Patient administered with subconjunctival normal saline).

II. Materials And Methods

This single-blind randomized controlled trial was conducted in the Department of Ophthalmology at a tertiary care hospital. Patients presenting with primary pterygium who fulfilled the inclusion and exclusion criteria were enrolled. The sample size was calculated using OpenEpi version 3.11 based on previous study data, yielding 34 patients in each group (total 68). Participants were recruited by simple random sampling.

Following approval from the Institutional Ethics Committee and written informed consent, patients were randomized into two equal groups using an odd-even allocation method. Group I received 0.5 mL subconjunctival dexamethasone, while Group II received 0.5 mL subconjunctival normal saline during conjunctival autograft harvesting.

A detailed history, demographic profile, systemic and ocular examination, and routine preoperative investigations, including complete blood count, random blood sugar, and viral markers (HIV and HBsAg), were performed. Ocular evaluation included best-corrected visual acuity, slit-lamp examination with pterygium grading, and fundus examination.

All surgeries were performed by a single experienced surgeon using the sutureless and glue-free conjunctival autograft technique under peribulbar anesthesia. After pterygium excision, a thin Tenon-free conjunctival autograft was harvested from the superior temporal conjunctiva following subconjunctival injection of dexamethasone or normal saline according to group allocation. The graft was secured over the bare sclera using the patient's autologous blood.

Postoperatively, all patients received topical 0.5% loteprednol etabonate + 0.5% moxifloxacin and 0.3% hydroxypropyl methylcellulose eye drops. Follow-up examinations were conducted on postoperative days 1, 2, 7, and 21. Subjective symptoms including pain, watering, and foreign body sensation, along with objective signs such as lid edema, graft inflammation, and host-site inflammation, were assessed using standard grading systems. Pain was evaluated using the Universal Pain Assessment Tool.

III. Results

A total of 68 patients were included in the study, with 34 patients each in the dexamethasone and normal saline groups. The majority of patients belonged to the 40–60 years age group (37, 54.4%), followed by the 60–80 years age group (23, 33.8%). Females constituted 52.9% of the study population. Grade II nasal pterygium was the most common presentation (48, 70.6%), and the right eye was more frequently affected (39, 57.4%). There were no statistically significant differences between the two groups with respect to age, gender, pterygium grade, or operated eye (all $p > 0.05$), indicating comparable baseline characteristics. (Table 1)

Patients receiving subconjunctival dexamethasone demonstrated significantly less host-site inflammation throughout the postoperative period. On postoperative day (POD) 1, severe inflammation was observed in only 1 (2.9%) patient in the dexamethasone group compared with 15 (44.1%) patients in the normal saline group. By POD 7, 26 (76.5%) patients in the dexamethasone group had no inflammation compared with only 2 (5.9%) patients in the normal saline group. On POD 21, inflammation had completely resolved in all patients of the dexamethasone group, whereas mild inflammation persisted in 3 (8.8%) patients in the normal saline group. (Table 2)

The dexamethasone group also showed superior control of donor-site inflammation. On POD 1, severe inflammation was present in only 1 (2.9%) patient in the dexamethasone group compared with 13 (38.2%) patients in the normal saline group. By POD 7, 24 (70.6%) patients in the dexamethasone group had no donor-site inflammation, whereas only 4 (11.8%) patients in the normal saline group showed complete resolution. On POD 21, all patients in the dexamethasone group were free of inflammation, while mild inflammation persisted in 2 (5.9%) patients in the normal saline group. (Table 3)

Lid edema was consistently less severe in the dexamethasone group during the early postoperative period. On POD 1, mild edema was observed in 22 (64.7%) patients in the dexamethasone group, whereas moderate edema predominated in the normal saline group (26, 76.5%). By POD 7, edema had resolved in 33 (97.1%) patients receiving dexamethasone compared with 30 (88.2%) patients in the normal saline group. Complete resolution of lid edema was observed in all patients by POD 21.(Table 4)

Postoperative pain scores were significantly lower in the dexamethasone group at each early follow-up visit. The mean pain score on POD 1 was 4.74 ± 1.19 in the dexamethasone group compared with 6.91 ± 1.55 in the normal saline group ($p < 0.001$). Similar significant differences were observed on POD 2 (3.82 ± 0.99 vs. 6.00 ± 1.65) and POD 7 (1.32 ± 2.11 vs. 2.21 ± 0.95) (both $p < 0.001$). By POD 21, pain had completely resolved in

both groups. These findings indicate that subconjunctival dexamethasone provided significantly better postoperative pain control than normal saline. (Table 5)

IV. Discussion

The present randomized controlled trial compared the efficacy of subconjunctival dexamethasone-assisted conjunctival autograft harvesting with normal saline during sutureless pterygium surgery. A total of 68 patients (34 in each group) were included. Both groups were comparable with respect to age, gender, grade of pterygium, and operated eye ($p>0.05$), indicating successful randomization. The majority of patients belonged to the 40–60 years age group and had Grade II nasal pterygium, which is consistent with the epidemiology reported by Veena et al., Shahraki et al., and Shah et al.[12-14]

The principal finding of the present study was the significantly lower postoperative inflammation in the dexamethasone group. Both host-site and donor-site inflammation were markedly reduced on postoperative days 1, 2, and 7 compared with the normal saline group ($p<0.001$), while inflammation had almost completely resolved in both groups by day 21. Similar findings have been reported by Meena et al. and Umarani et al., who demonstrated that subconjunctival dexamethasone effectively reduces postoperative inflammation and improves early healing after pterygium surgery.[15,16] Shahraki et al. further emphasized that adequate control of postoperative inflammation plays an important role in improving surgical outcomes and reducing recurrence.[13]

Lid oedema also resolved more rapidly in the dexamethasone group. Mild oedema predominated in the dexamethasone group during the early postoperative period, whereas moderate oedema was more common in the normal saline group. Although oedema resolved in both groups by day 21, early postoperative recovery was significantly better with dexamethasone. Similar observations have been reported by Kodavoor et al., highlighting the beneficial effect of corticosteroids in reducing postoperative tissue swelling.[17]

Postoperative pain scores were significantly lower in the dexamethasone group on postoperative days 1, 2, and 7 ($p<0.001$), indicating superior patient comfort during the early recovery period. These findings agree with those of Umarani et al. and Meena et al., who also reported reduced postoperative pain following dexamethasone-assisted conjunctival autograft harvesting.[16,15]

Overall, the present study demonstrates that subconjunctival dexamethasone-assisted conjunctival autograft harvesting provides faster resolution of inflammation, reduced lid oedema, and better postoperative pain control compared with normal saline, while maintaining the safety and effectiveness of sutureless pterygium surgery. These findings are consistent with previous studies supporting corticosteroid use for enhancing postoperative recovery after pterygium excision.[18]

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Tables

Table 1. Baseline Characteristics of the Study Population

Variable	Dexamethasone (n=34)	Normal Saline (n=34)	Total (n=68)	p-value
Age (years)				
20–40	2	4	6	0.831
40–60	20	17	37	
60–80	11	12	23	
>80	1	1	2	
Gender				
Male	15	17	32	0.671
Female	19	17	36	
Grade of Pterygium				
NPTR I	3	3	6	1.000
NPTR II	24	24	48	
NPTR III	6	6	12	
Temporal PTR II	1	1	2	
Operated Eye				
Right	21	18	39	0.462
Left	13	16	29	

Table 2. Comparison of Host-Site Inflammation Between Groups

Follow-up	Grade	Dexamethasone (n=34)	Normal Saline (n=34)
POD 1	Mild	9	1
	Moderate	24	18
	Severe	1	15
POD 2	None	2	0
	Mild	12	4
	Moderate	20	18
	Severe	0	12
POD 7	None	26	2
	Mild	8	22
	Moderate	0	10
POD 21	None	34	31
	Mild	0	3

Table 3. Comparison of Donor-Site Inflammation Between Groups

Follow-up	Grade	Dexamethasone (n=34)	Normal Saline (n=34)
POD 1	Mild	9	2
	Moderate	24	19
	Severe	1	13
POD 2	None	2	0
	Mild	15	2
	Moderate	17	22
	Severe	0	10
POD 7	None	24	4
	Mild	10	20
	Moderate	0	10
POD 21	None	34	32
	Mild	0	2

Table 4. Comparison of Lid Edema Between Groups

Follow-up	Grade	Dexamethasone (n=34)	Normal Saline (n=34)
POD 1	Mild	22	7
	Moderate	12	26
	Severe	0	1
POD 2	None	4	2
	Mild	20	9
	Moderate	10	23
POD 7	None	33	30
	Mild	1	4
POD 21	None	34	34

Table 5. Comparison of Postoperative Pain Scores

Postoperative Day	Dexamethasone (Mean ± SD)	Normal Saline (Mean ± SD)	p-value
POD 1	4.74 ± 1.19	6.91 ± 1.55	<0.001
POD 2	3.82 ± 0.99	6.00 ± 1.65	<0.001
POD 7	1.32 ± 2.11	2.21 ± 0.95	<0.001
POD 21	0.00 ± 0.00	0.00 ± 0.00	—