

# 1 Incidence and Severity of Postoperative Dry Eye Disease: A Comparative 2 Study of Phacoemulsification versus Small Incision Cataract Surgery.

## 3 4 **Abstract:**

5 **Purpose:** To compare the incidence and severity of dry eye disease (DED) following  
6 phacoemulsification and small incision cataract surgery (SICS) using subjective and  
7 objective tear film parameters.

8 **Methods:** A comparative study of 500 patients who underwent cataract extraction,  
9 divided equally into a phacoemulsification group (n=250) and a SICS group (n=250).  
10 Postoperative evaluation at one month included the Ocular Surface Disease Index  
11 (OSDI), Tear Film Break-Up Time (TBUT), and the Schirmer I test.

12 **Results:** At one-month follow-up, DED incidence was 22% (n=55) in the  
13 phacoemulsification group and 35% (n=88) in the SICS group. The SICS group  
14 demonstrated significantly higher mean OSDI scores ( $25.6 \pm 8.4$ ) compared to the  
15 phacoemulsification group ( $18.4 \pm 6.9$ ). Objective tear film instability was also more  
16 pronounced following SICS, with a mean TBUT of  $7.2 \pm 1.8$  seconds and Schirmer I  
17 value of  $9.6 \pm 3.2$  mm, versus  $8.9 \pm 2.1$  seconds and  $11.8 \pm 3.4$  mm in the  
18 phacoemulsification group, respectively.

19 **Conclusion:** Both surgical techniques are associated with postoperative dry eye;  
20 however, the incidence and severity are significantly greater following SICS. Early  
21 identification and targeted management of ocular surface changes are  
22 recommended to optimize surgical outcomes.

23  
24 **Keywords:** Dry Eye Disease, Phacoemulsification, Small Incision Cataract Surgery,  
25 Tear Film Break-Up Time, Ocular Surface Disease Index.  
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## 27 **1. Introduction**

28 Dry eye disease (DED) is a multifactorial disorder of the ocular surface characterized  
29 by tear film instability, ocular discomfort, and visual disturbance.<sup>1</sup> Cataract surgery is  
30 one of the most commonly performed ophthalmic procedures worldwide and has  
31 been associated with transient postoperative dry eye symptoms.<sup>2</sup> Several factors  
32 contribute to postoperative dry eye, including corneal nerve transection, ocular  
33 surface inflammation, microscope light exposure, and the use of topical  
34 medications.<sup>3</sup>

35 Phacoemulsification and small incision cataract surgery (SICS) are widely practiced  
36 techniques for cataract extraction.<sup>4</sup> Although both procedures provide excellent  
37 visual outcomes, differences in incision size and surgical manipulation may influence  
38 postoperative tear film stability.<sup>3</sup> Previous studies have demonstrated a temporary  
39 reduction in tear secretion and tear film stability following cataract surgery, with  
40 varying degrees of severity between surgical techniques.<sup>5</sup>

41 The present study was undertaken to compare the incidence and severity of dry eye  
42 following phacoemulsification and SICS using subjective and objective tear film  
43 parameters.

## 44 **2. Materials and Methods**

45 A comparative clinical study was conducted comprising 500 patients scheduled for  
46 cataract extraction. The cohort was divided into two equal groups: 250 patients  
47 undergoing phacoemulsification and 250 patients undergoing SICS.

48 Postoperative ocular surface evaluations were performed at one month. Subjective  
49 assessment was quantified using the Ocular Surface Disease Index (OSDI)

questionnaire. Objective tear film parameters were evaluated utilizing Tear Film Break-Up Time (TBUT) to assess stability and the Schirmer I test to measure basal and reflex tear secretion.

### 3. Results

Baseline demographic characteristics were comparable between the two cohorts. The mean age was  $63.2 \pm 7.8$  years in the phacoemulsification group and  $64.1 \pm 8.1$  years in the SICS group.

At the one-month postoperative follow-up, DED was observed in 55 patients (22%) in the phacoemulsification group and 88 patients (35%) in the SICS group. Mean OSDI scores increased significantly from baseline in both groups, reflecting the subjective impact of cataract surgery on ocular comfort, but were notably higher in the SICS group compared to the phacoemulsification group.

Objective evaluations corroborated the subjective findings, indicating greater tear film instability and ocular surface disturbance following SICS. Mean postoperative TBUT and Schirmer I test values were lower in the SICS group compared to the phacoemulsification group.

**Table 1: Comparison of Postoperative Dry Eye Parameters at One Month**

Parameter	Phacoemulsification (n=250)	SICS (n=250)
Age (years, mean $\pm$ SD)	$63.2 \pm 7.8$	$64.1 \pm 8.1$
Incidence of DED, n (%)	55 (22%)	88 (35%)
OSDI Score (mean $\pm$ SD)	$18.4 \pm 6.9$	$25.6 \pm 8.4$
TBUT (seconds, mean $\pm$ SD)	$8.9 \pm 2.1$	$7.2 \pm 1.8$
Schirmer I Test (mm, mean $\pm$ SD)	$11.8 \pm 3.4$	$9.6 \pm 3.2$

### 4. Discussion

The present study demonstrated a higher incidence of postoperative dry eye in patients undergoing SICS compared to phacoemulsification. Both surgical techniques resulted in deterioration of tear film parameters; however, the changes were more pronounced following SICS.

The higher incidence observed in the SICS group may be attributed to larger corneal or sclero-corneal incisions, increased surgical manipulation, and greater disruption of corneal innervation.<sup>3</sup> Corneal nerves play a crucial role in maintaining tear secretion through the lacrimal functional unit, and their disruption can contribute to postoperative tear film instability.<sup>2</sup>

Our findings are consistent with previous studies that reported significant reductions in TBUT and Schirmer values following cataract surgery. Bista et al. observed greater postoperative dry eye changes in patients undergoing SICS compared to phacoemulsification.<sup>5</sup> Similarly, Garg et al. highlighted the role of surgical trauma and postoperative inflammation in the development of ocular surface dysfunction.<sup>2</sup>

82 The increase in OSDI scores observed in both groups reflects the subjective impact  
83 of cataract surgery on ocular comfort. Although most cases are transient and  
84 improve with time, recognition of postoperative dry eye remains important for  
85 optimizing patient satisfaction and visual quality.

86 The major strength of the present study was the large sample size. Limitations  
87 include the relatively short follow-up period and the inability to assess the effect of  
88 confounding factors such as diabetes, duration of surgery, and pre-existing  
89 meibomian gland dysfunction.

## 90 **5. Conclusion**

91 Both phacoemulsification and SICS are associated with postoperative dry eye.  
92 However, the incidence and severity of dry eye are significantly greater following  
93 SICS. Early identification and management of ocular surface changes are vital and  
94 may substantially improve postoperative clinical outcomes and patient satisfaction.

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