

Comparison of Intraoperative Efficacy of Preoperative Single-Dose Corticosteroid Over Short Course in Functional Endoscopic Sinus Surgery for Nasal Polyposis

Abstract

Background: Patients having nasal polyposis who do not respond to medical management are subjected for functional endoscopic sinus surgery (FESS). One of the most common complications of surgery is bleeding. One of the strategies to reduce bleeding and securing a dry operating field during surgery is the use of preoperative corticosteroids which shrink the polyps and decrease mucosal inflammation. **Aim:** The current study is designed to assess whether preoperative single-dose steroids 24 h before surgery can be a substitute for a 5-day regimen. **Methods:** The proposed study was conducted on 60 patients of unilateral/bilateral nasal polyposis divided into two random groups. Group A was given a single oral dose of 1 mg/kg/dose of prednisolone on the day before surgery. Group B was given 1 mg/kg/day of oral prednisolone for 5 days before surgery. Side effects of steroids in both groups were assessed. Outcome measures were the amount of blood loss, quality of the surgical field, and time taken for the surgery. **Results:** The mean age in both groups was similar with the majority of patients being male in both groups. Patients receiving a single dose of corticosteroid have almost no side effects as compared to patients receiving 5-day course. However, patients receiving single doses of corticosteroid preoperatively had significantly more blood loss during surgery. The surgical field in the single dose group was poor and the time taken for surgery was also significantly more. **Conclusion:** Preoperative single dose of oral corticosteroid can reduce side effects but it is not as effective as short course of preoperative corticosteroid 5-day regimen in case of FESS for nasal polyposis.

Keywords: Bleeding, corticosteroid, functional endoscopic sinus surgery, nasal polyposis

Introduction

Nasal polyposis is a multifactorial, chronic inflammatory disease of sinonasal mucosa which may be preceded by chronic rhinosinusitis that includes inflammation in paranasal sinuses too leading to the projection of benign edematous masses from the meatus to the nasal cavity.^[1] Diagnosis is based on history, clinical presentation, nasal endoscopy, and computed tomography (CT) findings.

CT scan is the gold standard investigation in all preoperative cases.^[2] Approximately 31.5% of cases of nasal polyposis fail to respond to medical management, therefore, patients are subjected to functional endoscopic sinus surgery (FESS).^[3] One of the most common complications associated with FESS is bleeding as sinonasal mucosa is highly vascular. In the narrow spaces of

the nose, the presence of only a few drops of blood is enough to limit the visual field. This poor visualization of the surgical field due to bleeding and the size of nasal polyps increases the risk of complications such as damage to orbit, optic nerve, unintended penetration of middle cranial fossa, or even damage to the internal carotid artery.^[4]

One of the strategies to reduce bleeding and securing a dry operating field during surgery is the use of preoperative corticosteroids which shrink the polyps and decrease mucosal inflammation.^[5] In contrast to nasal topical steroids, systemic steroids can reach all parts of the nose and sinuses so can decrease bleeding better than topical steroids. Steroids help by decreasing the number of inflammatory reaction mediators such as cytokines, chemokines, adhesion molecules such as ICAM-1 and E-selectin, interleukin-5, and eosinophils in the nasal and sinus mucosa, limit tissue transudates and edema as well as

**Sahil Maingi,
Ankur Sharma¹**

Department of ENT, Dayanand Medical College and Hospital, Ludhiana, Punjab, ¹Department of ENT, Indira Gandhi Hospital, Delhi, India

Submitted: 10-Sep-2024

Revised: 16-Jan-2025

Accepted: 20-Jan-2025

Published: 07-Apr-2025

Address for correspondence:

Dr. Sahil Maingi,
Department of ENT, Dayanand Medical College and Hospital, Civil Lines, Tagore Nagar, Ludhiana - 141 001, Punjab, India.

E-mail: sahil201191@gmail.com

Access this article online

Website:

<https://journals.ww.com/IJAB>

DOI:

10.4103/ijabmr.ijabmr_431_24

Quick Response Code:



How to cite this article: Maingi S, Sharma A. Comparison of intraoperative efficacy of preoperative single-dose corticosteroid over short course in functional endoscopic sinus surgery for nasal polyposis. Int J App Basic Med Res 2025;15:104-8.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

inflammatory congestion.^[6] They also increase the spastic reactivity of smooth muscles and heighten the effects of endogenous adrenaline and noradrenaline by affecting the vascular constriction in the microcirculation and can lessen the capillary bleeding that is the main component of operative bleeding in FESS.^[7]

However, in the case of tissue with inflammatory changes, all these measures may not guarantee less bleeding and good visibility in the operative area. In fact, reducing the blood pressure with inhalant anesthetics to the level of 70 mmHg may cause deconstruction of the peripheral blood vessels, instinctive tachycardia, and an increase of bleeding in consequences. Moreover, risk of severe complications of internal organ ischemia may occur.^[7] In such a situation, preoperative systemic steroids may be considered.

The main concerns associated with the use of long- or short-term systemic steroids are their adverse effects. Long-term corticosteroid use may lead to “Iatrogenic Cushing’s Syndrome.” Other serious adverse effects with short course include peptic ulcers, hypomania acute psychosis, sodium and fluid retention, loss of potassium, glucose intolerance, hypertension, adrenal suppression, gastrointestinal bleeding, glaucoma, and osteoporosis.^[8]

Accordingly, the current study was designed to assess the effect of preoperative single-dose steroid (1 mg/kg 24 h before surgery) in comparison to 5-day regimen (1 mg/kg/day) in FESS. The outcome measures studied were – lost blood volume, quality of surgical field, and time taken for FESS.

Methods

The proposed study was conducted on 60 patients of unilateral/bilateral nasal polyposis in the Department of Otorhinolaryngology. The formula for sample size calculation for comparison between two groups when the endpoint is quantitative data was used.^[9] The sample size was calculated using the results of the study done by Atighechi *et al.*, where the standard deviation for group 1 was 96.31 and for group 2 was 52.81. The pooled standard deviation was 83. The sample size by putting all these values came out to be 30 in each group.^[10]

Cases with unilateral or bilateral nasal polyposis were included in the study. Exclusion criteria were previous sinus surgery, antrochoanal polyp or severe deviated nasal septum, systemic steroids use within 2 months before surgery, uncontrolled diabetes mellitus, and hypertension.

Written consent to participate in the study was taken from all patients. The patients included in the study were drawn from the OPD services department of ENT. All patients who were included were given medical treatment for 2–3 months before inclusion into the study. Medical management included intranasal corticosteroids, nasal saline irrigation, and oral antihistamines. Those patients

who did not respond to medical management were included in the study.

Clinical assessment was done by nasal endoscopy grading system proposed by Vendelo Johansen *et al.*, 1993.^[11] After nasal endoscopic assessment and staging, only those cases of nasal polyposis [Figure 1] meeting endoscopic criteria of grades 2 and 3 were considered for surgery. Further, noncontrast CT of the nose and paranasal sinuses [Figure 2] with coronal, axial, and sagittal cuts of 3-mm thickness having bone window images and radiological staging of the polyps was conducted as per Lund Mackay score.^[12] To achieve near-identical disease involvement between two groups, only cases having partial-to-total opacification of all sinuses were included in the study. They were again reassessed and further planned for FESS. Informed consent was taken from the patients and preanaesthetic checkup was done and posted for surgery. Patients were randomized into Group A (single oral dose of 1 mg/kg on the day before surgery) and Group B (1 mg/kg/day oral prednisolone for 5 days before surgery) of 30 patients each.

Various complications of steroid therapy of both groups such as hypertension, high blood glucose level, euphoria, stomach irritation, and sleeplessness were recorded. In our study, all the patients were operated under general anesthesia following the same protocol. Mean arterial blood pressure was kept around 70–80 mm of Hg in both groups.

Surgical procedure

All patients were taken up in general anesthesia, positioned in reverse Trendelenburg position. Although Messerklinger technique (anterior to posterior approach) was used in all patients,^[13] the extent of surgery performed, the number of sinuses opened, and inflamed diseased mucosa and bony partitions removed depend on the amount of disease identified on preoperative evaluation by nasal endoscopy and CT scan. It is, therefore, not a “one size fits all” operation; but a procedure that is tailored to each patient’s set of findings from history, endoscopy, and radiological

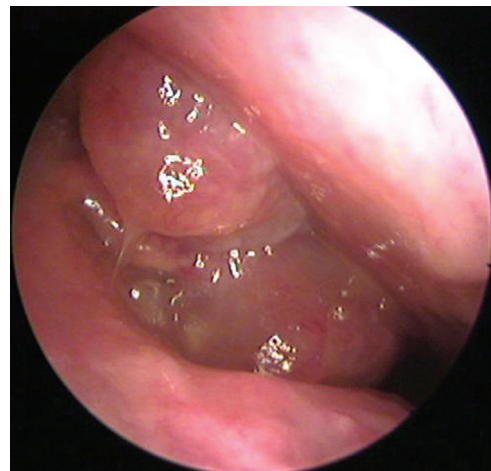


Figure 1: Nasal polyps on nasal endoscopy

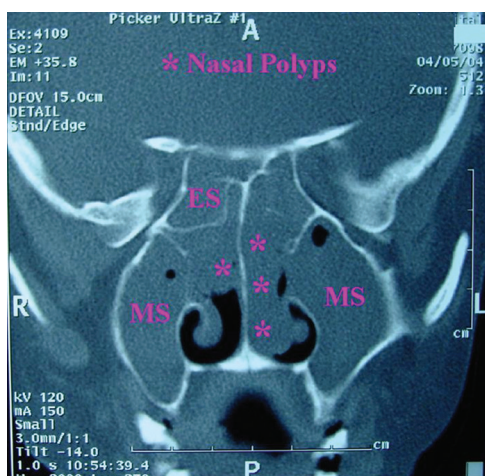


Figure 2: The computed tomography scan shows bilateral polyps “*” and opacified maxillary sinus “MS” and an opacified anterior and posterior ethmoid sinus “ES”

evaluation. Optimally surgery removes diseased bone and mucosa in critical areas. All the ostium was examined carefully. Hemostasis was achieved and nasal packing was done in the middle meatus to keep the middle turbinate medialized and removed after 48 h. The same surgeon operated on all the patients and was not aware of the patient's group.

The objective assessment of bleeding volume was done by measuring the total volume in the suction jar as-Bleeding volume = total volume – (irrigation volume in suction jar + excess weight of pharyngeal pack). The surgeon estimated the quality of the surgical field in the operative area according to the 6-point scale of Fromme *et al.* as – 0 = No bleeding; 1 = slight bleeding, no suctioning required; 2 = slight bleeding, occasional suctioning required; 3 = slight bleeding, frequent suctioning required, bleeding threatens surgical field several seconds after suction is removed; 4 = moderate bleeding, frequent suctioning required, bleeding threatens surgical field directly after suction is removed; 5 = severe bleeding, constant suctioning required, bleeding appears faster than can be removed by suction, the surgical field is severely threatened and surgery is usually not possible. Time taken during surgery was noted from the removal of the nasal pack used for decongestion till the application of the merocele pack at the end of surgery.

Results

The patients in both groups range from 19 years to age >50 years. The mean age in both the groups was almost similar, with Group A mean of 38.6 and Group B of 37. The difference in age group was not significant between the two groups. The majority of patients in both the groups were males that is 21 out of 30 in Group A (70%) and 17 out of 30 in Group B (56.67%). Hence, there were 36.67% females and 63.33% males in our study.

In both the groups, bilaterality of disease was predominant. In Group A, 6 (20%) had unilateral disease and 24 (80%) had bilateral disease. In Group B, 4 (13.33%) had unilateral disease and 26 (86.67%) had bilateral disease. Thus, 16.67% had unilateral disease and 83.33% had bilateral disease in our study.

The mean for clinical staging in Group A for the right side was 2.26 and for the left side was 2.16. The mean for clinical staging in Group B for the right side was 2.33 and for the left side was 2.33. The difference in clinical staging was not significant between the two groups. The mean for Lund Mackay's score in Group A was 14.50 ± 4.90 . The mean for Lund Mackay's score in Group B was 15.03 ± 4.41 . The difference in Lund Mackay score was not significant between the two groups.

Many side effects of oral steroid therapy such as peptic ulcers, hypomania, acute psychosis, sodium and fluid retention, loss of potassium, glucose intolerance, hypertension, adrenal suppression, gastrointestinal bleeding, glaucoma, and osteoporosis were recorded. These side effects were significantly less in Group A receiving single-day steroids than Group B having patients of 5-day course of steroid.

The blood loss ranged from 125 to 725 mL in Group A with a mean blood loss of 305.33 mL. The mean blood loss in Group B was 106.67. This difference was statistically significant ($P = 0.0001$) [Table 1]. Mean blood loss in unilateral cases was 145.7 mL and in bilateral cases was 212.12.

The mean value and median for surgical field score in Group A were 2.7 and 3, respectively. The mean value and median for surgical field score in Group B were 1.93 and 2, respectively. Hence, surgical field was better in patients receiving 5-day course of steroids and this difference was statistically significant ($P = 0.0001$) [Table 1]. The mean for the surgical field in unilateral cases was 1.9 and in bilateral cases was 2.4, so the surgical field was significantly better in unilateral cases.

The mean value for time taken during surgery for Group B was 118.03 min which was significantly less as compared to Group A with a mean value of 142.47 min ($P = 0.0003$) [Table 1]. The mean time taken in surgery for unilateral cases was 124 min and in bilateral cases was 131.5 min.

Discussion

A total of 60 subjects were studied and operated under general anesthesia in our study. All patients were diagnosed through nasal endoscopy and CT scan as cases of unilateral/bilateral nasal polyposis. All subjects were divided into two groups of 30 each, with one group receiving a single preoperative corticosteroid at 1 mg/kg/dose and the other receiving 5-day steroid and compared. Nasal polyposis was

Table 1: Comparison of outcome measures in both groups

Parameter	Group A	Group B	P
Blood loss (mL)			
Mean±SD	305.33±141.22	106.67±47.7	0.0001
Minimum–maximum	125–725	40–220	
Field score			
Mean±SD	2.7±0.7	1.93±0.64	0.0001
Median	3	2	
Minimum–maximum	2–4	1–3	
Time (min)			
Mean±SD	142.47±21.99	118.03±19.96	0.00003
Minimum–maximum	106–184	80–154	

SD: Standard deviation

common in males than females. Bilateral nasal polypsis was more common than unilateral disease. Parameters that were studied show that net blood loss was more in patients receiving single preoperative corticosteroid. Surgical field was poorer in patients receiving single preoperative corticosteroids. Time taken in surgery was more in patients receiving single preoperative corticosteroid.

Bleeding during FESS presents a very important problem. Not only does it prolong the time of the procedure, but it limits the possibility of precise, atraumatic removal of the lesion, and prevents the creation of appropriate conditions for healing and normalization of the function of sinonasal mucosa. The risk of severe complications is also increased.

Fromme *et al.* in their study to assess the role of hypotensive anesthesia in reducing bleeding and improving surgical field found no significant differences between the 3 groups they selected.^[14] A study conducted by Atighechi *et al.* concluded that treatment with a 5-day prednisolone (1 mg/kg/day) as compared to single dose (1 mg/kg/day) can reduce blood loss during FESS more efficiently, but may not improve surgery field quality significantly.^[10] In our study also, 5-day regimen reduced blood loss more efficiently. Similarly, Sieskiewicz *et al.* concluded that steroids 5 days before surgery significantly improved the visibility of the operative field and shortened the time of the procedure, although it did not significantly influence the bleeding intensity during the surgery.^[7] Our study's result for the surgical field and time taken during surgery support the above study's result but there was a significant reduction in blood loss also in 5-day group patients in our study. This may be due to the appropriate dose of steroids used in our study compared to the above study, as 30 mg seems to be a low dose for an adult patient.

In another study by Giordano *et al.*, the effect of oral corticosteroids on bleeding volume and the surgeon's evaluation were investigated.^[15] In the study, 21 patients were treated by oral prednisolone (1 mg/kg for 7 days before surgery) and 19 with a placebo. The study did not record any significant difference between the two groups

in terms of bleeding volume, but in our study, there is a significant difference between the two groups.

Kirtsreesakul *et al.* evaluated the clinical efficacy of a short course of systemic steroids in nasal polyposis. The patients were divided into two groups – the first group of patients treated with oral prednisolone (30 mg/day) and the second group with a placebo.^[16] The results showed a reduction in bleeding volume to a small extent in the test group, with a significant improvement in the surgery field, but in our study, there is a significant difference in both blood loss and surgical field.

Another study by Pundir *et al.*^[17] reported that preoperative use of local or systemic corticosteroid in FESS results in significantly reduced blood loss, shorter operative time, and improved surgical field quality, and our study's result also supports the same result.

Conclusion

It can be concluded that for corticosteroids to have optimum anti-inflammatory effect, minimum of 4–5 days short course of corticosteroid should be given preoperatively. Although the side effects of steroids are significantly decreased, preoperative single dose of oral corticosteroid is not as effective as a short course of preoperative corticosteroid regimen on the outcome of surgical field and blood loss during FESS for nasal polyposis.

Ethical clearance

Ethical approval was given by the institutional ethical committee of Dr. RML Hospital, New Delhi, for the study. Written consent to participate in the study was taken from all patients.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Settipane GA. Epidemiology of nasal polyps. *Allergy Asthma Proc* 1996;17:231-6.
- Hähnel S, Ertl-Wagner B, Tasman AJ, Forsting M, Jansen O. Relative value of MR imaging as compared with CT in the diagnosis of inflammatory paranasal sinus disease. *Radiology* 1999;210:171-6.
- Norès JM, Avan P, Bonfils P. Medical management of nasal polyposis: A study in a series of 152 consecutive patients. *Rhinology* 2003;41:97-102.
- Jacob SM, Chandy TT, Cherian VT. Oral bisoprolol improves surgical field during functional endoscopic sinus surgery. *J Anaesthesiol Clin Pharmacol* 2014;30:59-64.
- Fokkens W, Lund V, Mullol J, European Position Paper on Rhinosinusitis and Nasal Polyps Group. European position paper on rhinosinusitis and nasal polyps 2007. *Rhinol Suppl* 2007;20:1-136.

6. Fernandes AM, Valera FC, Anselmo-Lima WT. Mechanism of action of glucocorticoids in nasal polyposis. *Braz J Otorhinolaryngol* 2008;74:279-83.
7. Sieskiewicz A, Olszewska E, Rogowski M, Grycz E. Preoperative corticosteroid oral therapy and intraoperative bleeding during functional endoscopic sinus surgery in patients with severe nasal polyposis: A preliminary investigation. *Ann Otol Rhinol Laryngol* 2008;115:490-4.
8. Chrousos G, Margioris A. Adrenocorticosteroids and adrenocortical antagonists. In: Katzung Basic and Clinical Pharmacology. 8th ed. New York: McGraw-Hill; 2001. p. 660-78.
9. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med* 2013;35:121-6.
10. Atighechi S, Azimi MR, Mirvakili SA, Baradaranfar MH, Dadgarnia MH. Evaluation of intraoperative bleeding during an endoscopic surgery of nasal polyposis after a pre-operative single dose versus a 5-day course of corticosteroid. *Eur Arch Otorhinolaryngol* 2013;270:2451-4.
11. Vendelo Johansen L, Illum P, Kristensen S, Winther L, Vang Petersen S, Synnerstad B. The effect of budesonide (Rhinocort) in the treatment of small and medium-sized nasal polyps. *Clin Otolaryngol Allied Sci* 1993;18:524-7.
12. Lund VJ, Mackay IS. Staging in rhinosinusitis. *Rhinology* 1993;31:183-4.
13. Kennedy DW. Functional endoscopic sinus surgery. Technique. *Arch Otolaryngol* 1985;111:643-9.
14. Fromme GA, MacKenzie RA, Gould AB Jr., Lund BA, Offord KP. Controlled hypotension for orthognathic surgery. *Anesth Analg* 1986;65:683-6.
15. Giordano J, Darras J, Chevalier D, Mortuaire G. Preoperative corticosteroid treatment and nasal polyposis. *Ann Otolaryngol Chir Cervicofac* 2009;126:120-4.
16. Kirtsreesakul V, Wongsritrang K, Ruttanaphol S. Clinical efficacy of a short course of systemic steroids in nasal polyposis. *Rhinology* 2011;49:525-32.
17. Pundir V, Pundir J, Lancaster G, Baer S, Kirkland P, Cornet M, *et al.* Role of corticosteroids in functional endoscopic sinus surgery – A systematic review and meta-analysis. *Rhinology* 2016;54:3-19.