

**Role of Amniotic Membrane  
Transplantation in Persistent Corneal  
Epithelial defect**

An Essay

Submitted For Partial Fulfillment of Master Degree  
*in Ophthalmology*

By

**Nagwa Soliman Ramadan**  
*M.B.B.CH*

Supervised By

**Prof. Dr. Hazem Hosny Nouh**

Professor of ophthalmology  
Faculty of Medicine, Ain shams University

**Dr. Ahmed Abd El-Mageed Radwan**

Lecturer of ophthalmology  
Faculty of Medicine, Ain shams University

Faculty of Medicine  
Ain Shams University - Cairo  
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# Contents

	<i>Page</i>
<b>LIST OF FIGURES .....</b>	<b>I</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>VI</b>
<b>INTRODUCTION .....</b>	<b>1</b>
<b>Aim of the work .....</b>	<b>3</b>
<b><u>REVIEW OF LITERATURE:</u></b>	
1-Anatomy of amniotic membrane .....	4
2-Anatomy of the Cornea .....	10
3- Physiology of Corneal wound healing .....	19
4- Physiological Properties of the Amniotic membrane .....	27
5-Preparation of the amniotic membrane .....	35
6- Indication of amniotic membrane transplantation .....	42
7- Surgical procedures .....	69
8-Complication of amniotic membrane transplantation .....	85
<b>SUMMARY AND CONCLUSION .....</b>	<b>91</b>
<b>REFERENCES .....</b>	<b>93</b>
<b>ARABIC SUMMARY .....</b>	<b>—</b>

## List Of Figures

Figure	Page
<b>Fig (1):</b> Blastocyst with an inner cell mass and trophoblast .....	<b>4</b>
<b>Fig (2):</b> Histology of Amniotic membrane (AM) .....	<b>7</b>
<b>Fig (3):</b> Transmission electron microscopy of the amnion .....	<b>9</b>
<b>Fig (4):</b> Normal histology of the cornea .....	<b>11</b>
<b>Fig (5):</b> Normal corneal epithelium .....	<b>11</b>
<b>Fig (6):</b> Electron microscopy: The corneal epithelium rests upon the Bowman's membrane, which consists of randomly arranged collagen fibrils	<b>13</b>
<b>Fig (7):</b> Specular microscopy of human corneal endothelial cells in situ .....	<b>15</b>
<b>Fig (8):</b> Hematoxyline staining of the limbal epithelium and the underlying limbal stroma has high cellularity and vascularity .....	<b>17</b>
<b>Fig (9):</b> Diagrammatic representation of an ocular surface defect involving the limbus .....	<b>22</b>
<b>Fig (10):</b> Amniotic membrane detachment from placental chorion .....	<b>35</b>
<b>Fig (11):</b> Macro graphic appearance of hyperdry AM .....	<b>39</b>
<b>Fig (12):</b> Histologic appearance of the hyperdry AM .....	<b>40</b>
<b>Fig (13):</b> Epithelial defect persisting in the left eye of a female patient with severe aqueous tear deficiency due to secondary Sjogren's syndrome .....	<b>43</b>

<b>Fig (14):</b> Patient with herpetic keratitis and PED before (a) and (b) after AMT .....	<b>47</b>
<b>Fig (15):</b> Impression cytology specimen of the human limbus .....	<b>48</b>
<b>Fig (16):</b> (a) Impression cytology from surface of cornea with stem cell deficiency and a fibrovascular pannus showing goblet cells. PAS stain (b) Biopsy of fibrovascular pannus showing multilayered epithelium, vascularisation and intraepithelial lymphocytes along the basal layers .....	<b>49</b>
<b>Fig (17):</b> Intraoperative steps of AMT in nearly total LSCD .....	<b>50</b>
<b>Fig (18):</b> Preoperative and postoperative appearances of case with idiopathic LSCD .....	<b>52</b>
<b>Fig (19):</b> Histopathology of bacterial keratitis .....	<b>54</b>
<b>Fig (20):</b> Clinical photographs of patient (A, B) Diffuse conjunctival inflammation with limbal ciliary injection and a layered hypopyon, (C, D) after ProKera insertion and at day 4 and (E, F) at day 14 .....	<b>55</b>
<b>Fig (21):</b> Histopathology of Stevens-Johnson syndrome (a): Focal basal cell vacuolar change with dense superficial dermal lymphocytic inflammation and occasional eosinophils (b) Full-thickness necrosis, basal vacuolar change, and subepidermal bullae .....	<b>58</b>
<b>Fig (22):</b> Acute ocular manifestation of SJS/TEN .....	<b>59</b>

<b>Fig (23):</b> Ocular grading of SJS (A): grade 1, (B) grade 2, (C): grade 3, (D): grade4 of lid margin and tarsal scarring and keratinization with clear corneas, (E), mild scarring and (F) severe scarring and vascularization .....	<b>60</b>
<b>Fig (24):</b> Two-year-old girl with Stevens-Johnson syndrome undergoing application of the amniotic membrane to the ocular surface in the operating room .....	<b>61</b>
<b>Fig (25):</b> Two-year-old girl who developed Stevens-Johnson syndrome following amoxicillin administration (a) both ocular and oral mucosal involvement is evident,(b)Three weeks after application of amniotic membrane to the entire ocular surface in the operating room, the patient is visibly comfortable and not photophobic .....	<b>62</b>
<b>Fig (26):</b> Photographs of hyperdry AM patching in a patient with avascular bleb leak .....	<b>65</b>
<b>Fig (27):</b> ICGA of ant. Segment after LCAT 1day post op (a): marked hypofluorescence at the graft area, (b): hyperfluorescent spots (dye leakage) during the late phase of angiogram, one week after, (c) perfusion originating from the vascular supply of the underlying and surrounding episcleral bed was seen (d) Isofluorescent and well-perfused graft with no leakage from the edges could be demonstrated one month after surgery .....	<b>68</b>

<b>Fig (28):</b> ICGA after AMT. (a) Hypofluorescent graft on postoperative day 1(b) with diffuse late leakage at the edge of the graft, (c) Shrinkage of the graft toward the limbus and consistent hypofluorescence at the graft area on postoperative week 1 (d) At one month after surgery, the graft was small and hypofluorescent at the limbus, and the surrounding conjunctival vascularization could be observed .....	<b>68</b>
<b>Fig (29):</b> Cryopreserved AMNIOGRAFTR .....	<b>71</b>
<b>Fig (30):</b> Surgical illustration of AMNIOGRAFTR used as a temporary graft to cover the corneal surface by anchoring it to the perilimbal sclera by a 10-0 nylon running suture .....	<b>72</b>
<b>Fig (31):</b> The scheme illustration of how AMNIOGRAFTR is used as a temporary graft to cover the entire ocular surface with interrupted or running 10-0 vicryl suture to the lid margin and double armed 4-0 silk sutures to the skin .....	<b>72</b>
<b>Fig (32):</b> Surgical steps of using AMNIOGRAFTR for conjunctival reconstruction after removal of primary pterygium .....	<b>74</b>
<b>Fig (33):</b> Surgical steps of using AMNIOGRAFTR and PROKERA™ for corneal perforation .....	<b>75</b>

<b>Fig (34):</b> Illustration of PROKERA™ (a), which consists of a polymethyl methacrylate (PMMA) (b) symblepharon ring fastened with semitransparent cryopreserved AMNIOGRAFT R. (c) inserted at the time of surgery behind the speculum, or in the office or the bedside. (d) Assessed by fluorescein staining without its removal .....	<b>76</b>
<b>Fig. (35):</b> Finger's amniotic membrane buffer technique	<b>79</b>
<b>Fig. (36):</b> Surgeon performing Finger's amniotic membrane	<b>80</b>
<b>Fig. (37):</b> The amniotic stroma above Bowman's zone (A) completely adherent with corneal stroma derived cells (CSDCs). B, the amniotic stroma above Bowman's zone is partially adherent with CSDCs.	<b>82</b>
<b>Fig. (38):</b> Transmission electron micrograph of a stratified corneal epithelial sheet showing well-defined desmosomes and hemidesmosomes	<b>83</b>
<b>Fig. (39):</b> A, breaks in Bowman's zone with (CSDCs) migrating through the breaks to adhere with the amniotic stroma above B, TEM of the Bowman's zone corresponding a nucleated CSDC migrating around the edge of the ruptured Bowman's zone .....	<b>84</b>
<b>Fig. (40):</b> Ring shaped stromal infiltratetion .....	<b>86</b>
<b>Fig. (41):</b> Persistent epithelial defect and calcium deposits in the central area of the corneal graft with 360° neovascular ingrowth .....	<b>88</b>



<b>Fig. (42):</b> Corneal stroma calcification (star) and inflammatory cell infiltration (arrow) with edematous change and architecture distortion ..	<b>89</b>
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## List Of Abbreviations

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- **AM** : Amniotic Membrane
- **AMGs** :Amniotic Membrane Grafts
- **AMT** : Amniotic membrane transplantation
- **BSA** : Body surface area
- **CSDC** : Corneal stroma derived cells
- **D** : Diopter
- **DMEM** : Dulbeco's modified Eagle medium
- **DMSO** : Dimethyl sulfoxide
- **EDTA** : Ethylene Diamine Tetraacetic acid
- **EGF** : Epidermal Growth Factor
- **GVHD** : Graft versus host disease
- **HAM** : Human amniotic membrane
- **HIV** : Human immunodeficiency virus
- **HLA** : Human leukocytic antigen
- **HTLV** : Human T-cell lymphotropic virus
- **HSK** : Herpetic stromal keratitis
- **HSV** : Herpes simplex virus
- **KCS** : keratoconjunctivitis sicca
- **IFN-AM** : Human amniotic interferon  $\gamma$
- **IL** : Interleukin

- **ICGA** : Indocyanine green angiography
- **LCAT** : Limbal-Conjunctival Autograft Transplantation
- **LSCD** : Limbal stem cell deficiency
- **MMPs** : Matrix metalloproteinase
- **PBS** : Phosphate buffered saline
- **PED** : Persistent epithelial defect
- **PEDF** : Pigment epithelium-derived factor
- **PMC** : Post mitotic cells
- **PMNL** : Polymorphic nuclear lymphocyte
- **SJS** : Stevens-Johnson syndrome
- **TAC** : Transient amplifying cells
- **TDC** : Terminally differentiated cells
- **TEM** : Transmission electron microscopy
- **TEN** : Toxic Epidermal Necrolysis
- **TGF** : Transforming growth factor
- **TIMPs** : Tissue inhibitors metalloproteinase
- **TNF- $\alpha$**  : Tumor necrosis factor- alpha
- **VEGF** : vascular endothelial growth factor
- **VLA** : Very late activation

## INTRODUCTION

Ocular surface of the eye includes conjunctiva, cornea, sclera, and tear film and lid margin. This represent protective coat of the eye (**Snell and Lemp, 1998**).

An intact corneal epithelium is one of the most important factors in maintaining ocular surface health. Corneal epithelial defects heal without any complications but several factors, such as chemical injuries, topical medication, xerosis and neurotropic keratopathy interfere with wound healing leading to persistent epithelial defect (PED), corneal melting, and corneal perforation leading to loss of sight (**Macaluso and Feldman., 1997**).

In the field of ophthalmology, Amniotic membrane transplantation has been first used by De Roetth in 1940 to treat conjunctival defects (**De Rotth, 1940**).

The membrane has been used successfully to treat PED and ulcers from different causes. The procedure has been shown to promote epithelial healing, reduce vascularisation, yield a good cosmetics, and also to be relatively easy to perform (**Kruse et al., 1999**).

The human amniotic membrane is the innermost layer of fetal membrane, which composed of three basic layers:

epithelial monolayer, thick basement membrane and a vascular, hypocellular stromal matrix (**Magdi et al., 2000**).

Amniotic membrane is obtained from prospective donors undergoing caesarean section, who are negative for communicable diseases including HIVs, Hepatitis and syphilis.

Amniotic membrane has unique combination of properties, including the facilitation of migration of epithelial cells, and ability to modulate stromal scarring and anti-inflammatory activity (**Fukuda et al., 1999**).

So amniotic membrane transplantation indicated in several ocular surgeries like: conjunctival surface reconstruction, pterygium surgery, cicatrizing conjunctivitis, Steven Johnson Syndrome, thermal and chemical burn, leaking blebs, ocular surface squamous neoplasia, symblepharon release, corneal surface reconstruction, persistent epithelial defect (PED), non healing stromal ulcers, bullous keratopathy, band keratopathy and partial and total limbal stem cell deficiency (**Fernandes et al., 2005**).

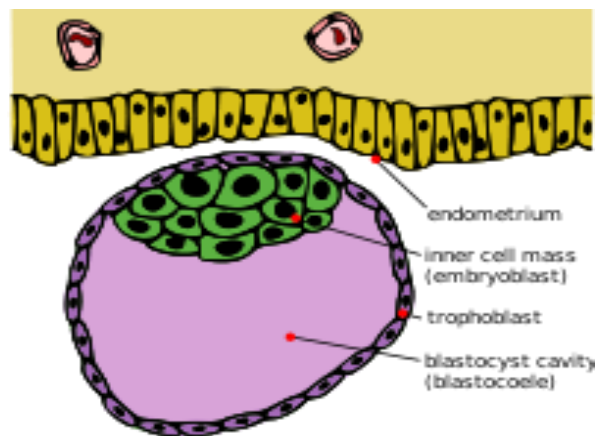
## AIM OF THE WORK

Highlight the efficacy of amniotic membrane transplantation in persistent corneal epithelial defect and different ocular surface disorders.

## ANATOMY OF AMNIOTIC MEMBRANE

Amniotic membrane (AM) is a thin innermost layer of the three layers that creates wall of amniotic sac which surrounds the human embryo.

In the process of human development, the blastocyst formation occurs when fluid secreted within morula form the blastocyst cavity with inner cell mass, which becomes embryoblast and outer cell mass, which becomes part of placenta, what's now called trophoblast; this occurs at 6 day (Ronald, 2001).



**Fig (1):** Blastocyst with an inner cell mass and trophoblast (Ronald, 2001).

The amniotic cavity first appears at about 7<sup>th</sup> day. The primitive ectoderm cells enclosing the cavity become flattened forming amnioblasts, amnioblasts cells which become the fetal