

# Efficacy of the Intraoperative Cold Saline-Soaked Gauze Compression on Intraoperative Bleeding, Postoperative Oedema and Ecchymosis in Rhinoplasty

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## ABSTRACT

**Introduction:** Intraoperative bleeding causes stress to surgeon due to increased operation time sometimes increasing up to 1-3 hours extra time than necessary. Postoperative periorbital edema and ecchymosis following rhinoplasty are very much disturbing for both patients and their surgeons. However, techniques that are readily available without any significant additional costs are incorporated easily into surgical practice of rhinoplasty. The basic aim of this study was to minimize intraoperative bleeding, postoperative edema, and periorbital ecchymosis and to reduce morbidity in Rhinoplasty with cold saline-soaked gauze compression.

**Material and methods:** The study was designed as a prospective, double-blind, randomized controlled study in a tertiary referral hospital in Hyderabad. Hundred patients who underwent rhinoplasty or septorhinoplasty were included. Hundred patients undergoing septorhinoplasty or rhinoplasty were divided into 3 groups. In the group I, study group, the nasal dorsum was continuously compressed with cold saline-soaked gauze during the operation and during the post-operative period for 24 hours. In the group II, control group, the nasal dorsum was continuously compressed with dry gauze during operation and during the post-operative period for 24 hours. In the group III, compression was not at all done either with cold saline soaked gauze or with dry gauze. The total duration of the operation, amount of bleeding and edema over nose and around eyes were recorded during surgery. Eye lid edema and periorbital ecchymosis was recorded at 24 hours and on postoperative days 2,3,5 and 7 and degree of Nose edema on 7 by two 2 investigators.

**Results:** The operation time was significantly shorter in the study group than in the control group. Nose edema, eyelid edema and periorbital ecchymosis were significantly less almost negligible in the study group at the following postoperative days 1, 3, 5, and 7

**Conclusion:** Eye lid edema and periorbital ecchymosis are the main post-operative morbidities of rhinoplasty apart from stress to surgeon due to increased operation time with bleeding during surgery. Cold saline-soaked gauze compression during operation has significant impact on these morbidities and less eventful postoperative period.

**Keywords:** Eye Lid Edema, Periorbital Ecchymosis, Cold Saline Gauze Compression, Rhinoplasty

required to return to normal social activities. The periorbital bruising, "panda eyes" famously called heal at 2-weeks.

Many methods and procedures are described to reduce this periorbital bruising such as steroid injections during operation, lidocaine with epinephrine injections, intra-operative hypotensive anaesthesia, fibrin sealant, subperiosteal osteotomy techniques and so on. Intra-operative steroids have been most extensively studied.<sup>5-7</sup> However pre, intra operative steroids carry the risks of psychosis, weight gain, immunosuppression, uncontrolled blood glucose and avascular necrosis of the hip. Taskin et al. examined the efficacy of the combination of intraoperative cold saline-soaked gauze compression and corticosteroids on rhinoplasty morbidity.<sup>1</sup> The study group shows significant reduction of edema of nose and periorbital soft tissues. However, this was performed in the presence of steroids, which is not routinely utilized by all surgeons.

The present study was to provide evidence for the use of direct compression intra-operatively without the risk profile of steroids and cost-effective, simple technique to minimize post-operative edema and ecchymosis.

## MATERIAL AND METHODS

Hundred rhinoplasty patients undergoing external rhinoplasty with osteotomy were included in this study between June 2014 and May 2016. They were enrolled randomly in this double-blind, randomized study. This study consisted of 100 patients (70 men, 30 women) with an age range of 18 to 45 and a mean age of 26. The total no patients assessed for eligibility (n = 126). Some patients are excluded (n = 26) for not meeting inclusion criteria (n = 18), declined to participate (n = 3) and other reasons (n = 5). Patients were randomized into three groups. In group I (n=40) was assigned as study group, the nasal dorsum was continuously compressed with cold (2-8°C) saline-soaked gauze during the operation and during the post-operative period for 24 hours every 15-20 minutes period gap. In group II (n=30), was assigned as control group and the patients were compressed with dry gauze continuously during the operation and during the post-operative period. In group III (n=30), was assigned as control group and the patients were neither compressed with

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**How to cite this article:** Vinnakota Sriprakash. Efficacy of the intraoperative cold saline-soaked gauze compression on intraoperative bleeding, postoperative oedema and ecchymosis in rhinoplasty. International Journal of Contemporary Medical Research 2017;4 (3):707-710.

## INTRODUCTION

Rhinoplasty operation especially like lateral osteotomy techniques used to reshape the bony nasal pyramid is large contributing factors to the degree of bruising and edema around nose and eyes.<sup>1-4</sup> Over years rhinoplasty surgeons faced difficulty in explaining to patients about swelling over nose and around eyes after the surgery as it can cause difficulty with visual acuity in the early post-operative period. And also this can be quite distressing to the patient and their family and impact the time

| Grades | Extent of Periorbital Ecchymosis  | Eyelid Edema                                 |
|--------|---|--|
| 0      | No ecchymosis   | No edema                                     |
| 1      | Up to medial one-third of the lower and/or upper eyelid (to the medial canthus) | No coverage of iris with eyelids             |
| 2      | Medial half of the upper and/or lower eyelid (to the pupil)                     | Slight coverage of iris with swollen eyelids |
| 3      | Past the pupil  | Full coverage of iris with swollen eyelids.  |
| 4      | Up to the full length of the lower and/or upper eyelid (to the lateral canthus) | Full closure of eyes                         |

**Table-1:** Grades of Periorbital Ecchymosis and Edema

|                                   | Study Group | Control Group | P value |
|-----------------------------------|-------------|---------------|---------|
| Operation time, mean 6 SD, min    | 62 ± 10     | 82 ± 20       | .039    |
| Amount of bleeding, mean 6 SD, mL | 160 ± 30    | 220 ± 40      | .022    |

**Table-2:** Intraoperative Amount of Bleeding and Operation Time

| Postoperative Day | Study Group | Control Group | P Value |
|-------------------|-------------|---------------|---------|
| 1                 | 3.90 ± 0.68 | 3.53 ± 0.80   | .017    |
| 3                 | 0.91 ± 0.39 | 3.21 ± 0.89   | .009    |
| 5                 | 0.49 ± 0.55 | 1.30 ± 0.52   | .032    |
| 7                 | 0.32 ± 0.49 | 0.42 ± 0.62   | .022    |

Values are presented as mean + 6 SD.

**Table-3:** Eyelid Edema Scores

cold saline-soaked gauze nor dry gauze continuously during the operation or during the post-operative period. All cases in groups I, II and III were operated under controlled sevoflurane hypotensive anaesthesia. Systolic arterial pressure was aimed to keep between 65 and 80 mmHg for controlled hypotensive anaesthesia. Controlled hypotension was achieved by a remifentanyl infusion of 0.1-0.5 microgm/kg/min, following a bolus of 1 microgm/kg.<sup>7</sup> Degree of Intraoperative bleeding, eyelid oedema and periorbital soft-tissue ecchymosis for each patient was evaluated separately using a scale of 0-4. The total duration of the operation, intraoperative amount of bleeding and edema over nose and around eyes were recorded during surgery. Patients were evaluated at 24 hours and postoperative days 2, 5, and 7.<sup>1,4</sup>

The operations were standardized by choosing patients with nearly the same nasal deformities.<sup>9</sup> The surgical techniques done in this study are open rhinoplasty and external osteotomies. All patients who underwent closed rhinoplasty were excluded in this study. A local anaesthetic infiltration of 2% lidocaine with 1:100,000 adrenaline was administered 20 minutes before surgery. A single dose of 10 mg dexamethasone was given intravenously in all cases at the beginning of the operation.<sup>10-14</sup> The bowel with ice water, made out of sterile saline preoperatively in the refrigerator was used for maintenance of cold gauze. The dorsal compression with cold saline-soaked gauze was manually applied at least 2 minutes between each surgical step such as hump resection, nasal dorsal rasping, bilateral median, oblique, transverse and lateral osteotomy. Different studies showed different methods to measure the degree of intraoperative bleeding, postoperative edema and ecchymosis. Most commonly used a scale from 0 to 4, others used a variation of the numeric scale (e.g., 0 to 3, 0 to 5) (table-1). Multiple methods used in different studies to measure the degree, of eyelid swelling for edema, and the maximal lateral distance of periorbital discoloration for ecchymosis.

More subjective and descriptive terms were used to grade edema and ecchymosis in older studies published before the 1970s. Objective measurement tools used in this study to grade edema and ecchymosis were callipers to measure eyelid approximation caused by edema and Photoshop to determine the intensity and extent of ecchymosis. However, methods like magnetic resonance imaging or volumetric three-dimensional stereo photogrammetry to measure soft-tissue thickness were not done as part of study. The ecchymosis commonly called “black eye” will appear as very dark purple initially and as it fades it may change the colour to light purple, greenish, or yellow.

#### Statistical analysis

SPSS version 21 was used for the statistical analysis. Descriptive statistics like mean and percentages were used to interpret the data. Chi square test was used for comparison between variables.

## RESULTS

The mean operation time and the mean amount of intraoperative bleeding are given in Table 2. The study group I demonstrated a significant decrease in the operation time and intraoperative bleeding and was significantly shorter compared to groups II and III. There was a significant difference between groups in terms of the amount of bleeding (P = .022 Table 2).

There was no statistically significant difference between all three groups with regard to age and sex.

Postoperative eyelid edema and periorbital ecchymosis were significantly decreased in group I with continuous compression with cold saline-soaked gauze during the operation and during the post-operative period for 24 hours every 15-20 minutes period gap. In the control group where compression with dry gauze during the operation and during the post-operative period was used, there is significant intraoperative bleeding, edema and ecchymosis treatment and is similar to group III.

Eyelid edema was significantly decreased in the study group at postoperative days 1, 3, 5, and 7 compared to the control group, the mean scores of upper and lower eyelid edema were significantly lower in the study group than in the control group (P = .017, P = .009, P = .032, P = .022 respectively; Table 3). Periorbital ecchymosis was also significantly decreased in the study group at postoperative days 1, 3, 5, and 7 compared to group II and group III (P = .039, P = .035, P = .024, P = .036, respectively; Table 4). Ecchymosis turned from dark purple to almost yellow on the fifth day in 82% of the study cases and in 45% of the control group. The colour turned into pale yellow,

| Postoperative Day                             | Study Group | Control Group | P Value |
|---|-------------|---------------|---------|
| 1   | 3.69 ± 0.49 | 4.29 ± 0.58   | .039    |
| 3   | 3.52 ± 0.52 | 4.12 ± 0.39   | .035    |
| 5   | 2.24 ± 0.48 | 2.68 ± 0.46   | .029    |
| 7   | 1.34 ± 0.46 | 1.86 ± 0.48   | .036    |
| Values are presented as mean ± 6 SD.          |             |               |         |
| <b>Table-4: Periorbital Ecchymosis Scores</b> |             |               |         |

seen in 96% of the study group and 88% of the control group on the seventh postoperative day.

Patients in the study group returned to the normal social life earlier ( $4.0 \pm 1.8$  days) than those in other groups ( $9.0 \pm 2.8$  days). The ecchymosis though took 5 to 10 days to be resorbed partially, complete resolution of edema and discoloration occurred in one month period. But none of patients complained from pain, tenderness, itching, and limitation of ocular motility or systemic symptoms such as fever, fatigue, headache, or rhinorrhoea.

## DISCUSSION

Although rhinoplasty remains the most common facial plastic surgical procedure performed, there is no consensus among rhinoplasty surgeons describing the perioperative and postoperative treatment of patients undergoing rhinoplasty to reduce intraoperative bleeding, post-operative edema and ecchymosis which are common undesired morbidities after rhinoplasty. Postoperative eyelid edema and periorbital ecchymosis are socially disturbing and frightening to patients.<sup>1</sup>

It is essential that formal consensual statement exists with rhinoplasty surgeons who attempt to decrease these perioperative and postoperative morbidities, which impacts postoperative recovery and perception of surgical outcome.

### Corticosteroids

Although dexamethasone, the most commonly used medication for corticosteroid administration has a significant effect on decreasing edema and ecchymosis after rhinoplasty<sup>1</sup>, it is not done in this study as conflicting literature exists despite the proposed efficacy of corticosteroids.<sup>10-14</sup>

### Decreasing Intraoperative Bleeding

Rhinoplasty surgical procedure inherently causes bony and soft-tissue trauma, leading to inflammation and disruption of the lymphatic and venous systems of the nose, which drain the excess interstitial fluid. Ecchymosis results from extravasation of blood from damaged vessels.

Intraoperative vasoconstriction methods like lidocaine with epinephrine and intraoperative cold saline-soaked gauze compression showed significant improvement in reducing intraoperative bleeding and postoperative morbidity. Intraoperative hypotension with remifentanyl was shown to improve intraoperative haemostasis.<sup>5</sup> But conflictive evidence shown in different studies makes it difficult to determine whether the corticosteroid, intraoperative hypotension or both together decreased edema and ecchymosis.<sup>1,4,9,15</sup>

However, techniques that is readily available, such as cold saline-soaked gauze compression for intraoperative haemostasis could be incorporated easily into surgical practice without any significant additional costs.

### Other Postoperative Interventions

Postoperative interventions like head elevation and nasal packing were part of the routine care of rhinoplasty patients. Many rhinoplasty surgeons regularly use head elevation postoperatively, with maximal head elevation being the most efficacious, which rely on the gravity to increase the drainage of excess interstitial fluid and extravasated blood.<sup>3</sup> Nasal packing was shown to have not a positive impact on postoperative edema and ecchymosis. Many rhinoplasty surgeons are not using nasal packing postoperatively routinely, possibly because of its increased patient discomfort or believing it is unnecessary.<sup>3</sup>

### Surgical Techniques

Multiple techniques have been described to reduce intraoperative bleeding, postoperative edema and ecchymosis. Careful handling of the bony and soft tissue during rhinoplasty, including periosteal elevation before lateral osteotomy, type of approach for rhinoplasty open or closed, and type of lateral osteotomy internal or external.<sup>4,17</sup> The combination of techniques is used by surgeons depending upon their experience or training that has developed over time.<sup>16-18</sup>

The purpose of periosteal elevation was to decrease damage to the periosteum, protect the underlying vasculature during osteotomy and to provide a barrier to prevent extravasation of blood into the subcutaneous tissues.<sup>8,9</sup>

With open or closed rhinoplasty, there is conflicting literature exists with some studies showing no difference between two techniques and with others studies significantly less edema and ecchymosis with closed rhinoplasty.

Lateral osteotomy is considered to be the chief cause of intraoperative bleeding, postoperative edema and ecchymosis as it is the major contributing factor of rhinoplasty surgery.<sup>15</sup> External/percutaneous osteotomy causes less intraoperative bleeding attributed to less intranasal trauma leading to less postoperative edema and ecchymosis when compared with internal/endonasal osteotomy.<sup>16,19</sup>

### Compression with cold saline-soaked gauze

Continuous compression with cold saline-soaked gauze during the operation and during the post-operative period for 24 hours every 15-20 minutes period gap has shown significant decrease in intraoperative bleeding and significantly shorter duration of the operation. Postoperative eyelid edema and periorbital ecchymosis are also significantly reduced leading to better perception of surgical outcome.

The main mechanism of cold gauze compression in rhinoplasty is local vasoconstriction. It also causes slowing down of the cell mechanism, decreases the production of inflammatory chemical mediators like serotonin, histamine, bradykinin, and decreases muscular tone and spasticity.<sup>20</sup> It is also believed that cold compression decreases edema and pain.<sup>20-22</sup> However, the exact physiological mechanism of cold compression is not known for now, new studies are required to determine the mechanism of cold on prevention of edema and ecchymosis. In addition, patients in the study group returned to their normal lives earlier than those in the control group.

## CONCLUSION

Stress to surgeon due to increased operation time with intraoperative bleeding during surgery and eye lid edema and periorbital ecchymosis are the main post-operative morbidities

of rhinoplasty operation. Cold saline-soaked gauze compression during operation and next 24 hours has significant impact on these morbidities and less eventful postoperative period and can be incorporated readily into surgical practice without any significant additional costs.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 23-02-2017; **Accepted:** 20-03-2017; **Published:** 01-04-2017