

Amniotic Membrane Membrane Transplantation In Management Of Primary Pterygium-A Hospital Based Study

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Abstract:

Background And Objective: Amniotic Membrane Transplantation Is Currently Being Used For A Continuously Widening Spectrum Of Ophthalmic Indications. It Has Gained Widespread Attention As An Effective Method Of Reconstruction Of The Ocular Surface. Amniotic Membrane Grafts Have Been Effectively Used As A Conjunctival Substitute For Reconstruction Of Conjunctival Defects Following Removal Of Pterygia. Hence The Present Study Was Undertaken To Evaluate The Outcomes Of Primary Pterygium Excision With Adjunctive Amniotic Membrane Transplantation. **Study Design:** Retrospective Study **Study Setting:** Navya Nethralaya Hospital Pvt. Ltd., Tirupathi, Andhra Pradesh, India **Study Duration:** August 2013 To December 2015 **Methodology:** In This Study, The Medical Records Of All Patients Who Had Pterygium Excision With Adjunctive Amniotic Membrane Transplant On Bare Sclera From August 2013 To December 2015 were Reviewed. All The Patients Were Followed Up For 6 Months. The Data Collected Were Sex, Age, Extent Of Pterygium, Post Operative Complications And Recurrent Pterygium Growth. **Results:** Out Of 35 Study Subjects, Males Constituted 20 And Females Constituted 15. The Mean Age Of Surgery Was 40 ± 8 Years. The Pterygia Extended Onto Cornea For 4 ± 1 Mm. One Eye (4%) Demonstrated Recurrent Growth Of Pterygium. **Conclusions:** Amniotic Membrane Transplantation After Primary Excision Of Pterygium Is A Safe And Effective Way In The Management Of Pterygium With Least Postoperative Complications. **Keywords:** Pterygium, Amniotic Membrane Transplantation, Recurrences.

I. Introduction

Pterygium Is A Wing Shaped Conjunctival Growth Onto The Cornea Which Is Generally Situated On The Nasal Side. The Prevalence Of Pterygium Seems To Be More Common In Countries Within The Peri Equatorial "Pterygium Belt" Latitudes Of 37 Degrees North And South Of The Equator. Pterygium Is More Frequently Seen In Areas With More Ultraviolet Radiation, Hot, Dry And Smoky Environments.¹ Presently, Pterygium Is Recognized As An Ocular Surface Growth Disorder, Secondary To Solar Radiations-Induced P53 Mutations In Limbal Epithelial Stem Cells.² It Is More Common In Patients With Outdoor Occupations Like Farmers, Labourers, And Soldiers And Less Common In Patients With Indoor Activity Like Housewives And Teachers.³ The Prevalence Of Pterygium Is More Common In Countries Within The Peri-Equatorial (Pterygium-Belt) Latitude Of 37 Degree North And South Of The Equator.^{4,5}

Recurrence Of Pterygium Is The Major And Most Common Complication After Surgery Which Is Described As The Development Of Fibro-Vascular Tissue On To The Excision Site.^{6,7} Different Modalities Of Treatment Like Buccal Mucous Membrane Graft, Lamellar Keratoplasty, Penetrating Keratoplasty, Sclerokeratoplasty And Yttriumaluminium- Garnet (Yag) Laser Treatment Have Been Tried But The Results Were Not Encouraging.⁸ The Mainstay Of Surgery Remains The Bare Sclera Excision, Followed By Either Adjunctive Therapy By Application Of Antifibrotic Agents Such As Mitomycin-C Or By Covering The Defect With Conjunctival Autograft.²

Human Amniotic Membrane Is Rich In Basement Membrane Components Such As Laminin And Type-IV Collagen. It Lacks Immunogenicity, Has Anti-Bacterial, Anti-Inflammatory, And Anti-Scarring Effects.⁹ The Membrane Produces Various Growth Factors Including Basic Fibroblast Growth Factor, Hepatocyte Growth Factor, Keratinocyte Growth Factor And Epidermal Growth Factor Which Can Stimulate Epithelisation And Act As Promoters Of Epithelization.¹⁰ The Rationale Of This Study Was To Evaluate The Role Of Amt In Treatment Of Primary Pterygium.

Patients And Methods:

A Retrospective Hospital Based Study Was Conducted In Navya Nethralaya Hospital Pvt.Ltd., Tirupathi Where The Records Of Patients Who Underwent Primary Pterygium Excision Followed By Amniotic Membrane Transplantation Were Evaluated .

Study Definitions:

Grade 1 Pterygium: Apex Of The Pterygium Is On The Limbus

Grade 2 Pterygium: The Apex Is Between The Limbus And Pupillary Margin(<3mm Encroachment On Cornea)

Grade 3 Pterygium: > 3mm Encroachment On Cornea

Grade 4 Pterygium: The Apex Of The Pterygium Is In Pupillary Area

Inclusion Criteria:

All Patients With Primary Pterygium Which Is Grade 2 Or Grade 3, Those With Symptomatic Pterygium.

Exclusion Criteria:

Patients With Systemic Diseases Like Diabetes, Hypertension, Those With Asymptomatic Pterygium Or Recurrent Pterygium, Patients With Diseases Of Ocular Adnexa Like Dacryocystitis, Blepharitis.

Preoperative Evaluation:

Pre-Operatively Detailed History Was Taken. A Complete Ocular Examination Included Visual Acuity, Refraction, Complete Anterior Segment Examination Including Intraocular Pressure, Extra-Ocular Movements And Fundus Examination Was Done In All Patients. An Informed Written Consent Was Taken From The Included Patients.

After Thorough Ophthalmic Evaluation, Patients Underwent Primary Pterygium Excision With Amniotic Membrane Transplantation Under Two Point Peribulbar Anaesthesia.

Amniotic Membrane Graft Procurement, Processing And Preservation:

Amniotic Membrane Is Procured From Prospective Donors Undergoing Caesarean Section Who Are Negative For Communicable Diseases Like Hiv, Hepatitis B And Syphilis. Different Protocols Exist For Processing And Storage.^{11,12}

Under Sterile Conditions, Placenta Was Washed Free Of Blood Clots. Amnion Is Separated From Chorion By Blunt Dissection. Separated Amnion Was Spread On Back Of Sterile Kidney Tray And Rinsed With Normal Saline Using Moist Gauze Till Blood, Mucus, Debris Was Washed. Then It Was Profusely Irrigated And Stored Aseptically With Normal Saline And Ceftriaxone (1 Gm In 5 Ml) Solution In A Sterile Petri Dish.

When Stored At 4 Degrees ,It Can Be Used For A Week.

Surgical Procedure:

All Surgeries Were Performed By A Single Surgeon Under Two Point Peribulbar Anaesthesia.

Pterygium Excision:

Under Aseptic Conditions, Eye Is Draped & Speculum Is Inserted. The Head Of The Pterygium Was First Separated At The Limbus And Dissected Towards The Central Cornea . After Excising The Head And Most Of The Body, Tenon And Subconjunctival Fibrovascular Tissue Were Separated From The Overlying Conjunctiva, Undermined And Excised Extensively Upward And Downward Towards The Fornices And Medially Towards But Not Reaching The Caruncle; Caution Was Taken Not To Damage The Medial Rectus. Cautery Was Gently Applied To Bleeding Vessels. The Conjunctiva Above And Below The Pterygium Was Trimmed To Create A Rectangular Area Of Bare Sclera Of Approximately 5x7 To 6x8 Mm. Residual Fibrovascular Tissue Over The Cornea Was Detached Using Toothed Forceps Or By Gentle Scraping With A #15 Surgical Blade.

Amniotic Membrane Transplantation:

The Area Of Bare Scleral Was Covered With Amniotic Membrane, Which Was Oriented With The Basement Membrane Side Up. The Amniotic Membrane Was Sutured Through The Episcleral Tissue To The Edge Of The Conjunctiva Along The Bare Sclera Border With Four To Five Interrupted Sutures Using 10-0 Nylon Suture Material. Antibiotic Eye Ointment Is Applied In The Fornix. Eye Is Patched For 24 Hrs.

Follow-Up

Postoperatively, Ciprofloxacin And Dexamethasone Eye Drops Were Administered 6 Times Daily For One Week And If There Was Excessive Irritation From The Stitches, Lubricants Were Also Prescribed. After One Week Dexamethasone Eye Drops Were Prescribed 4 Times / Day For One Month And Two Times/Day For Ten Days. Patients Were Examined 1 Day, 1 Week And 1month And 6 Months Postoperatively.

At Each Follow Up Visit, Patients Were Examined Under Slit Lamp To Look For Graft Bed Integrity And Development Of Postoperative Complications. Fluorescein Staining Was Done At Each Visit To Know The Epithelial Integrity. Vision Was Recorded At Each Visit. Measurement Of Intraocular Pressure Was Also Done To Know The Steroid Induced Rise Of Pressure If Any. The Main Outcome In This Study Was The Recurrence Rate Of The Pterygium. Other Complications Were Also Recorded.

The Recurrence Was Graded On A Scale Of 1–4.¹³ Grade 1 Indicated A Normal Appearance Of The Operated Site; Grade 2 Indicated The Presence Of Fine Episcleral Vessels In The Excised Area, Extending To The Limbus, But Without Any Fibrous Tissue; Grade 3 Showed Fibrovascular Tissue In The Excised Area, Reaching To The Limbus But Not Invading The Cornea; And Grade 4 Represented A True Corneal Recurrence, With Fibrovascular Tissue Invading The Cornea .

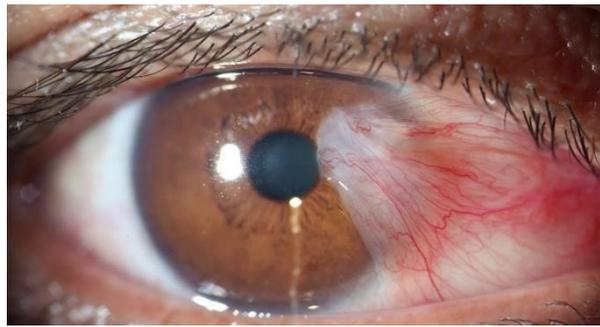


Figure 1: Grade 3 Pterygium

II. Results:

Out Of 35 Patients, 20 (57%) Were Males And 15 (43%) Patients Were Females. The Mean Age Of Study Group Was 40 ± 8 Years. Table 1 Shows The Demographic Data Of The Patients. Graph 1 Shows The Gender Distribution Of The Patients.

Number Of Patients	35
Number Of Eyes	35
Age Range (Years)	28-56 Yrs
Mean Age (Years)	40 ± 8 Yrs
Sex Ratio (Male : Female)	1.3:1
Eye (Right : Left)	1.5:1

On The First Postoperative Day, All Patients Had Corneal Epithelial Defects .By One Week, All Epithelial Defects Healed Completely And There Was No Conjunctival Staining With Fluorescein. Minor Post Operative Complaints Like Watering, Foreign Body Sensation Are Noted In Few People. Few Graft Complications Like Graft Odema Was Seen In 6 Out Of 35 Cases (24%). Haemorrhage Within The Graft Was Observed In 4 Cases(16%). These Minor Complications Resolved In Subsequent Follow Up Visits. No Significant Change In Visual Acuity Or Intraocular Pressure Is Noted Postoperatively.

Recurrence Of Pterygium Of Grade 3 Was Noted In One Patient (4%) In The Present Study At The Last Follow Up Visit.

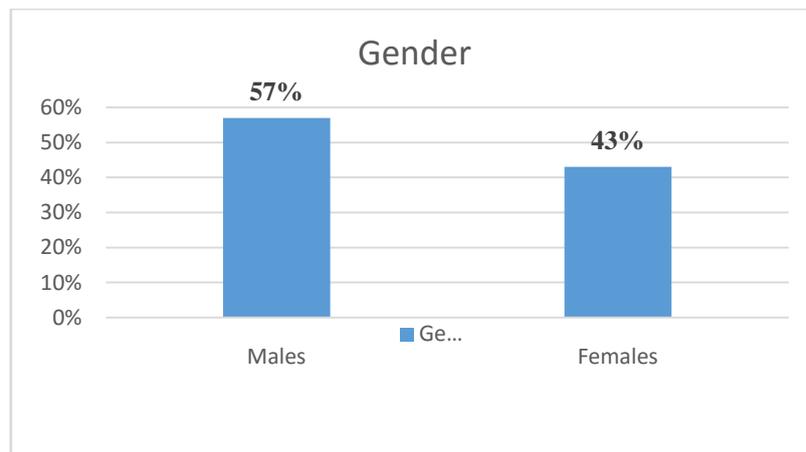


Figure 1: Gender Distribution Of The Patients

Grade 2 Pterygium Was Seen In 16 (45.7%) Patients Whereas Grade 3 Was Present In 19(54.3%) Patients.(Figure 2)

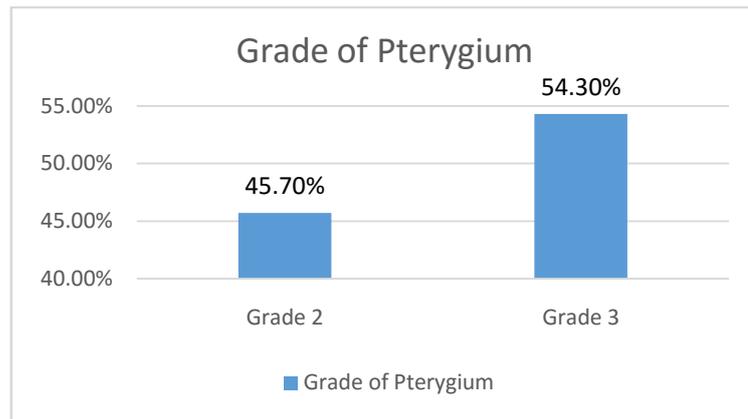


Figure 2: Distribution Of Pterygia Among The Study Group

III. Discussion

Currently, Pterygium Is Recognized As An Ocular Surface Growth Disorder Secondary To Solar Radiation-Induced P53 Mutations In Limbal Epithelial Stem Cells.¹⁴ Even Though Various Surgical Modalities Are Now Available In Treatment Of Pterygium, Recurrence Of Pterygium Onto The Cornea After Surgical Excision Is Still The Single Most Common And Frustrating Complication. The Benefits Of Using Amt In Pterygium Surgery Were First Reported By Prabhasawat *et Al.* various Techniques Have Been Used In Anchoring Amniotic Membrane To The Scleral Bed After Excision Like Suturing, Application Of Fibrin Glue, Applying Cautery.^{11,13,15,17,27-30} A Sutured Human Amniotic Membrane Graft After Excision Of Primary Pterygium Has Been Used Earlier With Encouraging Results.^{11,13,15,17}

Amniotic Membrane Transplantation Has Been Used As An Alternative To Conjunctival Graft To Reconstruct Conjunctival Defects To Restore A Normal Stroma And To Provide A Healthy Basement Membrane For Renewed Epithelial Proliferation And Differentiation. It Has Been Shown That The Amniotic Membrane Includes Matrix Proteins That Cause Adhesion, Differentiation, Migration Of Epithelial Cells, And Prevention Of Epithelial Apoptosis. Thus Inducing Conjunctival Epithelial Wound Healing And Inhibiting Extracellular Matrix Synthesis By Pterygium Fibroblasts Are Considered To Be The Major Mechanisms In Preventing Pterygium Recurrence By The Amniotic Membrane That Has Been Used At An Increasing Rate In Ocular Surface Diseases.¹⁶ These Properties Have Propelled The Use Of Amniotic Membrane As An Alternative To Conjunctival Autograft For Repairing Damaged Conjunctival Surface Secondary To Chemical Burns, After Removal Of Scar Or Symblepharon, Conjunctival Tumors, Cicatricial Entropion, And Pterygium.²¹⁻²⁸

Recurrence Rate Of Pterygium In The Present Study Was Found To Be 3%. Kucukerdonmez Et Al Reported A Recurrence Rate Of 3.7%.¹⁷ katbab Et Al Had A Recurrence Rate Of 2% Over A 12-Month Follow-Up Period Following Amniotic Membrane Graft For Primary Pterygium Excision.¹⁸

The Recurrence Rate In The Current Study Was Less Than That Reported By Obiekweet Al Which Is 6%.¹⁹ The Recurrence Rate Of Pterygium Excision With Amniotic Membrane Graft Was 10.9% According To Prabhasawat *et Al.*¹⁵

It Has Been Shown That The Amniotic Membrane Includes Matrix Proteins That Cause Adhesion, Differentiation, Migration Of Epithelial Cells, And Prevention Of Epithelial Apoptosis. Thus, Inducing Conjunctival Epithelial Wound Healing And Inhibiting Extracellular Matrix Synthesis By Pterygium Fibroblasts Are Considered To Be The Major Mechanisms In Preventing Pterygium Recurrence By The Amniotic Membrane That Has Been Used At An Increasing Rate In Ocular Surface Diseases.²⁰

The Advantage Of Using Human Amniotic Membrane Is That It Can Restore Large Excised Areas Of Pterygium When Conjunctival Autograft Is Not Possible Or Conjunctiva Is Already Scarred From Previous Surgery Or Has To Be Preserved For A Possible Glaucoma Filtering Surgery.¹³

The Low Recurrence Rate And No Major Post Operative complication Following Amniotic Membrane Graft With Pterygium Excision In The Present Study Agree With Other Reports That This Procedure Is Effective And Safe. However Due To The Study's Major Limitations Which Are It Being Retrospective, Its Small Sample Size And A Short Period Of Follow-Up, The Findings Should Be Interpreted With Caution.

IV. Conclusion:

This Study Reports The Results Of Primary Pterygium Excision With Amniotic Membrane Transplantation. It Is Now Evident That Amt Has Certainly Gained An Acceptable Position In The Surgical

Armamentarium Of The Ocular Surface Surgeon. The Relative Ease Of The Procedure, Repeatability And Freedom From Intraocular Intervention Makes It An Attractive Surgical Option. The Low Rate Of Intraoperative And Postoperative Complications And The Avoidance Of Immunosuppression Are Other Advantageous Features Of This Procedure. The Results Of The Present Study With Minimal Postoperative Complications And Low Recurrence Of Pterygium Further Strengthen The Fact That The Future Of Amniotic Membrane Transplantation In Surgical Management Of Pterygium Looks Promising.

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