 Minor ipsilateral simple limbal epithelial transplantation (mini-SLET) for pterygium treatment

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ABSTRACT
We describe a novel surgical technique for pterygium removal taking advantage of the properties of amniotic membrane and limbal epithelial stem cells. A total of 10 eyes underwent pterygium excision with amniotic membrane coverage of the bare sclera and placement of pieces of limbal epithelium in a linear fashion in the affected limbal area covered by a second amniotic membrane using fibrin glue. After up to 8 months of follow-up, there were no signs of early recurrence or sight-threatening complications. The minor ipsilateral simple limbal epithelial transplantation technique for the treatment of pterygium requires less tissue than the conventional conjunctival autograft, leaving healthy conjunctiva if needed for another procedure in the future and offers the advantages of epithelial stem cells, which in the long term may reduce the rate of recurrence significantly.

INTRODUCTION
Pterygium is a benign, wing-shaped fibrovascular proliferation extending onto the cornea. As of today, there are many approaches to its treatment once it is decided that surgical intervention is needed. The most common surgical techniques include leaving bare sclera, using a conjunctival or conjunctival limbal autograft, coverage with amnion membrane (AM) or the use of adjuncts like mitomycin C. Recurrence rates among these techniques vary widely, with reports as high as 88% for the bare sclera technique1–3 and more comparable results among the other mentioned techniques, with a recurrence rate between 0.003% and 40.9%.4–7

Conjunctival-limbal autograft offers a low recurrence rate and fewer complications;6 however, it cannot be performed in cases where a large defect needs to be covered or in patients where the conjunctiva needs to be preserved for future glaucoma surgery to avoid conjunctival scarring at the harvesting site. Some advantages of using an AM are inhibition of angiogenesis and the possibility to cover a large area without the need of harvesting healthy conjunctiva.8 Nevertheless, the cosmetic results, postoperative inflammation and recurrence rates are higher with AM transplantation than they are with conjunctival limbal autografts.8 9 10

Our innovative technique describes the use of an AM graft to cover the bare sclera area combined with a small autologous simple limbal epithelial transplant (mini-SLET) to provide stem cells at the limbal area.

DISCUSSION
Sangwan et al12 described SLET as a technique for the treatment of stem cell deficiency. Inspired by this technique, we decided to combine the use of an AM...
graft, which serves as an ideal substrate to support the growth of epithelial progenitor cells\(^ {13,14}\) with a mini-SLET for pterygium in cases that are not good candidates for a conjunctival autograft.

Based on the concept that there is a localised limbal stem cell dysfunction or deficiency at the limbal area\(^ {15,16}\) and the better outcomes reported with the use of conjunctival autografts compared with AM, we hypothesise that the addition of the stem cells contained in the mini-SLET pieces could reduce recurrence rates and, as a secondary result, improve the cosmetic outcomes.

Despite the fact that additional expenses of AM for patients with primary pterygium might not be justified, in patients with limited amounts of conjunctiva, the need of future surgeries such as glaucoma suspects or patients with previous multiple surgeries, the spending on mini-SLET technique could be acceptable. Surgeon experience influences outcomes and recurrence rate with auto conjunctival grafting.\(^ {17}\) A simple technique as described here may help reduce learning curves and surgical skills needed to achieve success.

### Table 1
Demographic, preoperative and postoperative outcomes of patients that underwent mini-SLET

<table>
<thead>
<tr>
<th>Patient</th>
<th>Gender</th>
<th>Age</th>
<th>Eye</th>
<th>Clinical grading</th>
<th>Site of pterygium</th>
<th>Recurrence</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>34</td>
<td>OD</td>
<td>T2</td>
<td>Bilateral</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>82</td>
<td>OD</td>
<td>T2</td>
<td>Temporal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>46</td>
<td>OS</td>
<td>T1</td>
<td>Nasal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>67</td>
<td>OS</td>
<td>T3</td>
<td>Nasal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>57</td>
<td>OS</td>
<td>T2</td>
<td>Nasal</td>
<td>None</td>
<td>Pyogenic granuloma</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>26</td>
<td>OD</td>
<td>T3</td>
<td>Bilateral</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>Female</td>
<td>70</td>
<td>OD</td>
<td>T2</td>
<td>Nasal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>8</td>
<td>Male</td>
<td>31</td>
<td>OS</td>
<td>T3</td>
<td>Nasal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>9</td>
<td>Male</td>
<td>49</td>
<td>OU</td>
<td>T3</td>
<td>Nasal</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

OD, right eye; OS, left eye; OU, both eyes; SLET, simple limbal epithelial transplantation.

The clear limitations of our study are the limited number of patients and the somewhat short follow-up, but since this is our initial report we believe that 10 eyes is enough to show the feasibility of the surgical technique and we are now working on a larger randomised trial comparing the mini-SLET technique to AM transplantation.

In conclusion, we describe a new technique in which an AM graft is combined with a mini-SLET for pterygium surgery. We found this technique to be easy to learn and believe it can be an interesting solution for those patients in which we want to preserve as much conjunctiva as possible. Although the initial results are encouraging and promising, results are subject to validation as the number of patients and longer follow-up are available in the future.

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Collaborators Alexandra Abdala-Figueroa and Andrew Olivo-Payne.

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