

# A Comparative Study in the Outcome of Primary Asian Blepharoplasty with and without Fat Removal

Surendra Jung Basnet<sup>1,2\*</sup>, Krishna Kumar Nagarkoti<sup>2</sup>, Khushboo Gurung<sup>2</sup>, Sudeep Amatya<sup>2</sup>, Srijana KC<sup>2</sup>

<sup>1</sup>Department of Plastic Surgery, Annapurna Neurological Institute and Allied Sciences, Maitighar, Kathmandu, Nepal

<sup>2</sup>Nepal Plastic Cosmetic and Laser Centre, Dhobighat-Ringroad, Lalitpur, Nepal

Email: \*surendrabasnet@hotmail.com

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## Abstract

**Background:** Asian Blepharoplasty (AB) is one of the most commonly performed aesthetic procedures today. Despite the increasing demand for AB and advancements in surgical techniques, creating an optimal upper eyelid crease remains difficult. This study aimed to determine whether removing the preaponeurotic fat pad (PAF) had any effect on the revision surgery rates following primary Asian blepharoplasty. **Methods:** A retrospective comparative analysis was conducted on patients who underwent primary AB between January 2016 and December 2020. Patients were divided into PAF removed and PAF not removed groups. The outcomes in the groups were compared by the frequency of revision surgery following primary AB using the chi-square test ( $p < 0.05$ ) with IBM SPSS version 21.0. **Results:** The study included 480 patients, 442 (92%) female and 38 (8%) male, and the final outcome was evaluated after 6 months postoperatively. 412 (86%) patients were observed to have PAF pads intraoperatively, while 68 (14%) had minimal/no PAF pads. In total, 115 (24%) patients underwent revision surgery, of whom 31 (27%) had PAF removed, 66 (57%) had PAF not removed, and 18 (16%) had minimal/no PAF noted. When compared to the PAF not removed group, the PAF removed group showed a significantly lower frequency of revision surgery between the two groups of patients ( $p = 0.0001$ ). **Conclusion:** In the final outcome, not removing the PAF in primary AB indicated a strong association with an increase in revision surgery. The removal of PAF in primary AB showed a better overall outcome and patient satisfaction.

## Keywords

Asian Blepharoplasty, Double Eyelid, Preaponeurotic Fat, Supra Tarsal Crease

## 1. Introduction

Asian Blepharoplasty, also popularly known as double eyelid surgery or STC surgery, is one of the most commonly performed aesthetic procedures, and its popularity is continuously increasing, particularly in the Asian population. [1] [2] Non-incisional suture ligation was the first type of AB to be reported in the literature, introduced by Mikamo using a 3-suture technique in 1896, [3] [4] and various modifications [5]-[10] of this technique had been used to create STC until the 1920s when Maruo documented the first external incisional technique, which had lower failure rates than its predecessor. [11] Since then, the external incisional technique has been revised and refined over time. Later, Chen extensively discussed the role of the PAF pad in the upper eyelid function and dynamics. [12] [13] He described a “glide zone”, a space occupied by PAF between the anterior skin, orbicularis oculi muscle, and orbital septum layers that act passively while allowing the posterior layers of the levator and its aponeurosis, Muller’s muscle, and tarsal plate to contract and invaginate into the eyelid fold to form the upper eyelid crease. Consequently, along with the anterior and posterior layers in regard to PAF, the formation of the STC also depends on the absence or presence of it in the “glide zone”. However, overzealous removal of the PAF can lead to a hollowed-out supratarsal sulcus with a loss of fullness in the preseptal zone. [12] [14] [15]

Although Nepal’s aesthetic surgery market is still in its infancy, there is an increase in demand for AB. Additionally, it is also one of the most frequently performed procedures in our practice. Because the majority of our population comprises various ethnic groups with distinct upper-eye anatomy, it is imperative to keep track of the methods employed and the outcomes of AB. This further emphasizes how crucial it is to be familiar with the different techniques and the variables that may influence the outcome of AB.

## 2. Objectives

The primary objective was to compare the outcomes of Asian blepharoplasty with and without PAF removal by occurrences of revision surgery following the primary surgery.

## 3. Methodology

A retrospective comparative study of 480 patients (960 eyelids) who underwent Asian blepharoplasty was included from January 2016 to December 2020 at the Annapurna Neurological Institute and Allied Sciences, Kathmandu, Nepal, with the approval of the Institutional Review Committee (IRC) board. Informed written consent was obtained from all the patients. According to the status of PAF intraoperatively and the type of treatment received for PAF, the patients were divided into three groups; PAF removed, PAF not removed, and PAF minimal or not noted. Inclusion criteria included primary blepharoplasty for creating a bilateral upper eyelid crease in both males and females of Asian des-

cent, ages 18 years and above. Patients with a history of previous eyelid surgery, congenital eyelid ptosis, neuromuscular disorders, or facial nerve palsy were excluded from the study. Preoperative evaluation, patient education regarding the procedure, complications, healing time, and follow-up time were completed on the initial visit.

### 3.1. Preoperative Preparation

All patients had primary blepharoplasty performed under local anesthesia, with an oral pre-medication of 1 gram paracetamol and 1 gram cefixime taken 30 to 45 minutes before the procedure. Preoperative considerations in selecting the appropriate eyelid crease included measuring the height and depth of the fold, as well as its configuration and relationship to the epicanthal fold (parallel, nasally tapered, or deep shapes), the amount of skin to be excised, and whether or not the fat was to be removed. To ensure the desired cosmetic outcome, skin markings were performed while the patients were sitting straight on the operating table. While in a downward gaze, the crease height of each upper eyelid was marked at a distance of 6 to 8 mm from the ciliary margin. Raising the brows also elevated the excess skin and aided in the precise placement of the new eyelid crease. A pair of forceps was used to determine skin excision using the pinch technique; care was taken to leave at least 2 cm between the lower margin of the brow and the high point of the new crease. The goal was also to remove any redundant tissues that might be impeding the formation of a natural crease.

### 3.2. Surgical Technique

Using a 26 gauge needle, each eyelid was infiltrated with a 1.5 cc to 2 cc solution of 2% Xylocaine with epinephrine (1:100,000) in the suborbicular plane. An incision was carefully made along the previously marked line, taking care not to pass the levator aponeurosis. A small strip of orbicular muscle was excised. A scissor was then advanced across the lid from the lateral to the nasal extent of the redundant tissue to complete an en-bloc resection. The upper skin line was preserved, and excess removal of the orbicular muscle was avoided to ensure the prevention of triple folds. Meticulous care was taken to preserve the lateral orbicular muscle to conserve an appearance of fullness in male patients. Opening of the orbital septum was done with Westcott scissors, and an appropriate amount of fat pads were also removed if needed in selected patients. The preaponeurotic fat was carefully evaluated to be either partially resected or repositioned. Fat pads were then removed from the central, temporal, and nasal areas, depending on the deposition of fat pads. Fat pads were coagulated with diathermy, which was tied with 6.0 Vicryl. To further enhance the crease, the inferior edge of the orbicularis oculi was trimmed.

Three interrupted sutures were placed at the mid-pupil, medial, and lateral limbus, respectively, while keeping in mind that these sutures passed the lower skin edge and levator aponeurosis at the level of the skin crease (superior mar-

gin of the tarsal plate) and upper skin edge. Each suture was placed approximately 3 mm apart with 6.0 prolene in an oblique fashion to avoid medial webbing. As crease placement is most critical in influencing the final outcome of the crease height and crease shape; patients were routinely asked intra-operatively to lift their upper eyelids to check for the efficiency of the levator in forming a crease and were shown in a mirror to confirm each patient's desired crease.

### 3.3. Postoperative

Cold compression was applied immediately for 15 minutes locally and was instructed to be continued for the first 72 hours postoperatively. Patients were advised to have bed rest on the first day, and the wound was to be dressed with ciprofloxacin ointment four times a day for a week. All sutures were removed on the 7<sup>th</sup> day after the procedure. Patient's expectations regarding eyelid crease height, shape, depth, and symmetry were assessed by observers (attending surgeons, medical staffs, and non-medical staff) postoperatively at 1, 3, and 6 months, respectively.

### 3.4. Statistical Analysis

All the collected data were entered and analyzed using IBM SPSS version 21.0. A chi-square test of association was used to determine if the two variables, the type of treatment for PAF and the type of surgery performed (primary surgery only or revision surgery), were either associated or independent of each other.

## 4. Result

### 4.1. Patient Demographics

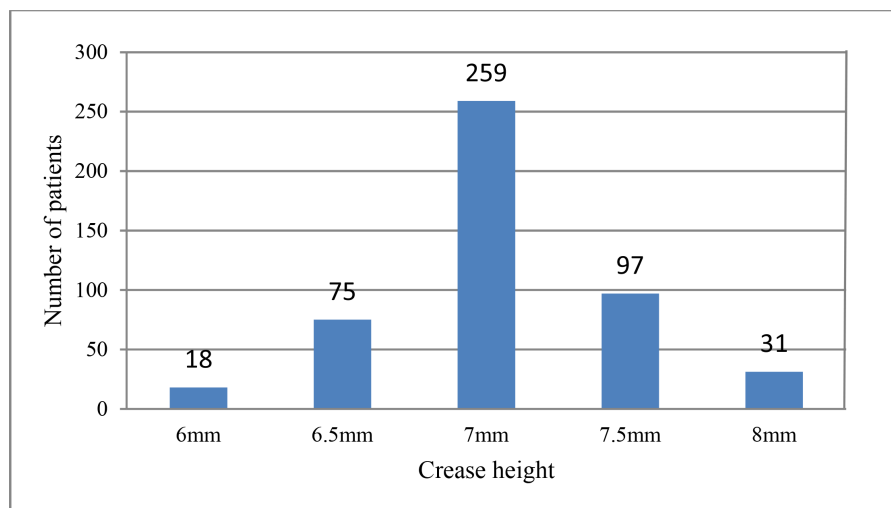
A total of 480 patients underwent primary blepharoplasty, of which 92% were female and 8% were male. The most common age group was 26 y to 35 y with 192 (40%) patients, and the least was the >56 y group with 14 patients (2.9%). Two patients were 76 y and 78 y. The age and sex distribution of all patients are presented in **Table 1**.

**Table 1.** Age and sex distribution.

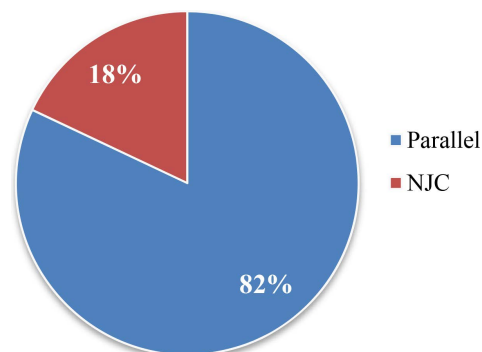
| S.N | Age Group    | Patient          |                | Total          |
|-----|--------------|------------------|----------------|----------------|
|     |              | Female           | Male           |                |
| 1   | <25          | 65               | 7              | 72             |
| 2   | 26 - 35      | 180              | 12             | 192            |
| 3   | 36 - 45      | 137              | 7              | 144            |
| 4   | 46 - 55      | 49               | 9              | 58             |
| 5   | >56          | 11               | 3              | 14             |
|     | <b>Total</b> | <b>442 (92%)</b> | <b>38 (8%)</b> | <b>N = 480</b> |

## 4.2. Chosen Eyelid Crease Characteristics

**Figure 1** shows that the most frequent crease height was chosen at 7 mm by 259 (54%) patients, and only 18 (3.66%) chose a crease height of 6 mm from the ciliary margin. Patient-chosen crease shapes were 392 (82%) parallel crease, and 88 (18.8%) nasal joining crease (NJC) (**Figure 2**). Digital photographs of preoperative and 6-month postoperative results with parallel crease shape (**Figure 3**), NJC shape (**Figure 4**), and NJC pre- and 7-day postoperative (**Figure 5**) are shown below. The most frequent upper lid excess-skin-excision thickness was 2 mm in 208 (43%) patients, whereas the least was 1.5 mm in 14 (3%) patients (**Figure 6**). A combined upper and lower blepharoplasty was performed on 16 (3%) patients in total.



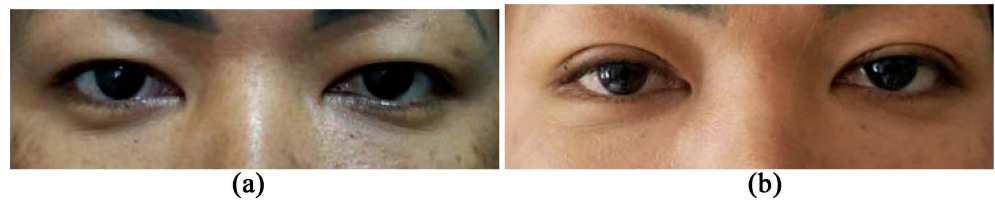
**Figure 1.** Frequency of chosen crease height.



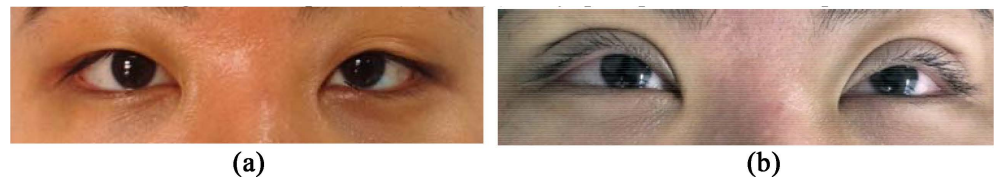
**Figure 2.** Selected crease shape.



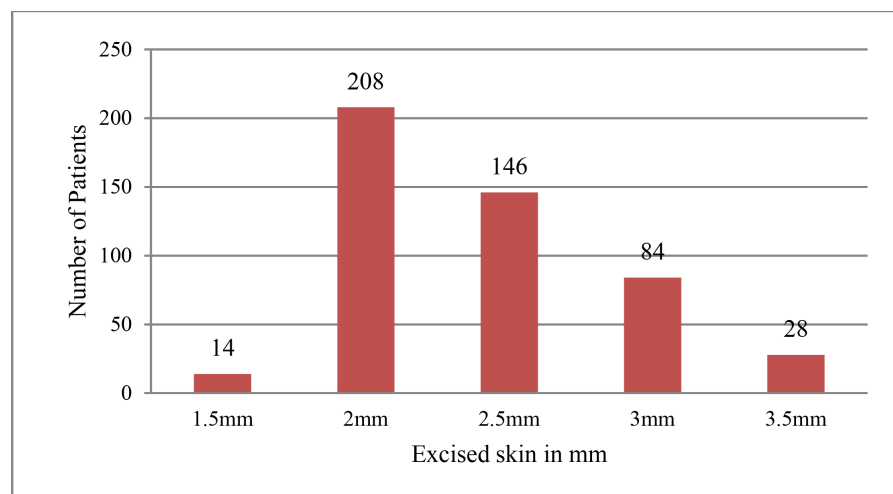
**Figure 3.** Preoperative (a) and (b) 6 months postoperative; Parallel crease shape.



**Figure 4.** Preoperative (a) and (b) 6 months postoperative; NJC shape.



**Figure 5.** Preoperative (a) and (b) 7 days postoperative; NJC shape.



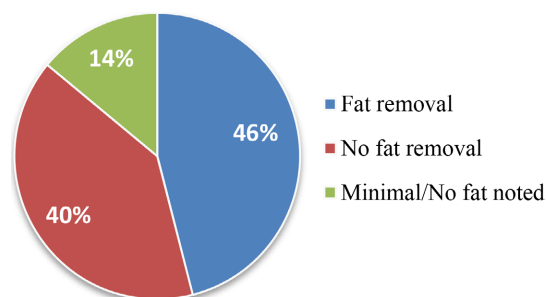
**Figure 6.** Excised excess skin.

### 4.3. Revision Surgery

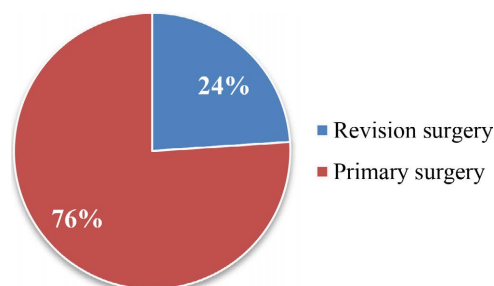
In total, 412 (86%) patients were observed to have PAF intraoperatively, whereas 68 (14%) had minimal or no PAF noted. 220 (46%) underwent PAF removal, while 192 (40%) had no PAF removed. The incidence of PAF and the treatment carried out in primary AB in all the groups are depicted in **Figure 7**. Altogether, revision surgery was performed in 115 (24%) patients in total (**Figure 8, Table 2**).

Out of a total of 480 patients, 115 underwent revision surgery; the majority was in the PAF not removed group, *i.e.* 66 (57%); and an asymmetrical crease was the most common reason for revision surgery 38 (33%). In all three surgical procedures, the least common reason for revision surgery was lateral eyelid excess skin 9 (8%). **Table 2** shows the reasons for the frequency of revision surgery in the various treatment groups.

The frequencies of revision surgery in both groups are presented in **Table 3**. A chi-square test  $p = 0.0001$  indicated a statistically significant difference in the frequency of revision surgery after primary AB between the two groups. AB with



**Figure 7.** Procedure for PAF in primary AB.



**Figure 8.** Primary vs. revision surgery.

**Table 2.** Reason for revision surgery vs. procedure type.

| Reason for revision surgery | Treatment             |                           |                                | Total      |
|-----------------------------|-----------------------|---------------------------|--------------------------------|------------|
|                             | PAF removed (N = 220) | PAF not removed (N = 192) | PAF minimal/not noted (N = 68) |            |
| High crease                 | 3                     | 7                         | 2                              | 12         |
| Low crease                  | 8                     | 15                        | 2                              | 25         |
| No crease                   | 4                     | 9                         | 3                              | 16         |
| Asymmetrical crease         | 11                    | 19                        | 8                              | 38         |
| Superficial crease          | 4                     | 9                         | 2                              | 15         |
| Lateral eyelid excess skin  | 1                     | 7                         | 1                              | 9          |
| <b>Total</b>                | <b>31</b>             | <b>66</b>                 | <b>18</b>                      | <b>115</b> |

**Table 3.** Chi-square test of association between the treatment groups and revision surgery.

| Treatment Type  | Primary surgery only | Revision surgery | Total      | p-value |
|-----------------|----------------------|------------------|------------|---------|
| PAF Removed     | 189                  | 31               | 220        | 0.0001  |
| PAF not Removed | 126                  | 66               | 192        |         |
| <b>Total</b>    | <b>315</b>           | <b>97</b>        | <b>412</b> |         |

PAF removed had a significantly lower revision rate of 14% than AB with PAF not removed, which had a revision rate of 34% ( $<0.05$ ). In this study, we found a

strong association between intact PAF and the occurrence of revision surgery, indicating that removal of the PAF in the primary AB resulted in a more desired outcome and decreased incidence of revision surgery. All revision surgeries were done 6 months after the initial attempt. No severe complications were observed.

## 5. Discussion

A total of 480 patients were included in the study, and the final outcome was evaluated after 6 months postoperatively. This study showed that the age distribution ranged from 18 to 78 years, with 26 to 35 years being the most common age group. The gender distribution was 92% female (442) and 8% male. It showed that the keenest group for cosmetic surgery belongs to the younger age group, dominated by the female.

Compared to Caucasians, Asians tend to have varied anatomy (with and without creases) regarding the upper eyelid. [16] [17] [18] [19] About 50% of people of Asian descent have a monolid crease, and the presence, depth, and location of the STC vary in Asian demographics, with a range of 2 - 5 mm from the lid margin. [11] [19] In this study, the most preferred crease height was 7 mm by 54% of patients. In monolid Asians, the levator aponeurosis does not reach the skin of the upper eyelid, there is a swollen, heavy, and thick eyelid due to hypertrophic orbicularis oculi muscle, and maybe there is a presence of pronounced fat on the pretarsal, preseptal, and orbital, causing the pupils to be less exposed and giving the eyes a droopy appearance. A natural double eyelid is created due to contraction of the levator muscle, which penetrates the orbicularis oculi and anterior dermal area to the tarsal plate and is characterized by: 1) a smooth upper eyelid with a shallow fold line when the eyes are closed; 2) a fold line that is not fixed onto the tarsus and thus capable of changing with eye movements; 3) an equally distributed tension at the upper and lower flaps of the fold line; and 4) an appropriate depth of the fold when the eyes are fully opened. [20]

In Asian blepharoplasty, PAF and soft tissue manipulation are crucial because the amount of PAF removed not only determines the longevity of the height and shape of the eyelid crease but also decreases the incidence of revision surgery, as seen in this study. Removal of PAF in primary Asian blepharoplasty was found to have lower revision rates of 14% when compared to PAF not removed at 34% and PAF minimal or not noted at 26%. Moreover, the removal of preaponeurotic tissue with minimal injury, the reduction of the fat volume with controlled excision, and the closure of the wound with minimal tension facilitate the construction of a physiological and more dynamic natural crease. In one particular study reported in the literature, residual fat was seen in 63% of the revisional cases, whereas 50% of the total revisional cases were due to failure of crease formation, which also required further clearance of PAF. [21] This study also emphasized the importance of PAF and how its treatment influenced the formation of a new crease in Asian blepharoplasty.



Selecting the right technique is not only pivotal in the outcome of AB, but the balance between the patient's preference for a certain lid crease and the surgeon's ability to use precise techniques to produce it to satisfy the desire for beautiful eyes is of paramount importance. As with all surgeries, and even with the most experienced surgeons, complications are inevitable. In our study, the most common complication or reason for revision surgery was asymmetry of the upper eyelids following primary AB. Certain considerations are suggested to reduce the incidence of revision surgery in Asian blepharoplasty. To begin, a proper preoperative evaluation is essential, as is selecting the appropriate crease shape, height, and depth. Second, a thorough understanding of the distinctive upper eyelid anatomy between Caucasian and Asian, as well as the differences in techniques and treatments for Asian blepharoplasty, is required. Finally, the importance of preaponeurotic fat management, which influences the permanence of the lid crease as well as the incidence of various complications, should be carefully evaluated and considered for the optimal creation of aesthetically pleasing eyelids.

## 6. Limitation and Recommendation

The anatomical variations of the upper eyelid in different ethnicities were not considered in this study, and the surgeon used only one technique for all the groups. The study was conducted in a single center, so it represents only a small group of the population. Therefore, a multi-centered study can be done to make it more applicable for an even better outcome, so a lower revision rate can be achieved in cosmetic AB in Nepal.

## 7. Conclusion

In conclusion, removal of the preaponeurotic fat pad during primary Asian blepharoplasty resulted in a much lower incidence of revision surgery in comparison to patients who did not have their PAF removed. It led to a better overall outcome and also increased patient satisfaction by minimizing complications and the need for revision surgery.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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