



ORIGINAL ARTICLE

# Effect of osteotomies during rhinoplasty on intraocular pressure



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## KEYWORDS

Rhinoplasty;  
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**Abstract** *Objective:* To investigate whether rhinoplasty with osteotomies for the treatment of deformed nose induces changes in intraocular pressure (IOP). *Design:* Prospective, nonrandomized study. *Setting:* University-affiliated medical center. *Patients:* Thirty patients who underwent rhinoplasty with osteotomies for the nose were prospectively enrolled in this study. Fifteen patients had lateral osteotomies with the external perforating technique, and fifteen with an internal continuous technique with periosteal elevation. We excluded patients with diabetes mellitus, hypertension, glaucoma, previous ocular trauma, history of ocular surgery, and previous use of topical corticosteroid eye drops. *Main outcome measures:* The intraocular pressure (IOP) in each patient was measured by Goldmann tonometry preoperatively and postoperatively on days 1, 2, and 7. *Results:* 23 women and 7 men with a mean age of 27 years were enrolled in the study. The mean  $\pm$  SD IOP of the eye was  $15.69 \pm 2.37$  mmHg preoperatively. Postoperatively, the mean  $\pm$  SD IOPs were  $15.96 \pm 1.92$  mmHg on day 1,  $15.45 \pm 2.55$  mmHg on day 2, and  $15.72 \pm 2.86$  mmHg on day 7 ( $P = .863$ ). *Conclusions:* Although osteotomies during rhinoplasty caused variations in the IOP compartment, the changes in IOP were not statistically significant. Therefore, rhinoplasty should be a safe surgical procedure with respect to ocular physiological function, however monitoring IOP peri-operatively is advised. To our best knowledge, this is the first clinical trial to determine the effect of rhinoplasty with osteotomy on intraocular pressure.

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## 1. Introduction

Rhinoplasty is a common procedure for both functional and cosmetic purposes. In fact, the American Society of Plastic Surgery ranked it the sixth most common elective procedure for esthetic plastic surgery in 2013. However, it can be

associated with significant postoperative periorbital edema and ecchymosis caused by manipulation and trauma of the soft and hard tissues of the nasal and paranasal regions. Postoperative periorbital edema and ecchymosis remain a concern, even for the most experienced surgeons. The surgery's sequelae can cause social and work-related inconveniences that often result in an elevated level of patient anxiety.<sup>1</sup>

Osteotomies are a form of (controlled) trauma with a considerable disruption of the abundant blood vessels in this facial region and, therefore, are associated with postoperative effects. Edema and ecchymosis are main concerns for patients after rhinoplasty. Furthermore, in addition to the discomfort associated with excessive edema, such as obstructed vision and nasal blockage, it can also lead to an undesired healing process of the tissues involved, ecchymosis may lead to permanent, undesired pigmentation of the skin. These clinical findings were the origin of the question regarding the possibility of documenting change in intraocular pressure during the postoperative period.<sup>2</sup>

A normal intraocular pressure (IOP) is essential for normal eye structure and function. When the balance of aqueous formation and drainage is altered, the IOP changes. The IOP elevation results in corneal edema, iris atrophy, cataract, and optic nerve atrophy. The common symptoms of increased IOP are blurred vision, epiphora, headache, nausea, vomiting, or a sensation of pressure in the eyes.<sup>3</sup>

Glaucoma is characterized by optic nerve damage, leading ultimately to irreversible blindness. Glaucoma is estimated to affect approximately 70 million people worldwide and more than 2 million people in the USA. Variation in IOP has been increasingly considered to be important, with several studies suggesting that its fluctuations are an independent risk factor for glaucoma progression.<sup>4</sup>

No reports have delineated the possible effects of rhinoplasty on ocular physiological function. The purpose of the present study was to evaluate the IOP status before and after rhinoplasty with osteotomies and to determine whether the variations might produce adverse effects on ocular physiological function. To the best of our knowledge, the relationship of IOP and rhinoplasty on patients with deformed nose has not been addressed in any published literature.

## 2. Patients

The ethics committee of Ain Shams Faculty of Medicine approved the study. Informed consent was obtained from the patients. Patients with deformed nose undergoing septorhinoplasty were prospectively enrolled in the study. The age of the patients ranged from 21 to 35 years (mean: 28 years).

Exclusion criteria included patients with diabetes mellitus, hypertension, glaucoma, ocular hypertension, previous ocular trauma, history of ocular surgery, and previous use of topical corticosteroid eye drops. Because the fluctuation of episcleral venous pressure results in changes in IOP, any patients with systemic conditions, such as carotid-cavernous fistula and pulmonary hypertension that may induce changes in episcleral venous pressure were excluded from this study.

## 3. Surgical procedure

Open septorhinoplasty was performed using transcolumellar infracartilaginous incisions and nasal skin envelope elevation

in the supraperichondrial and subperiosteal planes. The following steps were tailored according to the preexisting deformity and the patient needs and were discussed with the patient. First, component hump reduction was done in 18 cases [60%]. Next, medial fading osteotomies were performed in those patients without hump 12 cases (40% of cases). Next, lateral osteotomies were performed in fifteen patients with lateral osteotomies with the external perforated technique, and fifteen with the internal continuous technique with periosteal elevation from low to high manner. The osteotomies were followed by cephalic trimming, alar base reduction tip sutures including interdomal and intradomal sutures, lateral crural mattress sutures and alar spanning sutures, and finally tip grafts as columellar struts and tip shield grafts.

## 4. Evaluation

All patients underwent a complete preoperative ophthalmic examination that consisted of best-corrected visual acuity, slit lamp biomicroscopy, Goldmann applanation tonometry, and dilated funduscopy as baseline data. The IOP of each eye was measured 3 times, and the mean IOP was calculated. Repeated IOP measurements were performed at the same times on day 1, on day 2, and after removal of the internal nasal splints on day 7 postoperatively. Physiological factors, such as heart rate and systolic and diastolic blood pressures, were recorded 10 min after each IOP measurement.

## 5. Results

23 women and 7 men with a mean age of 27 years were enrolled in the study. All patients had osteotomies. The postoperative ocular symptoms on the first day were edema (23 of 30 [76.6%]) and ecchymosis (7 of 30 [23.3%]). On the second day edema was seen in 28 of 30 [93.3%] and ecchymosis in 9 of 30 [30%]. On the seventh day edema was resolved in all patients while mild ecchymosis persisted in 2 patients. The mean  $\pm$  SD IOP of the eye was  $15.69 \pm 2.37$  mmHg preoperatively. Postoperatively, the mean  $\pm$  SD IOPs were  $15.96 \pm 1.92$  mmHg on day 1,  $15.45 \pm 2.55$  mmHg on day 2, and  $15.72 \pm 2.86$  mmHg on day 7 ( $P = .863$ ).

## 6. Statistical analysis

Results were expressed as mean  $\pm$  SD (Table 1 and Fig. 1). The comparisons of IOPs and physiological factors such as heart rate, systolic blood pressure, diastolic blood pressure, and mean blood pressure were generated preoperatively and postoperatively. The comparisons of these values were determined by the paired *t*-test. Differences were considered to be statistically significant at  $P < 0.05$  (Tables 2 and 3).

## 7. Discussion

Rhinoplasty may cause serious orbital and periorbital complications such as orbital hemorrhage, enophthalmos, exophthalmos, periorbital cellulitis, and blindness.

Most acute orbito-periorbital complications are related to lateral osteotomies. Medial orbital wall damage following osteotomy may result in orbital emphysema as it allows air

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