

An alternative surgical approach: Stem cell conjunctival autograft transplantation following surgical debulking of limbal dermoid

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Abstract

Purpose: This study aims to assess the safety and efficacy of Stem cell conjunctival autograft transplantation following surgical excision of limbal dermoid as an alternative approach to AMG transplantation.

Methods: A hospital-based observational study was conducted at a tertiary eye hospital. A total of 35 patients were included in the study. Patients underwent a routine ophthalmological examination at the follow-up period of 1st POD, 7th POD, 1 month and 3 months along with visual acuity, infection, corneal scar, and recurrence as degerminators of outcome.

Results: About 34.29% (age group 1-10 years) underwent surgical treatment of limbal dermoid. About 51.43% (n=18) patients were female and 48.57% (n=17) patients were male. Limbal dermoid were found common in the left eye of 57.14% of the patients and the right eye of 42.86% of the patients. Most of the limbal dermoid grade-I was 54.29% and grade-II was 45.71% and this difference was statistically significant ($\chi^2 = 39.29$, $df = 9$, $\text{Gamma } V = .39$, $\text{Lamda } \ddot{e} = .42$). Majority of the patients (51.43%) had limbal dermoid located in Inferotemporal region ($P < 0.05$). The second most common location was the supero-temporal region (28.57%). Postoperatively infection was seen in 8% of patients, corneal structural disfigurement was found in 8% of patients, and recurrence of dermoid was seen in 4% of the patients.

Conclusion: Combined simple excision with suture-less limbo-conjunctival autograft may be an alternative approach to AMG transplantation in the surgical treatment of limbal dermoid due to its good cosmetic and functional outcomes with reduced incidence of recurrence and complication.

Keywords: Stem cell corneal auto-graft (SCCAG), Amniotic membrane graft (AMG), IIEI&H.

Introduction

Limbal dermoids rank among the most common tumors of the corneal limbus¹. They are ocular choristomas and can occur in a variety of sizes ranging from only small lesions to larger masses in the epibulbar region². Though being a benign tumor, the removal of a limbal dermoid is not only performed to improve the cosmetic appearance of

the eye but more importantly to prevent loss of visual acuity. Vision is often impaired by astigmatic refractive errors caused by corneal astigmatism. This may lead to irreversible anisometropic amblyopia in children³. Large dermoids can also lead to surface irritation and discomfort or even central corneal opacification⁴.

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There are two ways to consider clinical problems associated with limbal dermoids: cosmetic and functional. Firstly, these lesions do not always affect vision, but patients may want treatment for cosmetic reasons. Although Kaufman stated that cosmetic issues should not be an indication for surgery, others insist that cosmetic problems can affect the quality of life of patients⁵. Secondly, limbal dermoids associated with lipid keratopathy can decrease visual acuity, especially when the visual axis is occluded. Furthermore, they can evoke corneal astigmatism. The pathogenesis is thought to involve intrinsic changes in the corneoscleral wall structure and can result in instability of the tear film⁶.

The optimal timing of surgical excision appears to depend on multiple factors, including the original size of the lesion, its rate of growth, and the anatomical area involved, as well as the request for removal for psychosocial reasons⁷. Overriding clinical indications for surgery include tumor size and growth, secondary corneal defect, unresponsive amblyopia, and psychosocial and cosmetic considerations⁸.

The usual surgical approach in limbal dermoids is simple excision mainly due to ease of the procedure. Lamellar keratoplasty is indicated in deep-seated dermoids. Other techniques include surgical resection followed by Corneal-limbal scleral donor graft transplantation or reconstructive suture-less multilayered amniotic membrane transplantation. Some studies also showed that the Mytomicin C can be used in addition to amniotic membrane transplantation in limbal dermoid surgery to prevent post-operative pseudo pterygium formation⁹. But still, there is no adequate evidence of the beneficial effect of Mytomicin C. In Jeong J study, they used an alternative surgical approach include simple excision, corneal tattooing, and a fibrin glue-assisted sutureless limbo-conjunctival autograft for limbal dermoids in 4 eyes of 4 patients. This method showed advantages in terms of shortening the operation time because conjunctival sutures could be skipped, with the aid of fibrin glue. The need for suture removal and the foreign body sensation from conjunctival suture knots could be avoided by this surgery, which could be helpful as a surgical option for children

with congenital limbal dermoids. Harvesting of the limbo-conjunctival autograft was made including the limbus margin of the cornea, and considered that this procedure has the benefit of preventing focal marginal limbal cell deficiency, by supplying limbal stem cells to the excised corneal limbal area. Thus, it could prevent recurrence or conjunctivalization, which can result from limbal cell deficiency without any additional surgical procedures, such as amniotic membrane transplantation¹⁰. Our study aims to assess whether Stem cell conjunctival autograft can be an alternative surgical approach to AMG following surgical debulking of limbal dermoid.

Methods

This study was carried out in the department of 'Cornea and Anterior Segment', Ispahani Islamia Eye Institute & Hospital, Dhaka, Bangladesh. The patients included in the study followed the inclusion and exclusion criteria. The study period was January 2021 – December 2022. A total of 35 patients were recruited for the study. Patients were recruited following the purposive sampling technique.

Inclusion criteria:

All patients of grade I and grade II limbal dermoid undergoing surgical excision.

Exclusion criteria:

Grade III limbal dermoid.

Study procedure:

Permission was taken from the academic and institutional Ethics Review Committee (ERC) and concerned departments of Ispahani Islamia Eye Institute and Hospital conducting the study. Patients admitted for surgical excision of limbal dermoid followed by stem cell conjunctival autograft transplantation that fulfills the selection criteria enrolled in the study. After the admission of the patient for surgery, written informed consent was taken from each subject before enrolment. Cases were selected purposively. At first patient came to our hospital and the following steps were performed:

Data collection procedure:

Patient history, presenting complaint, Duration of

growth, Association with other growth, Past history of ocular disease, Past history of systemic disease, and Drug history were recorded in a pre-designed questionnaire.

Ocular examination:

Patient ocular examination including best corrected visual acuity (BCVA), (Unaided, With PH&Aided), and measurement of IOP were conducted. Location, size, and grading of dermoid and structures involvement were done by slit lamp examination.

Surgical procedure:

If needed patient is sent for an anesthesiologist check-up. If the patient is fit for operation then the operative procedure is done according to the following steps.

1. Local or General anesthesia.
2. Patients undergoing surgical excision of dermoid followed by Stem cell corneal autograft (SCCAG)
3. BCL is given when need
4. Post-operative follow up of 1st POD, 7th POD, 1 month & 3 months are done.

Data Analysis Plan:

All data was collected and recorded in a data collection sheet. Data editing and analysis were done. Data and results will be presented in the form of tables and diagrams where applicable. Statistical analysis was conducted on the SPSS (Statistical Package for the Social Sciences) latest version as per availability for Windows software. Sensitivity, specificity, and data accuracy were calculated. Continuous variables were shown as mean \pm SD or mean rank, and categorical variables were given as frequency (percentage). A test of significance was done and the level of significance was defined as p -value <0.05 . Statistical analysis was done using unpaired t-tests between the groups and paired t-tests within the groups. The chi-square test and Fisher's Exact test were done for categorical data.

Results

Our data show that the majority (60%) of patients were 1-20 years age group. The below table

indicates that very few patients were aged 40 years and above (table 1). Young patients came to the hospital for treatment of limbal dermoid.

Table- I: Distribution of patients according to Age

Age	Number	P-value
1-10	12 (34.29%)	P= 0.027 ^S
11-20	09 (25.71%)	P= 0.031 ^S
21-30	07 (20%)	P= 0.062 ^S
31-40	03 (8.57%)	P= 0.086 ^{NS}
41-50	02 (5.71%)	P= 0.113 ^{NS}
>50	02 (5.71%)	P=0.113 ^{NS}
Total	35 (100%)	

In our study about 51% were females whereas 49% were male (table 2).

Table- II: Distribution of patients according to Sex

Sex	Patient's Number	P-Value
Male	17 (48.57%)	P = 0.135 ^{NS}
Female	18 (51.43%)	
Total	35 (100%)	

There is no significant difference between male and female distribution ($P > 0.05$).

Table- III: Distribution of patients according to Laterality of Eye

laterality	Number of Patients	P-value
Right	15 (42.86%)	P = 0.027 ^S
Left	20 (57.14%)	
Total	35 (100%)	

Data reveals that limbal dermoid is more common in the left eye (57%) and right eye 43% (table 3).

Table- IV: Distribution of patients according to the grading of limbal dermoid

Grade	Number	p-value
Grade-I	19 (54.29%)	P=0.045 ^S
Grade-II	16 (45.71%)	
Total	35 (100%)	

Table-VI shows the distribution of patients according to the grading of limbal dermoid. Here, 19 patients had grade-I and 16 patients had grade-II limbal dermoid. There is a significant difference present ($P < 0.05$). Grade-I is more common in patients.

Table- V: Distribution of patients according to Location

Location	Number	P-value
Supero-temporal	10 (28.57%)	P=0.067 ^{NS}
Infero-temporal	18 (51.43%)	P=0.031 ^S
Supero-nasal	05 (14.29%)	P=0.098 ^{NS}
Infero-nasal	02 (5.71%)	P=0.134 ^{NS}
Total	35 (100%)	

Here, limbal dermoid is more commonly located in infero-temporal region, then common in supero-temporal and comparatively less common in supero-nasal and infero-nasal regions.

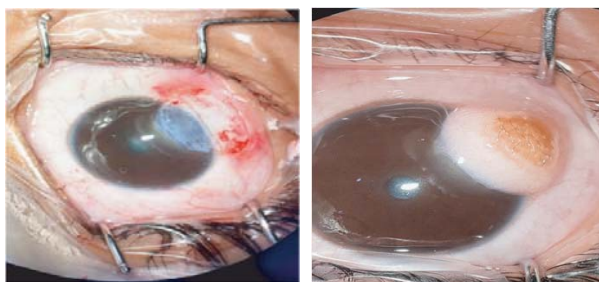
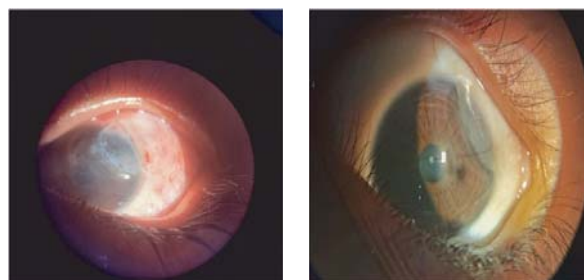
Table- VI: Distribution of patients according to Post-operative outcome

Post-operative outcome	Patient number	P-value
Infection	02 (5.71%)	P= 0.175 ^{NS}
Corneal structural disfigurement	02 (5.71%)	P=0.175 ^{NS}
Recurrence	01 (2.86%)	P=0.187 ^{NS}
Total Patient	35 (100%)	

Table VI shows, two infections, two corneal structural disfigurements and only one recurrence found in patients which are statistically not significant ($P>0.05$).

Discussion

A hospital-based observational study was performed in Ispahaniislamia Eye Institute and Hospital. In this study, 35 patients were taken as samples who were undergone surgical excision followed by suture-less stem cell limbal autograft for limbal dermoid.

**Pic A: Preoperative limbal dermoid****Pic B: postoperative 0 POD****Pic C: 7th POD****Pic D: After 3 months**

In this study, most common age group is 1-10 years about 34.29% who underwent surgical treatment of limbal dermoid. Here 18 (51.43%) patients were female and 17 (48.57%) patients were male. There is no statistical significant difference. Limbal dermoid common in left eye about 57.14% than right eye about 42.86%. Most of the limbal dermoid were grade-I (54.29%) than grade-II (45.71%) where statistical significant difference observed. Majority of the patients (51.43%) had limbal dermoid located in Infero-temporal region which was statistically significant ($P<0.05$). Second most common location was supero-temporal region about 28.57%. Postoperatively infection was seen in 2 patients, corneal structural disfigurement found in 2 patients and recurrence of dermoid was seen in only one case.

Conclusion

Combined suture-lesslimbo-conjunctival autograft with simple excision in patients with grade I & II limbal dermoid resulted in goodcosmetic and functional outcomes with reduced incidence of recurrence and complication. It can be a good choice as an alternative approach to AMG transplantation insurgical treatment of limbal dermoid if patients are selected appropriately.

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