

Factors that Influence the Periorbital Edema and Ecchymosis After Open Septorhino-Plasty

Zhino Adil Mohammed Amin*

Aqeel Abdulrazaq Al-hulfi**

Abstract

Background and objectives: Septorhinoplasty is one of the most common plastic surgical procedures. Periorbital edema and ecchymosis following rhinoplasty are disturbing for both the patient and the surgeon. The aim of this study was to assess and to compare the effect of different factors and procedures on periorbital edema and ecchymosis after rhinoplasty. **Methods:** The study involved 104 patients, with 4 equal groups. The first group (standard) with external osteotomy and nasal packing, the second group with internal osteotomy and nasal packing, the third group with external osteotomy, nasal packing and steroid injection and the last group with external osteotomy without nasal packing. **Results:** there was a significant decrease of edema and ecchymosis in those patients that had undergone external osteotomies than an internal osteotomies on the first and on the seventh postoperative day, there was also a significant decrease in edema and ecchymosis in patients that received dexamethasone injection, in contrast nasal packing was found significantly increasing the severity and duration of periorbital ecchymosis post rhinoplasty. Edema was disappearing in most of patients after 7 days postoperatively, in the first group (61.5%), a second group (61.5%), a third group (73.1%), and the last group (76.9%). **Conclusions:** This study concluded that; external osteotomy and steroid injection were associated with decreased incidence of edema and ecchymosis postoperatively, while there was an increased incidence with anterior nasal packing.

Keywords: Open septorhinoplasty; Periorbital edema; Periorbital ecchymosis; Osteotomy; Anterior nasal pack.

Introduction

Rhinoplasty is one of the most common invasive plastic surgical procedures, both for functional as well as cosmetic purposes^{1, 2}. Meticulous surgical techniques can minimize the sequelae of inflammation, but cannot prevent them even with the most experienced surgeon^{1, 2}. Two of the most common sequelae are periorbital edema and ecchymosis that influences both short term and long term cosmetic results and may create patients and surgeon dissatisfaction².

Edema is the typical result of bony and soft tissue trauma during the rhinoplasty that causes the inflammation and the inability of the lymphatic and venous systems of the nose to drain excess interstitial fluid³. Ecchymosis is caused by the extravasations from the damaged vessels, which moves from deep tissues to surfaces such as the thin and lax skin of the eyelids⁴. The most common cause of periorbital edema and ecchymosis after rhinoplasty is

the osteotomy. Other factors including nasal anatomy, type and degree of deformity along with skin and connective tissue characteristics of the patient^{2, 5}. Lateral osteotomies are generally the last step in aesthetic rhinoplasty, and it is done to correct the asymmetric lateral nasal wall and to narrow the nose⁶.

The technical refinements of the last decade have produced a considerable reduction in ecchymosis and edema, resulting in quicker and better healing. The most important factors are: precise placement of the local vasoconstrictive and anesthetic solutions, the use of micro-osteotomies, preservation of periosteal attachment, medial-oblique osteotomies to eliminate transverse osteotomies⁷.

Another way of minimizing or preventing edema and ecchymosis is administration of steroids, which were widely practiced in maxillofacial and plastic surgery⁷⁻¹³. Corticosteroids can be used in various doses, they can decrease swelling by reducing vascular permeability, diminishing

* MBChB, KHCMS (ENT) trainee. ENT, Head and Neck surgery – Sulaimani Teaching Hospital.

**MBChB, FICMS, CABS, Consultant Otorhinolaryngology. Sulaimani Teaching Hospital. Otorhinolaryngology, Head and Neck center, Kurdistan region, Iraq.
Corresponding author: drzhino@gmail.com

vascular metabolites and inhibiting migration of inflammatory cells¹¹. It was reported in a few surgeries that the anterior nasal packing, when used unnecessarily following lateral osteotomies in rhinoplasty, contributed significantly to the postoperative eyelid edema and ecchymosis, it is most likely due to the accumulation of blood in the osteotomy site instead of it being drained in the nasal cavity forcing it into the skin and soft tissues of the periorbital region^{14, 15}.

Patient and methods

This study is a quasi-experimental design study conducted in Center of Otolaryngology- Head and Neck surgery/ Sulaimani, Teaching Hospital and Azmar private hospital from December 2016 to December 2017. The study conducted on 104 patients in equal numbers from both genders, who underwent primary open approach Septo-rhinoplasty. Ages ranging from (20-30) years. The patients were divided into 4 equal groups, 26 cases for each group (13 male and 13 female): 1st group had undergone an external osteotomy with nasal packing only. The 2nd group had undergone an internal osteotomy and nasal packing. The 3rd group had an external osteotomy with nasal packing and steroid, and the 4th group had an external osteotomy without nasal packing. We compared 2nd ,3rd and 4th groups with the 1st group in the first and seventh postoperative days for both edema and ecchymosis. All patients underwent open septorhinoplasty with median, lateral osteotomies and thumping alone without any other procedures in the nasal cavity or the nose at all. Intra operative head elevation, cooling, hypotension performed in all patients. The study excluded those patients who had undergone closed technique rhinoplasty, tip plasty alone, revision cases, those without a nasal hump or with severe nasal deformity (very thick nasal bone, twisted nose), patients with hypertension, diabetes mellitus, peptic ulcer, psychiatric condition, allergy to dexamethasone or patient on menstrual cycle or using those used aspirin. After the agreement of the ethics and scientific committee of Kurdistan Board for Medical Specialties the data were collected. Preoperative history was taken, nasal examination, facial analyzing, and routine investigations were done. Written consent was taking after patients being informed about the procedure and photo-

graphs were taken preoperatively and postoperatively on first and seventh day.

The procedure was done by the classical way, under general anesthesia with hypotension technique. 8mg dexamethasone was given IV to the third group patients at the time of osteotomy. First, third and fourth groups underwent percutaneous lateral osteotomy and the second group underwent endonasal lateral osteotomy. Bilateral anterior nasal packs were put in all groups apart from the forth group. An external nasal splint was applied in all cases. After 24 hrs postoperatively nasal packs were removed. A second dose of 8 mg dexamethasone injected I.V to 3rd group patients. External nasal splint and stitches were removed on postoperative day seven. The patients scored for periorbital edema and ecchymosis on the first and the seventh postoperative day using a graded scale Figure (1) and (2)¹⁶. The "IBM SPSS Statistics version 20" was used for the data analysis. Moreover, a p-value of ≤ 0.05 was considered statistically significant.

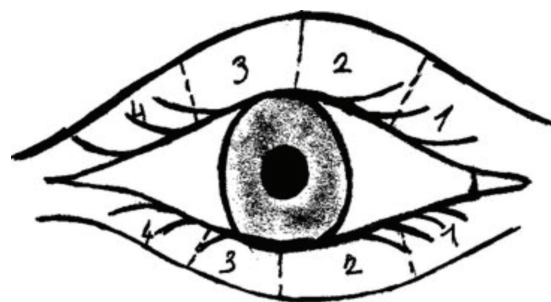


Figure (1): Scale for periorbital ecchymosis: 0 (none), (+) 1 (in the medial canthus), (+) 2 (extending to the pupil), (+) 3 (past the pupil), (+) 4 (extending to the lateral canthus).

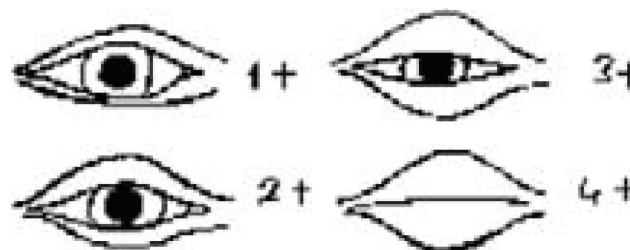


Figure (2): Scale for eyelid edema: 0 (none), (+) 1 (minimal), (+) 2 (covering to the iris), (+) 3 (extending to the pupil), (+) 4 (massive edema).

Results

In this study, ecchymosis in the first post operative day

was more in the second group with internal osteotomy than first group with external osteotomy the p-value= 0.041. Ecchymosis was less in third group which they received steroid than first group p-value= 0.032. Ecchymosis was less in those patients without nasal packing (fourth group) than those with nasal packing in the first group, and most of the patients has grade 2 periorbital ecchymosis in the first post operative day (50%) in the first group, (34.6%) in the second group, (46.2%) in the third group, (65.4%) in the last group, with lower incidence in the second group while grade 3 and 4 periorbital ecchymosis were more in the second group than other groups, because internal osteotomy done blindly and continuous incision of periosteum and nasal bone which lead to more bleeding, Table (1).

Table (1)A comparism of different grades of periorbital ecchymosis at day 1 post rhinoplasty.

First day periorbital ecchymosis	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Total	p-value
Group 1 (Standard)	3(11.5%)	4(15.4%)	13(50%)	4(15.4%)	2(7.7%)	26(100%)	0.041
Group 2 (internal osteotomy)	0 (0%)	5(19.2%)	9(34.6%)	8(30.8%)	4(15.4%)	26(100%)	
Group 1 (Standard)	3 (11.5%)	4(15.4%)	13 (50%)	4(15.4%)	2 (7.7%)	26(100%)	0.032
Group 3 (+steroid)	3 (11.5%)	5 (20%)	12(46.2%)	4(15.4%)	2 (7.7%)	3 (11.5%)	
Group 1 (Standard)	3 (11.5%)	4(15.4%)	13 (50%)	4(15.4%)	2 (7.7%)	26(100%)	0.028
Group 4 (no pack)	4 (15.4%)	3(11.5%)	17(65.4%)	2 (7.7%)	0 (0%)	26(100%)	

Regarding the edema was more in the second group with internal osteotomy in the first post operative day than with external osteotomy in the first group p-value = 0.075. Edema was less in third group patients which they received steroid than first group p-value = 0.071. Edema was less in those patients without nasal packing (fourth group) than those with nasal packing in the first group p-value = 0.059, and most of the patients had grade 1, 2 periorbital edema in the first post operative day, Table (2).

Table (2)A comparism of different grades of periorbital edema at day 1 post rhinoplasty.

First day periorbital edema	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Total	p-value
Group 1 (Standard)	1(3.8%)	10(38.5%)	10(38.5%)	4(15.4%)	1(3.8%)	26(100%)	0.075
Group 2 (internal osteotomy)	0 (0%)	8 (30.8%)	6 (23.1%)	10(38.5%)	2(7.7%)	26(100%)	
Group 1 (Standard)	1(3.8%)	10(38.5%)	10(38.5%)	4 (15.4%)	1(3.8%)	26(100%)	0.071
Group 3 (+steroid)	3(11.5%)	4 (15.4%)	9 (34.6%)	5 (19.2%)	5(19.2%)	26(100%)	
Group 1 (Standard)	1 (3.8%)	10(38.5%)	10(38.5%)	4 (15.4%)	1 (3.8%)	26(100%)	0.059
Group 4 (no pack)	4(15.4%)	10(38.5%)	9 (34.6%)	3 (11.5%)	0 (0%)	26(100%)	

On 7th postoperative day, there was less ecchymosis in the first group than the second group with internal osteotomy and ecchymosis was less in third and fourth groups in compare with the first group, and most of the patients had grade 2 periorbital ecchymosis, Table (3).

Table (3)A comparism of different grades of periorbital ecchymosis at day 7 post rhinoplasty.

Seventh day periorbital ecchymosis	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Total	p-value
Group 1 (Standard)	4(15.4%)	8(30.8%)	12(46.2%)	2 (7.7%)	0 (0%)	26(100%)	0.041
Group 2 (internal osteotomy)	3 (11.5%)	4 (15.4%)	12 (46.2%)	5(19.2%)	2(7.7%)	26(100%)	
Group 1 (Standard)	4 (15.4%)	8 (30.8%)	12 (46.2%)	2 (7.7%)	0 (0%)	26(100%)	0.032
Group 3 (+steroid)	6 (23.1%)	7 (26.9%)	11 (42.3%)	2 (7.7%)	0 (0%)	26(100%)	
Group 1 (Standard)	4 (15.4%)	8 (30.8%)	12 (46.2%)	2 (7.7%)	0 (0%)	26(100%)	0.025
Group 4 (no pack)	4 (15.4%)	8 (30.8%)	12 (46.2%)	2 (7.7%)	0 (0%)	26(100%)	

On day 7 postoperative edema was more in the second group with internal osteotomy than with external osteotomy in the first group p-value= 0.048, edema was less in third and fourth group patients in comparison with the first group, and most of the patients had grade 0 periorbital edema, Table (4).

Table (4)A comparism of different grades of periorbital edema at day 7 post rhinoplasty.

Seventh day periorbital edema	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Total	p-value
Group 1 (Standard)	16(61.5%)	8(30.8%)	2(7.7%)	0 (0%)	0 (0%)	26(100%)	0.048
Group 2 (internal osteotomy)	16(61.5%)	8(30.8%)	1(3.8%)	1(3.8%)	0 (0%)	26(100%)	
Group 1 (Standard)	16(61.5%)	8(30.8%)	2(7.7%)	0 (0%)	0 (0%)	26(100%)	0.034
Group 3 (+steroid)	19(73.1%)	6(23.1%)	1(3.8%)	0 (0%)	0 (0%)	26(100%)	
Group 1 (Standard)	16 (61.5%)	8 (30.8%)	2 (7.7%)	0 (0%)	0 (0%)	26(100%)	0.021
Group 4 (no pack)	20(76.9%)	5(19.2%)	1(3.8%)	0 (0%)	0 (0%)	26(100%)	

Discussion

In this study regarding the first and second visit, periorbital edema and ecchymosis were more in endonasal lateral osteotomy than external lateral osteotomy, with a significant p value. Hashemi et al. compared the severity of edema and ecchymosis in internal and external osteotomy and reported that on the first day after surgery, edema and ecchymosis was significantly lower in external osteotomy method, also, ecchymosis severity 7 days after the surgery has been lower in external osteotomy and the difference was significant¹⁷. Rohrich et al. demonstrate that external osteotomy causes less nasal mucosal damage with less edema and ecchymosis than internal osteotomy¹⁸. In Giacomarra et al. they report lower edema and ecchymosis with external osteotomy versus an internal approach¹⁹. In Yazdani et al. study a prospective double-blind randomized clinical trial, ²⁰ cases underwent internal and ²⁰ cases underwent external lateral osteotomies, edema, ecchymosis and mucosal

tears were less in external osteotomy than internal but the difference was not significant²⁰. There are less mucosal tear, mucosal damage and preservation of periosteum in external perforating osteotomy, this provides excellent control and reduction in intranasal complication and post-operative morbidity such as edema and ecchymosis^{6, 20}. In the current study regarding the first and second visits, periorbital edema and ecchymosis were less in patients received the dexamethasone injection. Sakalliglu et al. study, included 75 patients, divided into 3 equal groups, group 1 was control, in group 2 patients administered oral Tranexamic acid and group 3 patients were administered intravenous methylprednisolone at the beginning of surgery, they concluded that there was a statically significant decrease in periorbital edema and ecchymosis in both groups received steroid and tranexamic acid on 1st, 3rd, 7th post operative days⁵. In a concurrent study done by Erisir et al. which include 56 patients, 30 of the patients received 10 mg dexamethasone intravenously, there was

a statically significant decrease in edema and ecchymosis in the first two days after the operation⁷. Hatef et al. reported that the perioperative steroid use decreases postoperative edema and ecchymosis significantly in first and seventh postoperative day. Preoperative administration is superior to postoperative, and extended dosing is superior to singular⁸. Valente et al. included 42 patients, 20 patients received dexamethasone intravenously before operation and 22 patients did not receive it, edema and ecchymosis were significantly reduced in the patients that received dexamethasone at the day 7 postoperatively¹¹. Coroneos et al. analyses included 336 patients, support that perioperative systemic corticosteroid treatment in rhinoplasty reduces short-term edema and ecchymosis without increased intraoperative bleeding²¹. Youssef et al. performed a meta-analysis on the role of steroids in reducing postoperative edema in rhinoplasty, they concluded that perioperative steroid use significantly reduces postoperative eyelid edema on the first and third days but that the benefit dissipates after the third day²². Gurlek et al. studied the effects of different corticosteroids on edema and ecchymosis in open rhinoplasty, they divided 40 patients into five groups receiving betamethasone, dexamethasone, methylprednisolone, tenoxicam, or placebo, they infused the medications just before anesthesia and postoperatively for 3 days, no differences were noted between the different types of steroids and, furthermore, these doses did not achieve prevention or reduction in edema or ecchymosis after rhinoplasty with osteotomies²³. Regarding the periorbital ecchymosis and edema in first and second visits was more in patients with nasal packing. In Sriprakash et al. periorbital ecchymosis was more among the patients with nasal pack. On day one there was not statically different, but on day^{3, 5, 7} there was statically significant difference between the 2ed group¹. Al Arfaj et al. a prospective self-controlled single-blinded study, 74 patients who underwent rhinoplasty, nasal cavity packing was done from one side without packing the other side, no difference was observed between the packed and unpacked sides of the first post-operative day, significant difference was noted on the 4th and the 7th days after surgery in favor of the unpacked side²⁴.

Conclusions

In this study, many factors have been studied to decrease postoperative periorbital edema and ecchymosis. According to the results of this study; external osteotomy seems to have less morbidity, so it seems to be the preferable choice. There was a significant benefit from using dexamethasone injection intraoperatively and postoperatively. Nasal packing plays a significant role in edema and ecchymosis formation, therefore it should be used only when necessary.

References

1. Sriprakash V. Comparison of anterior nasal packing and absence of packing after rhinoplasty. *International Journal of Otorhinolaryngology and Head and Neck Surgery*. 2017;3(4):943-7.
2. Zojajy M, Alani N, Abdi-Soofi S, Akbari-Dilmaghani N. Does injection of Lidocine with 1/100000 Epinephrine Immediately before Lateral Osteotomy Reduce Post-Operative Periorbital Edema and Ecchymosis in Rhinoplasty? *Novel Biomed*. 2014;2(2):59-63.
3. Pulikkottil B, Dauwe P, Daniali L, Rohrich R. Corticosteroid Use in Cosmetic Plastic Surgery. *Plastic and Reconstructive Surgery*. 2013;132(3):352e-360e.
4. Kara CO, Kara IG, Yaylali V. Subconjunctival ecchymosis due to rhinoplasty. *Rhinology*. 2001;39(3):166-8.
5. Sakallioğlu Ö, Polat C, Soylu E, Düzer S, Orhan İ, Akyigit A. The Efficacy of Tranexamic Acid and Corticosteroid on Edema and Ecchymosis in Septorhinoplasty. *Annals of Plastic Surgery*. 2015;74(4):392-6.
6. Sinha V, Gupta D, More Y, Prajapati B, Kedia B, Singh S. External vs. internal osteotomy in rhinoplasty. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2007;59(1):9-12.
7. Erisir F, Öktem F, İnci E. Effects of Steroids on Edema and Ecchymosis in Rhinoplasty. *Turk Arch ORL*, 2001; 39(3): 171-5.
8. Hatef D, Ellsworth W, Allen J, Bullocks J, Hollier L, Stal S. Perioperative Steroids for Minimizing Edema and Ecchymosis After Rhinoplasty: A Meta-Analysis. *Aesthetic Surgery Journal*. 2011;31(6):48-657.
9. Tuncel U, Turan A, Bayraktar M, Erkorkmaz U, Kostakoglu N. Efficacy of dexamethasone with controlled hypotension on intraoperative bleeding, postoperative oedema and ecchymosis in rhinoplasty. *Journal of Cranio-Maxillofacial Surgery*. 2013;41(2):124-8.
10. Koc S, Gürbüzler L, Yaman H et al. The Effectiveness of Steroids for Edema, Ecchymosis, and Intraoperative Bleeding in Rhinoplasty. *American Journal of Rhinology & Allergy*. 2011;25(2):e95-e98.
11. Valente D, Steffen N, Carvalho L, Borille G, Zanella R, Padoin A. Pre-

- operative Use of Dexamethasone in Rhinoplasty. *JAMA Facial Plastic Surgery*. 2015;17(3):169-73.
12. Alajmi M, Al-Abdulhadi K, Al-noumas H, Kavitha G. Results of intravenous steroid injection on reduction of postoperative edema in rhinoplasty. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2009;61(4):266-9.
 13. Ozdel O, Kara C, Kara I, Sevinc D, Oguzhanoglu N, Topuz B. Does corticosteroid usage in rhinoplasty cause mood changes?. *Advances in Therapy*. 2006;23(5):809-16.
 14. Shadfar S, Deal A, Jarchow A, Yang H, Shockley W. Practice Patterns in the Perioperative Treatment of Patients Undergoing Septorhinoplasty. *JAMA Facial Plastic Surgery*. 2014;16(2):113-9.
 15. Cil Y. Loop Drainage Tube for Reduction of Edema and Ecchymosis After Rhinoplasty. *Aesthetic Plastic Surgery*. 2008;32(6):937-8.
 16. Gun R, Yorgancılar E, Yıldırım M, Bakır S, Topcu I, Akkus Z. Effects of lidocaine and adrenaline combination on postoperative edema and ecchymosis in rhinoplasty. *International Journal of Oral and Maxillofacial Surgery*. 2011;40(7):722-9.
 17. Hashemi H, Mokhtarinejad F, Omrani M. A comparison between external versus internal lateral osteotomy in rhinoplasty. *Journal of Research in Medical Sciences* 2005;1:10-5.
 18. Rohrich R, Janis J, Adams W, Krueger J. An Update on the Lateral Nasal Osteotomy in Rhinoplasty: An Anatomic Endoscopic Comparison of the External versus the Internal Approach. *Plastic and Reconstructive Surgery*. 2003;111(7):2461-2.
 19. Giacomarra V, Russolo M, Arnez Z, Tirelli G. External Osteotomy in Rhinoplasty. *The Laryngoscope*. 2001;111(3):433-8.
 20. Yazdani M, Bohluli B, Sarkarat F, Nowruzi A, Davoudmanesh Z. Evaluation of the effect of internal and external osteotomy on the amount of mucosal rupture. *J Craniomax Res*. 2017; 4(1):289-295.
 21. Coroneos C, Voineskos S, Cook D, Farrokyar F, Thoma A. Perioperative Corticosteroids Reduce Short-Term Edema and Ecchymosis in Rhinoplasty: A Meta-Analysis. *Aesthetic Surgery Journal*. 2016;36(2):136-46.
 22. Youssef T, Eliabary H, Amish K. Role of steroids in reducing postoperative edema in rhinoplasty: a meta-analytic study. *European Archives of Oto-Rhino-Laryngology*. 2012;270(4):1189-93.
 23. Gurlek A, Fariz A, Aydogan H, Ersoz-Ozturk A, Eren A. Effects of Different Corticosteroids on Edema and Ecchymosis in Open Rhinoplasty. *Aesthetic Plastic Surgery*. 2006;30(2):150-4.
 24. Al Arfaj A. The use of nasal packing post rhinoplasty: does it increase periorbital ecchymosis? A prospective study. *Journal of Otolaryngology - Head & Neck Surgery*. 2015;44(1):22.