

Results of intravenous steroid injection on reduction of postoperative edema in rhinoplasty

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Abstract

Objective To determine the efficacy of intravenous dexamethasone in reducing postrhinoplasty edema.

Design A prospective, randomized clinical trial with placebo control.

Setting Department of Otorhinolaryngology, Al-Sabah and Zain Hospital, Kuwait.

Subject Eighty-four patients (male = 28; female = 56) aged between 20 and 40 years, undergoing open rhinoplasty with hump removal and bilateral lateral osteotomies were enrolled in this study.

Intervention Patients were randomized to receive two doses of 10 mg of dexamethasone intravenously or placebo, first dose during surgery and second dose 12 hours after surgery.

Main outcome measures Patients were evaluated post-operatively at 24 hours, days 2, 5, 7 and 10 for periorbital edema.

Results 10 mg of dexamethasone given intravenously during rhinoplasty and a second dose 12 hours after surgery, reduced postoperative periorbital edema significantly.

Conclusion This study showed a statistically significant benefit of dexamethasone over placebo in reducing periorbital edema after rhinoplasty. No complications were attributed to the administration of dexamethasone.

Keywords Rhinoplasty · Dexamethasone · Lateral osteotomy · Edema

Introduction

Postoperative periorbital edema following rhinoplasty is quite distressing for the patients and can result in dissatisfaction for both the surgeon and the patient. In the standard rhinoplasty procedure, fractured nasal bones and osteotomies account for a notable proportion of this periorbital swelling and ecchymosis due to injury to the angular vessels crossing the osteotomy sites [1, 2]. A marked improvement in the usual postoperative appearance would occur if this edema could be decreased.

Administration of steroids to minimize or prevent edema is widely practiced in maxillofacial and plastic surgery [2]. Some experimental animal studies have demonstrated reduced edema in flap models or replants [3–5]. Nevertheless, few well-controlled studies have demonstrated the efficacy of steroid use in rhinoplasty.

Theoretically, the anti-inflammatory properties of glucocorticoid result in diminished vascular permeability, leading to less exudation and diminished edema [6]. In our study, dexamethasone was chosen since it has the highest anti-inflammatory activity and a biologic half-life of 36–54 hours, the longest available [6]. Given this information, we planned a randomized placebo-controlled study to determine the efficacy of dexamethasone in reducing periorbital edema following rhinoplasty.

Materials and methods

A total of 84 patients requiring open rhinoplasty with hump removal and lateral osteotomies were enrolled in this study. Patients having history of peptic ulcer, diabetes mellitus, psychiatric problems, coagulation disorder and allergy to steroids were excluded.

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Patients were randomized alternatively into study group and control group. The study group consisted of 44 patients who received 10 mg of intravenous dexamethasone intraoperatively and a second dose 12 hours after surgery. The control group of 40 patients received 5 ml of saline as placebo intravenously according to the same schedule as the study group. The patients were blinded to treatment allocation until the completion of the study.

Appropriate approval was procured from the Institutional Review Board and informed consent was obtained from all patients. The anesthetic protocol was standardized and did not include any other prophylactic anti-inflammatory drug. The operations were performed by the authors under general endotracheal anesthesia. In addition, 5 cc of 1% lidocaine with 1:100,000 epinephrine was infiltrated to the osteotomy sites.

The surgical technique was standardized for all patients by open rhinoplasty with dorsal hump removal and bilateral lateral osteotomies. Dexamethasone 10 mg or placebo of 5 ml of saline was given just before the osteotomy. Silastic sheets were routinely used to support the septum and nasal packing with merocel for 24 hours was routinely used

followed by placement of a splint to the outside of the nose. No attempt was made to control edema either during surgery or during the postoperative period with pressure, ice packs, etc. except for head elevation for all the patients.

All patients received similar postoperative care and all received antibiotics for 7 days and paracetamol tablets 1 g as analgesic whenever required. The second dose of dexamethasone or placebo was given in the ward 12 hours after surgery by the ward doctor. Nasal pack was removed the next morning following surgery. Assessment of edema was performed by the authors after 24 hours and on days 2, 5, 7 and 10 postoperatively. Absence of edema was graded as 0, edema of lower eyelid alone was graded 1, edema of lower and upper eyelids was graded 2 and edema all around the orbit spreading to face ± subconjunctival ecchymosis was graded 3. The nasal splint was removed routinely on 7th postoperative day. This was followed by application of steri strips to the nose for another 7 days which was subsequently removed. All patients were discharged on 2nd postoperative day and had a regular follow-up visit with the author on 5th, 7th, 10th days, and end of 2nd and 3rd week postoperatively.

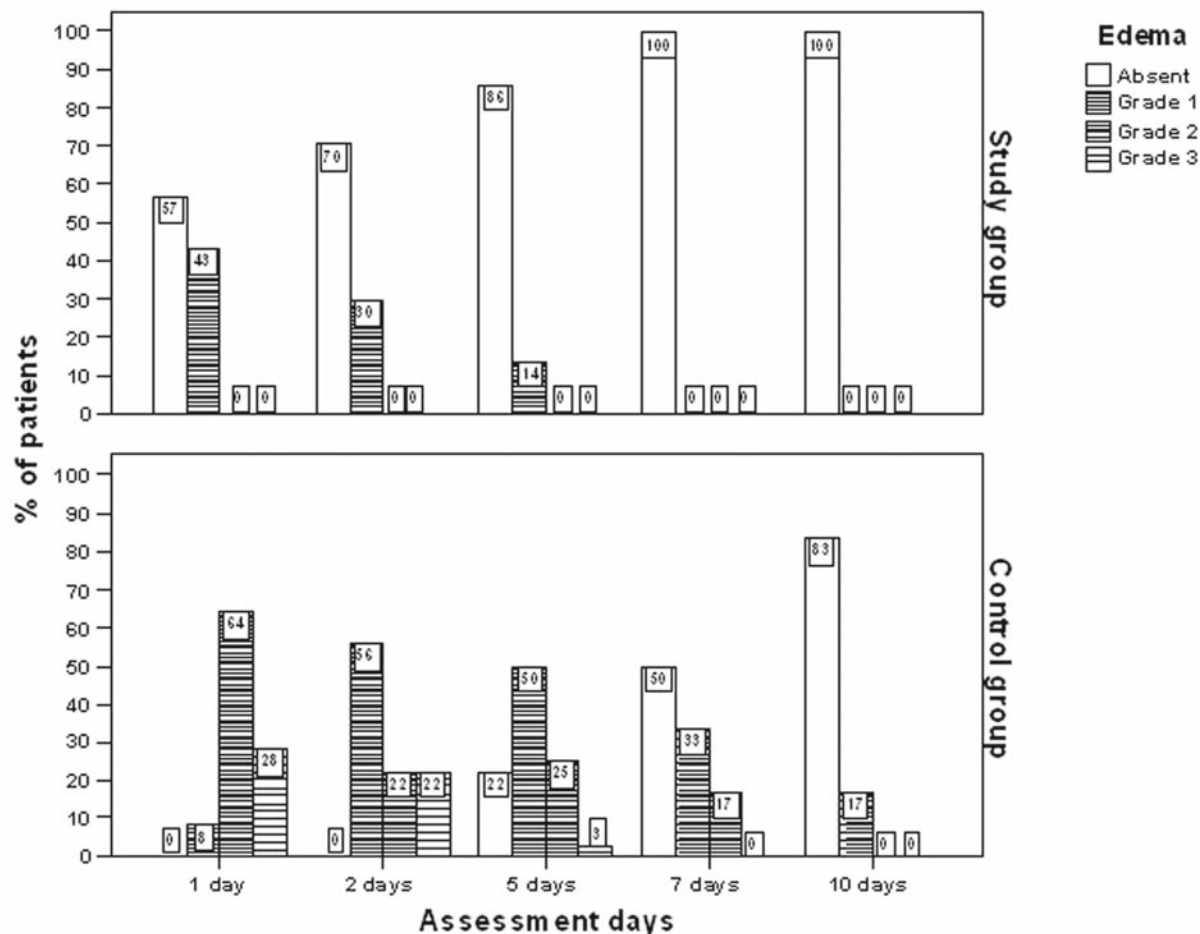


Fig. 1 Edema scores in steroid group and placebo group on postoperative assessment days

Statistical analysis was performed using STATA (SE 8.2, StataCorp, College Station, TX, USA). Five percent was used as the threshold for statistical significance. The Chi-square test or Fisher's Exact test were used to assess the association between two qualitative variables where ever appropriate. Student t-test was used to compare the difference in age of patients between the study group and the control group.

Results

There was no significant difference in gender between the study group and control group ($p = 0.886$). About two-thirds of patients in each group were females, 30 (68.2%) and 24 (66.7%) in study group and control group, respectively. Four patients in placebo group were latter excluded from this study as two of them had trauma to nose postoperatively and another two patients were lost follow-up.

The mean age of patients in the two groups was not significant (mean \pm SD = 28.1 \pm 5.7 in study group and mean \pm SD = 28.9 \pm 6.5 in control group, $p = 0.535$).

Figure 1 shows the presence of edema after 24 hours and on days 2, 5, 7 and 10 postoperatively according to the two groups of patients. There was very highly significant difference in the presence of different grades of edema in the study group and the control group in all assessment days ($p < 0.001$). The edema of lower eyelid alone (grade 1) was present in the study group after 24 hours and on days 2, 5 (43.2%, 29.5% and 13.6% of patients, respectively) and was completely absent from 7th postoperative day onwards in all patients in this group.

In the placebo group, none was free off edema after 24 hours postoperatively and 27.8% of patients had grade 3, 63.9% had grade 2 and 8.3% had grade 1 edema. On the 7th postoperative day, 33.3% in placebo group still had grade 1 and 16.7% had grade 2 edema in contrast to the steroid group where none had edema at this time. Moreover, 16.7% in placebo group, continued to have grade 1 edema on the 10th postoperative day.

None of the patients had any complications related to the use of dexamethasone.

Discussion

Postoperative edema is a universal occurrence following most of the plastic surgical procedures carried out on face. In the standard rhinoplasty, the osteotomies are responsible for a significant amount of periorbital swelling and ecchymosis due to the injury to angular vessels which cross the osteotomy sites and the trauma of fracturing the nasal bones [1, 2].

To overcome this problem, several steroid preparations have been administered at various doses, schedules and routes perioperatively. Corticosteroids reduce inflammation by inhibiting the early processes of the inflammatory response which include edema, fibrin deposition, capillary dilatation, migration of lymphocytes and phagocytic activity [7].

Steroid administration to prevent postoperative edema is been widely practiced in maxillofacial and plastic surgery [3]. Several clinical studies evaluated the use of steroids perioperatively in a variety of orthognathic and facial surgical procedures, but the results have been conflicting [8, 9].

Various corticosteroids have been used in previous studies but dexamethasone seems to be most suitable due to its highest anti-inflammatory effect with relatively early onset of action and a prolonged biological half-life of 36–54 hours, the longest available [7].

Moreover, short-term and low dose use of dexamethasone does not compromise patient safety since most of the unwanted effects of the use of steroids are related to its mineralocorticoid activity [10].

Griffies et al. [11] administered a single dose of 10 mg, intravenous dexamethasone to 31 patients in their double-blind study of rhinoplasty patients. They stated that preoperative administration of steroids may reduce intraoperative bleeding and they reported that edema and ecchymosis decreased by 24 hours postoperatively. In a study by Kara and Gokalan [2], the effect of single-dose dexamethasone on postoperative edema and ecchymosis, and intraoperative bleeding in rhinoplasty were investigated. There was a significant difference between the steroid and control groups in terms of decreasing edema during the first 2 days only. On the following days, single-dose steroid use lost its effect and it did not shorten recovery. Similarly, in a study by Erisir et al. [12]. The effects of steroids on edema and ecchymosis in rhinoplasty, a single dose of preoperative dexamethasone, significantly reduced postoperative edema and ecchymosis only on the initial 2 days and its use did not shorten the recovery. They noted some increased edema in the treatment group on the 2nd and 3rd day although still significantly lower than in placebo group. This increase in the edema might be due to inflammation, in which during the 1st postoperative day, the effect of single dose steroid decreases.

Hoffmann et al. [13] used dexamethasone intraoperatively and gave additional tapering doses for 5 days. They reported that swelling and ecchymosis were reduced for up to 7 days after rhinoplasty. Moreover they did not report swelling increment on the 2nd day because they continued steroid use for 5 days and the inflammatory response might be overcome and the increment of edema on the 2nd day would not appear. Kargi et al. [14] designed different administration patterns of dexamethasone to assess

the effect of steroids after rhinoplasty and concluded that triple dose administration of steroids effectively decreased edema and ecchymosis during the first 5–7 days and also established that steroid administration before osteotomy reduced edema and ecchymosis significantly. The findings of Hoffmann et al. and Kargi et al. are comparable with our study. In our study, double dose of dexamethasone, the first dose being just before osteotomy and the second dose 12 hours after surgery, was sufficient enough to significantly reduce postoperative edema during the first 1 week and has promoted early recovery of the patients by the end of 1st week. In this study, the degree of edema was assessed only by authors, without blinding. Therefore, some degree of bias is expected. This could be a minor limitation of this study. But while assessing the edema, the authors were strict in grading the edema.

Conclusion

In a cosmetic surgery like rhinoplasty, where a smooth and non-depressive postoperative period is expected, dexamethasone has significantly improved the postoperative appearance of patients by decreasing the edema. Single dose of dexamethasone lost its effect after the initial 2 days. In our study, double dose administration has significantly decreased edema during the first postoperative week and enhanced early recovery of the patients. More over, this dose of steroids was very safe and no patient developed complication with this short-term dose of dexamethasone.

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