

## Prospective Study on Rate of Recurrence and Cosmesis in Primary Pterygium Cases Undergoing Pterygium Extended Removal Followed by Extended Conjunctival Transplant (P.E.R.F.E.C.T.) Surgical Technique

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### Abstract:

**Background:** This study was conducted to ascertain the cosmetic outcome and recurrence rate in patients following the P.E.R.F.E.C.T. (Pterygium Extended Removal Followed by Extended Conjunctival Transplant) surgical procedure.

**Methods:** This hospital-based prospective study was carried out over a 2-year period, from December 2020 to November 2022, among 50 patients with primary pterygium who were attending the Ophthalmology Outpatient Department at Regional Eye Hospital, Kurnool. The study was approved by the institutional ethics committee, and the participants' written informed consent was obtained.

**Results:** In 60% of cases, pterygium is of the primary progressive type; in 26% of cases, it is of the grade 3 primary progressive type. In 14.5 instances, the primary atrophic type is observed. With a mean size of 3.4 mm, grade 2 pterygium is more common than grade 3 pterygium. The majority of patients had cosmesis, visual abnormalities, redness, and pain. After 6 weeks, the overall mean astigmatism (for grades 2 and 3) was 2.08 +/- 1.36 D postoperatively, indicating a considerable reduction in astigmatism following excision. Preoperatively, it was -3.43 +/- 1.95 D. Based on the Hirst web-based grading system, 46% of patients receive a normal score, 30% receive an exceptional grade, and 18% receive a good grade. This indicates that the majority of patients are satisfied with their cosmetic look following P.E.R.F.E.C.T. surgery. With the exception of minor buttonhole flaws, there were no significant intraoperative problems. Following surgery, 56% of patients reported pain, discomfort, and redness.

**Conclusion:** According to a web-based grading system provided by Hirst L. W. et al., 95% of patients who had P.E.R.F.E.C.T. for pterygium had cosmetic appearances of normal, excellent and good.

**Keywords:** Rate of Recurrence, Cosmesis in Primary Pterygium, Conjunctival Transplant (P.E.R.F.E.C.T.) Surgical Technique.

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### Introduction

The most prevalent degenerative condition of the ocular surface is pterygium. Susrutha gave the first description of the word pterygium (which is derived from the Greek word "PTERYX," which means wing) about 1000 BC. [1] In tropical parts of India, particularly in southern states like Andhra Pradesh and Karnataka, pterygium is most prevalent. It is described by Duke Elder as a triangular-shaped degenerative and hyperplastic process whereby the fibrovascular growth of subconjunctival tissue extends horizontally into the interpalpebral fissure on either the nasal or temporal side of the cornea, encroaching over the limbus onto the

cornea. [2] It is most commonly observed in those who work outside and have lower socioeconomic positions. In ophthalmology practices, where recurrences are more common and surgical removal is the sole treatment option, it is the most common clinical entity. Depending on the degree of the condition, pterygium can cause a variety of indications and symptoms, such as irritation of the ocular surface, reduced vision, uneven astigmatism, and an unsightly cosmesis. [3] Numerous surgical procedures have been employed in the past, but due to the wide range of recurrence rates and the fact that most recurrences occur between the first and third

months, no single procedure is acceptable worldwide. [4] Numerous surgical methods, such as simple excision, bare sclera, amniotic membrane graft, conjunctival autograft, and conjunctival limbal autograft, with or without adjuvant therapy such as mitomycin-C, beta irradiation, thiotepa drops, and limbal stem cell transplantation, can be used to treat pterygium. The primary drawback of pterygium surgery is still its recurrence rate, which can range from 2% with CLAG to 89% with the bare sclera approach. [5] Environmental factors or surgical damage can also be the cause of recurrences. Surgical trauma can result in postoperative inflammation that stimulates vascular cell growth, extracellular matrix deposition, and sub conjunctival fibroblast activation, all of which increase the risk of recurrences. The significant modification of auto conjunctival transplant is the P.E.R.F.E.C.T. procedure for primary pterygium removal, which has been reported to have 1 recurrence in 250 excisions. [6] We did this study in primary pterygium cases to establish the rate of recurrence and cosmetic outcome in patients following a P.E.R.F.E.C.T. surgical procedure because pterygium is most frequent in our nation and very few studies were done in our country.

#### Aims and Objectives

- To examine the surgical results of P.E.R.F.E.C.T.
- To examine the rate of recurrence and the cosmetic result in fifty cases of primary pterygium that were surgically excised using the P.E.R.F.E.C.T. approach.

#### Materials and Methods

This hospital-based prospective study was carried out over a 2-year period, from December 2020 to November 2022, among 50 patients with primary pterygium who were attending the Ophthalmology Outpatient Department at Regional Eye Hospital, Kurnool. The study was approved by the institutional ethics committee, and the participants written informed consent was obtained.

#### Inclusion Criteria

- Patients older than 18 years of age.
- Patients with primary pterygium.
- Patient willing to participate in the study.
- Patient willing to follow up for a period of one year.

#### Exclusion Criteria

- Patients with evidence of any ocular disease other than pterygium and refractive errors.
- Previous ocular surgery, patients with squints.
- Patients with recurrent pterygium.
- Patients with conjunctival intraepithelial neoplasia.
- Inability to follow-up for the duration of the study.
- History of autoimmune systemic disease conditions with poor wound healing.

#### Statistical Methods

Data was entered in MS Excel and analyzed using SPSS software. The results were presented as tables.

#### Results

**Table 1: Demographic Distribution**

Age (in years)	Number of Patients	Percentage
18-29	02	4%
30-39	07	14%
40-49	17	34%
50-59	17	34%
60-69	07	14%
TOTAL	50	100%
<i>Age Distribution</i>		
Sex	Number of Patients	Percentage
Males	18	36%
Females	32	64%
Total	50	100%
<i>Sex Distribution</i>		

The patients in our research were aged between 24 to 66 years. The age of the patients was 47.86 +/- 9.4 years on average.

According to a study, pterygium is less common as

people age and more common in the younger and middle age groups. Three-quarters of men and sixty-four percent of women are impacted.

**Table 2: Comparison of Mean Preoperative and Post-Operative Keratometric Astigmatism (K1-K2) in Diopters in Grade 2 and 3 pterygium**

Variable	Pre-Op Astigmatism (D) (k1-k2)	Postop Astigmatism (k1-k2) (D) after 6 Weeks	P-Value
Grade-1	-	-	-
Grade-2	2.62 +/- 1.19D	1.74 +/- 0.91 D	0.002
Grade-3	5.33 +/- 2.08D	2.87 +/- 1.87D	<0.001

The mean astigmatism for grade -3 and grade -2 pterygium in the current study was determined to be 5.33 +/- 2.08D and 2.62 +/- 1.19D, respectively, preoperatively. Postoperative astigmatism was significantly altered, falling to 2.87 +/- 1.87D for grade 3 and 1.74 +/- 0.91D for grade 2.

P-values, which were 0.002 and <0.001 for grades

2 and 3, respectively, were considered to be statistically significant. The paired t-test indicates that the p-value of <0.05 was statistically significant.

There was a considerable reduction of 1.35 +/- 0.59 D. The total mean astigmatism (for grades 2 and 3) preoperatively was -3.43 +/- 1.95 D and decreased to 2.08 +/- 1.36 D postoperatively after 6 weeks.

**Table 3: Improvement in Refractive Cylinder following Surgery Postoperatively at 6<sup>th</sup> Week and 3 Months**

Grade of Pterygium	Post-Operatively (6 Weeks)	Post-Operatively (3Months)	P-Value
Grade 2	1.16D	0.88D	0.048
Grade 3	2.46D	1.78D	<0.001

In the current investigation, the statistically significant p-values for grade 2 and grade 3 were 0.048 and <0.001, respectively (paired t-test p < 0.05\* was statistically significant).

**Table 4**

Grading of Cosmesis	No. of Patients	Percentage
Normal	23	46%
Excellent	15	30%
Good	9	18%
Fair	3	6%
Poor	--	-
Ungradable	-	-
<b>Cosmetic Outcome following P.E.R.F.E.C.T Surgery</b>		
Complication	No. of Patients	Percentage
Pain, Redness, Discomfort	28	56%
Transient Graftedema	8	16%
Transient Diplopia	10	20%
Tenons Granuloma	1	2%
Graft Retraction	1	2%
Steroid induced Glaucoma	0	-
Recurrence	0	-
Dellen Formation	3	6%
<b>Postoperative Complications after P.E.R.F.E.C.T Surgery</b>		

After three months of follow-up, the surgically repaired eye's cosmetic appearance was graded using Hirst's web-based grading system 10, which revealed a normal grade for 23 patients, an excellent grade for 15, a good grade for 9, and a fair grade for three patients.

**Grading is as Follows:**

**Normal:** Eye that was identical to a typical eye. Whitish, quiet, without vascular anomalies, conjunctival alterations, or corneal opacity.

**Excellent:** There was no aberrant vasculature and a discernible white opacity on the cornea.

**Good:** Eye with conjunctival vascular injection and corneal opacity that may or may not be present.

**Fair:** Local conjunctival vascular anomaly limited to the nasal region with normal temporal distribution.

**Poor:** Nasal puckering, scarring, and abnormalities in the conjunctival blood vessels.

**Ungradable:** When the nasal region is out of focus, it is challenging to provide a real grade.

In the current study of 50 patients, the majority of patients (28) experienced pain, redness, and discomfort during the first week after surgery. Eight

patients experienced transient graft edema for 1-3 weeks, and ten patients experienced transient diplopia for 1-3 weeks. One patient developed a Tenon's granuloma in the fourth postoperative week.

One patient experienced graft retraction because of a tiny graft, while three patients suffered Dellen without vascularization.

**Table 5: Post-Operative Improvement of BCVA for Distant Vision**

BCVA	No. of Patients	Percentage
BCVA 2 Lines Gain	8	16%
BCVA 1 Line Gain	18	36%
BCVA No Gain (Unchanged)	24	48%
BCVA Loss	-	-

52% of the patients in this study had an improvement in best corrected visual acuity following the removal of the pterygium, while 48% of patients had no gain in BCVA as a result of an underlying cataract with nuclear sclerosis grade 2-3.

### Discussion

The current study, which was carried out in REH, Kurnool, over the course of two years, from December 2020 to November 2022, examined the recurrence rate and cosmetic outcome in primary pterygium cases undergoing the P.E.R.F.E.C.T. approach. Fifty individuals with primary pterygium were included in this investigation. Size >2.5 mm, cosmesis, foreign body sensation, pain, and visual symptoms are the requirements for pterygium excision.

Pterygium is characterized by elastotic degeneration of sub Conjunctival tissue with fibro vascular growth intruding onto the cornea and it is exacerbated by chronic inflammation, micro trauma, and environmental variables and is brought on by increased UV light exposure and a dry climate. [7,8]

Pterygium is a prevalent ocular issue and a significant disease burden that medical professionals deal with on a daily basis in our nation. The cornerstone of treatment is surgical excision; management is successful when the patient is freed from symptoms such as redness, irritation, and cosmetic issues that are related to the advancement of the visual axis.

Throughout 1500 publications in scientific journals, more than 50 distinct pterygium surgery techniques have been detailed throughout the course of the last three millennia of practice. Regarding which technique has the best aesthetic outcome and the lowest recurrence rate, opinions are still divided. [9]

Adjunctive techniques that are used to cure pterygium and minimize recurrence have frequently led to problems.

When bare sclera surgery was first used in the 20th century, the recurrence rate was 88%. Later, bare sclera surgery in conjunction with a variety of adjunctive therapies replaced it, lowering the recurrence rate from 2% to 15%.

When Strontium 90 was widely used in radiation

therapy in 1960, the reported recurrence rate ranged from 6.4% to 12%. Scleromalacia was still unacceptably common decades later.

When combined with the bare sclera treatment, mitomycin C was utilized either during or after surgery in 1990, and there was a considerable decrease in the recurrence rate, which was about between 4 and 20%. On the other hand, a number of acute and late-onset side effects, such as inflammatory scleritis, Scleromalacia, and vision loss, have been documented.

Amniotic membrane grafting has been used recently to lower the recurrence rate, which was found to be between 4% and 60%.

A common way to lower the recurrence rate is to combine the bare sclera technique with conjunctival auto grafts for the excision of the pterygium.

Since the early 1980s, superior conjunctival auto graft transplants have been performed often, with a 2% to 12% recurrence rate.

Retrospective analyses on the benefits of inferior conjunctival auto transplants have been published recently. These analyses show that these transplants can reduce recurrence rates by 3.3% to 5.25 percent while preventing regrowth of more than 1.5 mm onto the cornea. [10]

Barrequer first proposed the idea of removing the tenon layer in 1980, and it is crucial for reducing the rate of recurrence following pterygium excision. While a study by Tan et al. [11] attempted to correlate the morphological parameters (indirectly assessed thickness of the tenons layer based on the obscuration of episcleral arteries by the pterygium) of the pterygium to recurrence rates post-excision, most studies do not record the size of the pterygium.

Australian surgeon Professor Hirst L.W. developed the novel P.E.R.F.E.C.T. approach for pterygium in 2001 and examined the cosmesis and recurrence rate of patients with recurrent pterygium.

It was observed that in cases of primary and recurrent pterygium, P.E.R.F.E.C.T. produced an almost perfect cosmetic outcome with an almost nil recurrence rate.

One approach used to further diminish recurrence is the P.E.R.F.E.C.T. surgical technique for pterygium; the majority of studies were conducted abroad by a single surgeon. There aren't many published studies on the effectiveness of this therapy in the Indian context, thus further study is required.

#### Age Incidence

A study led by Professor Hirst L.W. involved 250 excisions for primary pterygium performed by P.E.R.F.E.C.T. with a one-year follow-up. The average age of the pterygium patients in the study was 53 years old.

In a research by Walled A. Allam et al. [12] 68 individuals were observed, with a mean age of 51.3 years +/- 7.6 SD (range: 29–61 years).

The current study's mean age group was 47.86 years +/- 9.4 SD, and 82% of the patients were older than 40, which is consistent with previous research.

Young and Cameron's study indicates that pterygium primarily affects middle-aged men, with a comparatively lower incidence in children.

#### Sex Incidence

Because outdoor workers are constantly exposed to sunshine, pterygium is more common in men than in women.

According to a study by Zhong H. et al. [13] the prevalence of pterygium is higher in females than in males, with females having a higher prevalence than males due to exposure to environmental risk factors and their lifestyle choices.

The male-to-female ratio in the current study was 9:16, and the findings are consistent with those of the previous investigations.

According to a 2006 study conducted in Taiwan by Shu-Fang et al. [14] female pterygium incidence is highly prevalent.

#### Occupational Incidence

Exposure to ultraviolet light, specifically UV A and UV B, from prolonged outdoor work is the primary risk factor for the development of pterygium. The number of hours worked outside is correlated with the size and progression of the pterygium.

The frequency and grade of pterygium grow with longer working hours in the sun, and the incidence of pterygium production is proportional to daily sunshine exposure.

The current study's findings indicate that people who work outside have a higher frequency of pterygium. Long-term exposure to UV radiation will have a cumulative effect, causing gradual deterioration of the ocular tissue that will eventually result in pterygium.

In research by Zhong H et al., the population that worked outside accounted for 74.8% of the pterygium instances.

The findings of this study indicate that around 70% of workers are exposed to UV radiation, which may be a contributing factor to the prevalence of pterygium and positively associated with its growth and progression.

Is it still dubious to wear protective sunglasses to prevent the establishment of pterygium? Many earlier studies that used protective eyewear to block UV A and UV B rays produced inconsistent results, ranging from no protective index to a high protective index.

#### Site of Pterygium

The nasal side of the cornea is more likely to experience pterygium because of increased sun exposure from the nose's reflection of light. According to a different theory, UV rays that strike the temporal cornea pass through the cornea laterally, refract, and focus on the nasal limbic area. Additionally, the nose partially blocks UV rays that originate on the nasal side.

85.2% of subjects in a study by CS H Tan et al. [15] exhibited nasal pterygium incidence.

A different study by Wu K et al. [16] found that nasal pterygium predominated in 93.31% of cases.

According to a study by A. Pandey et al. [17] nasal pterygium was present in 88 of the eyes, or 96.70%.

Similar to earlier investigations, 47 (96%) of the 50 individuals in this study had nasal pterygium in their eyes.

#### Laterality of Pterygium

In their study, Waleed A. Allam et al., examined 68 eyes from 57 individuals; 46 of the eyes were unilateral, 11 were bilateral, and 26 of the eyes involved were the right eye and 42 were the left eye.

The study comprises 50 individuals, 45 of whom are unilateral and 5 of whom are bilateral. Of the 45, 19 (38%) had involvement of the right eye and 26 (52%) had involvement of the left eye. These results are consistent with previous research.

According to a study by Hsin-Yu Liu et al. [18] pterygium was discovered in 31 (53%) of the left eyes and 27 (47%) of the right eyes.

#### Size of Pterygium

The average size of the pterygium measured in a prospective research by Hirst L.W. on the recurrence rate and cosmetic outcome after P.E.R.F.E.C.T. surgery for recurrent pterygium was 3.95 +/- 1.02 mm onto the cornea.

Lawrence W. Hirst used the P.E.R.F.E.C.T. approach to perform a prospective study on primary pterygium cases. The mean size of the pterygium measured was 3.5 mm +/- 0.8 mm, with a range of 1-6.5 mm.

### Recurrence

Recurrence is the most important pterygium complication. The problem of recurrence following pterygium excision has been addressed by the use of numerous adjuvant treatment techniques, including topical MMC, AMT, anti-VEGF, and anti-fibrotic drugs.

The optical extent of the pterygium that should be excised is a matter of debate. Some suggest that the entire pterygium should be removed, requiring significant dissection, in order to prevent recurrences.

A recurrence incidence of 5.3% was reported by Kenyon et al. [19] following pterygium excision using a conjunctival autograft. Lewallen S. et al. randomized clinical trial [20] found that the bare sclera method had a 40% recurrence rate while CAG had a 7% incidence.

In a research by Prabhasawat et al. [21] the recurrence rate following AMT was shown to be 10.9% for primary and 37.5% for secondary pterygium; this was a greater risk of recurrence than with CAG.

LW Hirst stated that 50% of recurrences occur within 4 months, and 97% occur within the 8- to 1-year follow-up period. He further defined recurrences as any new growth of fibrovascular tissue greater than 1 mm on the cornea. According to one investigation, the majority of recurrences will have begun at least six months prior.

Hirst first published results on the P.E.R.F.E.C.T. technique in 2008 for cases of primary pterygium, showing a 0.4% recurrence rate (one patient's vascularized dellen considered a recurrence) out of 250 consecutive patients. Later in 2012, he published an article stating that he noticed a recurrence rate of 1 in 1000 in his first 1000 consecutive cases, which included both primary and recurrent pterygium. (0.1%).

The current study found that of the 50 patients, 94% (47 patients) had a 1-year follow-up, with 6% (3 patients) losing contact after 6 months. The 1-year follow-up period had a zero recurrence rate in 94% of patients, which is almost similar to the results of previous studies and is likely due to the small sample size.

A study by Allam et al. examined patients of primary pterygium receiving P.E.R.F.E.C.T. with a three-year follow-up. Out of 68 cases, 100% had a 1-year follow-up at which point there was no recorded recurrence.

When Cornelius [22] independently analyzed the effectiveness of P.E.R.F.E.C.T. for pterygium excision in 60 instances with 90% of patients after a year of follow-up in 2017, he found a very low 1.6% recurrence rate.

In this case, it confirms that the P.E.R.F.E.C.T. for pterygium approach can reach recurrence rates of less than 2%.

In 57 patients undergoing pterygium extended removal followed by fibrin glue assisted AMT (P.E.R.F.A.M.T.) with a one-year postoperative follow-up, Hsin-Yu Liu et al. conducted a prospective interventional cohort study. He graded postoperative recurrence using the previously described system by Prabhasawat et al., with some modifications as (grades 1-4). Eighty-one percent of eyes were graded as grade-1, grade 2-0%, 12% of eyes showed grade 3, and 7% of eyes showed grade 4.

The P.E.R.F.E.C.T. technique can help achieve a low recurrence rate and a safe profile with minimal complications for pterygium. This attests to the efficacy of this treatment modality in reducing recurrence rates when compared to some of the studies mentioned above that found high recurrence rates with treatment modalities like adjunctive therapies.

According to this study, P.E.R.F.E.C.T. for primary pterygium is one of the newer methods for lowering the recurrence rate while still producing a good aesthetic result.

### Cosmetic Outcome

One of the main complaints made by younger patients with pterygium is cosmesis. While this is a relatively uncommon aspect of pterygium surgery, for many young patients, this condition represents a significant cosmetic flaw, so the ideal surgical procedure should not only improve the patient's appearance cosmetically but also prevent recurrence.

Along with patient satisfaction, postoperative cosmesis is becoming recognized as one of the key outcomes following surgery due to advancements in surgical procedures and a decrease in recurrence rates.

Measuring cosmetic outcomes has not been the focus of many studies. To aid in standardizing the reporting of cosmetic outcomes, Lawrence W. Hirst conducted a study in 2011 based on a web-based grading system [23] based on postoperative conjunctival appearance following P.E.R.F.E.C.T. for pterygium.

Nearly 95% of the eyes in his study had ratings of Good, Fair, Excellent, or Normal, which clearly implies that the majority of patients were satisfied with their cosmetic outcome.

94% of the eyes in the current study were rated as

normal, excellent, or good, and according to the web-based grading system, none of the patients are classified as ungradable.

The feasibility and safety of FLAPS (Femtosecond Laser Assisted Pterygium Surgery) were assessed in 29 patients (29 eyes) with primary pterygium by Darren Shu Jeng Ting et al. [24] through a prospective interventional case series.

In the study by Darren Shu Jeng Ting et al., the pterygium is graded preoperatively using the TAN's grading system, and the cosmetic appearance is graded postoperatively using the web based grading system created by Hirst et al. Of the patients, 83% and 10% had excellent and good cosmetic outcomes, respectively, while 3% had a poor outcome. Not a single patient experienced a recurrence or an ungradable grade.

**Table 6: Comparison of Results of Cosmetic Outcome Based on Web Based Grading System**

Grade	P.E.R.F.E.C.T. Present Study	FLAPS by Darren Shu Jeng Ting et al.	CAG	AMT
Normal and Excellent	76%	83%	80%	46%
Good	18%	10%	10%	21%
Fair	6%	-		
Poor	-	3%	9-10%	33%
Ungradable	-	-		

The cosmetic results of AMT and CAG transplantation were compared by Kucukerdonmez et al. [25] and Prabhasawat et al.

#### Complications

There are minor intraoperative problems, such as buttonholing, but no significant difficulties were observed in the current investigation.

As a result of the careful and less traumatic surgical procedure utilized in the current study to retrieve the donor graft without removing the tenon layer, none of the patients experienced scarring at the donor site.

About 56% of patients had immediate postoperative problems such as pain, redness, and discomfort.

Graft edema may develop after pterygium excision by conventional CAG because of insufficient graft debridement. In a research by Salagar et al., 4 (4% of cases) experienced conjunctival auto graft-related graft edema, which improved with a brief course of systemic steroids. [26]

In a research by Waleed A. Allam et al., he observed that 22% of patients had temporary graft edema, which went away on its own in the early postoperative phase. In the current study, topical steroid eye drops and preservative-free lubricant eye drops were used to treat 16% of patients with temporary graft edema.

Graft edema was found in 16% of the cases in the current study. All patients were advised to carefully use tapering doses of antibiotic and steroid drops during the post-operative period. After three weeks, there was a gradual reduction in graft edema, patients' symptoms improved, and the edema was not detected after four weeks of follow-up.

Momentary Diplopia: Hirst's investigation revealed momentary diplopia, which was spontaneously cured and suggested that the medial rectus was active in nearly all patients during the first few weeks.

Waleed A. Allam et al. found 17.6% of patients experiencing momentary diplopia by the end of the first postoperative week in their study.

In current study 20% of patients complained of transient diplopia in first two to three weeks of post operative period. They were reassured and told not to ride their bikes.

When Tenon's layer is exposed due to improper technique, Tenon's granuloma may develop. In a study by Shet SD et al., three cases (7.5%) of pyogenic granuloma were seen after conjunctival auto graft. However, these cases were quickly fixed with more minor surgery. [27]

In a research by Waleed A. Allam involving 68 patients receiving P.E.R.F.E.C.T., one patient developed a tenon granuloma after two weeks, which was surgically removed.

In the current study, a patient appeared in the second postoperative week after surgery with Tenon's granuloma caused by exposed sutures and an unexcised Tenon's capsule. The granuloma was removed, and the patient was then prescribed topical antibiotics and steroid eye drops.

In the current investigation, three patients had Dellen formation and a persistent epithelial defect; it was recommended that they continue using lubricating eye drops if there was no peripheral corneal vascularization.

Peripheral corneal vascularization in Dellen is seen as a recurrence that was not documented in the study.

**Table 7: Comparing the Incidence of Complications between Present and Waleed Allam Study after P.E.R.F.E.C.T. Surgical Technique**

Complication	Present Study	Waleed Allam et al.
Transient Graft Edema	8%	22%
Transient Diplopia	20%	17.6 %
Pyogenic Granuloma	2%	1.4%
Dellen	6%	-
Recurrence	0	-

In this study, there was no incidence of graft necrosis, steroid-induced glaucoma, inclusion cysts, or graft dislodgement.

The most frequent complications in this study were pain, redness, grittiness, or discomfort in the first three weeks following surgery. These were followed by eight patients who experienced transient graft oedema, which required liberal amounts of preservative-free lubrication for a week, and ten patients who experienced transient diplopia, for which they were advised to drive carefully for five to seven days.

Graft retraction is the result of a little graft that was removed from the inferior conjunctiva and sutured on postoperative day seven.

#### Zero Recurrence is Seen

#### Astigmatism Changes following Pterygium Excision

Pterygium distorts the shape of the cornea, alters the cornea's topography, which impairs vision, and induces astigmatism.

The following mechanisms account for the astigmatism: With-the-rule astigmatism is caused by the tractional forces applied by the contractile filaments within the pterygium, which flatten the horizontal meridian.

Yousuf, Vadodaria et al. [28] state that when pterygium encroaches on the cornea, the corneal meridian flattens and changes in refractive index result.

Refractive status, topographical analysis, and keratometry data can be used to calculate changes in the cornea's refractive status caused by the pterygium.

Pterygium size and induced astigmatism are significantly correlated, according to Lin and Stern. [29] Pterygium also causes WITH-THE-RULE astigmatism, with lesions extending to over 45% of the corneal radius or near 3.2 mm of the visual axis, producing an enhanced degree of induced astigmatism.

In a comparative study on astigmatic changes after pterygium excision, Vera Zheleva and Latchezar Voynov et al. [30] found a correlation between the size of the pterygium and the amount of astigmatism induced. They also found that a

horizontal extension of the pterygium that was greater than 2.25 mm increased the risk of developing 2D corneal astigmatism.

A research comprising 37 individuals found that the mean preoperative astigmatism in eyes with grade 1 was  $-0.67 \pm 0.63$  and in eyes with grade 2 was  $1.55 \pm 1.28$ . Of these patients, 12 had grade 1 pterygium and 25 had grade 2 pterygium. R. Kujur et al. examined the change in mean refractive cylinder from  $3.29 \pm 1.46D$  preoperatively to  $1.49 \pm 0.82D$  postoperatively. The mean preoperative refractive cylinder was  $1.26 \pm 1.18D$ , which improved to  $0.84 \pm 0.73D$  postoperatively.

The mean astigmatism value before surgery was  $3.47 \pm 2.50D$ , while after surgery it was  $1.29 \pm 1.07D$ , according to Rana Altan et al.

According to a research by Maheswari S, et al, [31] there was a clinically significant decrease in corneal astigmatism from  $4.40 \pm 3.64D$  to  $1.55 \pm 1.63 D$  (p-value < 0.001).

The preoperative mean keratometric astigmatism for grade 3 pterygium in this study was  $5.33 \pm 2.08D$ ; postoperatively, it was determined to be  $2.87 \pm 1.87D$ , indicating a substantial decrease in astigmatism with a p-value < 0.001.

The preoperative mean astigmatism for grade-2 pterygium in this study was determined to be  $2.62 \pm 1.19D$ . Postoperatively, it was found to be  $1.74 \pm 0.91D$ , indicating a significant change in astigmatism with a p value of 0.002.

Following pterygium excision surgery, astigmatism significantly decreases and the refractive cylindrical component improves, leading to improved visual outcomes.

#### BCVA

Astigmatism may be the root cause of pterygium-induced reduced visual acuity due to the mechanical impact of a corneal lesion and changes in the tear film.

Thus, removal of the pterygium results in the restoration of the cornea's normal surface free from irregularities, which lowers astigmatism and enhances visual acuity.

The best corrected visual acuity was observed in this study, and it improved surgically following



pterygium excision and refractive astigmatism correction.

The results of a study by Waleed Allam et al. showed that there was no visual loss during the investigation and that CDVA improved by two lines on the Snellen chart in 15 patients (22%), one line in 39 instances (57%), and remains stable in 14 cases (21%).

In the current study, 16% of patients saw an improvement in visual acuity of two lines, 36% saw an improvement of one line, and 48% showed no change in BCVA. This is because a small percentage of patients had an immature senile cataract diagnosed at the time of surgery, which prevented them from seeing an improvement in visual acuity.

### Conclusion

Pterygium is the most frequent issue that ophthalmologists deal with on a daily basis and is one of the conditions where the rate of recurrence is the most frequent cause of complications. There isn't a single perfect method that enhances the visual result while lowering the chance of problems and recurrence. P.E.R.F.E.C.T., a new method for pterygium that enhances cosmesis and decreases recurrence rate with few problems, was described by Professor LW Hirst. The benefits of this method include excellent cosmetic results and a zero recurrence rate. This procedure is unsuitable for glaucoma filtering surgeries due to its long operating time, the surgical expertise required, and potential complications such as donor site granuloma, transient graft oedema, button hole defects caused by large grafts, etc. Additionally, it carries a risk of graft necrosis and steroid-induced glaucoma, similar to traditional conjunctival autografting. A better visual look after excision is the last concern regarding pterygium. According to the web-based grading method provided by Hirst L. W. et al., 95% of patients in the current study who had P.E.R.F.E.C.T. for pterygium had cosmetic appearances of normal, excellent, and good.

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