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Dr. Parvathy PK
PG Resident, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Dr. Beni Prasad
Professor & Head, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Dr. Rakesh Saboo
Professor, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Dr. Jerin Jose Thomas
Assistant Professor, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Dr. Nitin Khari
PG Resident, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Corresponding Author:
Dr. Nitin Khari
PG Resident, Department of Otorhinolaryngology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India

Effect of preoperative systemic corticosteroids on intraoperative bleeding during sinonasal polyposis surgery

Dr. Parvathy PK, Dr. Beni Prasad, Dr. Rakesh Saboo, Dr. Jerin Jose Thomas and Dr. Nitin Khari

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Abstract
This prospective study was done to evaluate the effect of preoperative systemic corticosteroids on intraoperative bleeding during sinonasal polyposis surgery.
Materials and Methods: A Total of 70 patients with age between 10-60 years were studied from the in-patient department. All the cases meeting the inclusion and exclusion criteria underwent Diagnostic Nasal endoscopy, CT scan and were divided into 2 groups of 35 each. Group A (35) received oral prednisolone 1mg/kg/day for 5 days prior to surgery and Group B (35) severed as control. The patients were operated under general anaesthesia, the bleeding volume and surgical field visibility was recorded. Postoperatively patients were followed up once weekly for 4 weeks.
Results: Better surgical field conditions were the results of the powerful anti-inflammatory and antiedematous activity of the drug, which facilitated blood and secretion evacuation from the operated area providing a better surgical field visibility.
Conclusion: In conclusion pre-operative administration of oral steroids reduces intra-operative bleeding and early post-operative complications.

Keywords: sinonasal polyposis, corticosteroids, endoscopic sinus surgery, intraoperative bleeding

Introduction

Polyp is the inflammation of the nose and paranasal sinuses associated with two or more symptoms, one of which should be nasal blockage/obstruction/congestion or nasal discharge

- +/− facial pain/pressure
- reduction or loss of smell and either
- endoscopic evidence of
- polyps and/or
- mucopurulent discharge from the middle meatus or oedema, mucosal obstruction primarily in the middle meatus and/or
- CT changes:
- mucosal changes within the osteomeatal complex and/or sinuses[1]

There are two types of polyps: Ethmoidal and Antrochoanal

1) Ethmoidal polyps are more common, emerge from the ethmoid sinus and are bilateral. Ethmoidal polyps are mostly associated with allergic diseases
2) Antrochoanal polyps arise from the maxillary sinus via the middle meatus and are unilateral.

Role of systemic steroids on nasal polyps involves

1) The down regulation of inflammatory protein encoding genes by the activation of intracellular glucocorticoid receptors.[2]
2) Steroids inhibit the damage to the blood vessels, transudation formation and tissue edema by the decrease of mediators of the inflammatory process in the nose and sinusmucosa [3]

3) Increase the spastic reactivity of the smooth muscles and heighten the effects of endogenous adrenaline and noradrenaline by affecting the vascular constriction in the microcirculation which reduces capillary bleeding [4]

Material and Methods

We conducted a prospective interventional randomised trial among 70 patients of Sinonasal Polyps planned for Functional endoscopic sinus surgery, who attended Otorhinolaryngology department of National Institute of Medical Sciences and Research, Jaipur in the period between January 2020 and June 2021. Written informed consent was obtained from each study participant. In case of adolescent subjects (between 12-18 yrs) consent was provided by legal guardian. All the recruited patients, after detailed history, general examination and ENT examination had Nasal Endoscopy and CT scans done.

Inclusion criteria: All patients attending OPD of otorhinolaryngology at NIMS Medical college and hospital with sinonasal polyposis planned for surgery.

Exclusion criteria

1. Nasal mass other than sino-nasal polyposis (e.g. fungal polyposis, papilloma, malignancy, rhinosporidiosis).
2. Patients of sino-nasal polyposis with diabetes, hypertension, renal failure, gastric ulcer, history of tuberculosis and history of cerebral stroke
3. Patients with previous h/o nasal surgery.
4. Patients not willing to take part in the study.

Procedure methodology

Pre-operative DNE was done using 0˚ rigid endoscope and findings were evaluated as per Lund-Kennedy Scoring System [5].

DNE was done before giving oral steroids.

CT scans were carried out using 3mm thickness in axial, coronal planes with saggital reconstruction. The results were evaluated as per Lund-Mackay Scoring System [5].

The selected patients were divided into two groups containing equal number of patients. The patients are allocated randomly in the two groups. All the patients having intranasal steroids pre-operatively were advised to stop their medication 4 weeks prior to surgery.

i. Group A- Patients received oral prednisolone 1mg/kg/day for a period of 5 days prior to the surgery.
ii. Group B- Patients received no oral steroids.

Intraoperative

- All the operations were done in General Anaesthesia. Nasal packing done with 4% lignocaine.The lateral wall of the nose was infiltrated with 2% lignocaine with adrenaline (1:200,000) solution.
- Procedures like uncinectomy, maxillary antrostomy, anterior ethmoidectomy, posterior ethmoidectomy, sphenoidotomy were done in the cases whenever needed. Intra operative bleeding was evaluated using Boezaart-Vandermerwe Grading System [6].

Grade	Assessment
0	No bleeding (cadaveric conditions)
1	Slight bleeding - no suctioning required
2	Slight bleeding - occasional suctioning required
3	Slight bleeding - frequent suctioning required; bleeding threatens surgical field a few seconds after suction is removed
4	Moderate bleeding - frequent suctioning required and bleeding threatens surgical field directly after suction is removed
5	Severe bleeding - constant suctioning required; bleeding appears faster than can be removed by suction; surgical field severely

Fig 1: Boezaart-Vandermerwe Grading System

Postoperative

- Patients were discharged after 2 days following removal of the nasal packs. Post-operative saline nasal douching was advised in all the patients.

The research was approved by the Training and Ethics Committee of our institution. All patients were informed about the research and filled out an informed consent form before the surgical intervention.

Result

Table 1 shows, among 70 patients, 45 patients (64.29%) were male. Rest 25 patients (35.71%) were female. Male: Female = 2: 1. Maximum 27 patients (38.57%) were seen in 31-40 years of age group.

Table 1: Age wise sex distribution

Age distribution	Male		Female	
	No.	%	No.	%
11-20 years	4	8.7	3	12
21-30 years	12	26.09	6	24
31-40 years	15	32.61	12	48
41-50 years	12	28.26	1	4
51-60 years	2	4.35	3	12
Total	45	100	25	100

Table 2 shows Nasal endoscopic findings (Lund and Kennedy) of all 70 patients, Maximum patients had nasal polyp beyond middle meatus (62.85%) discharge was mild (48.57%) and edema was absent in 85.71%

Table 2: Diagnostic Nasal Endoscopy (Lund and Kennedy)

Nasal Endoscopy	Extent	Edema	Discharge
0	0(0%)	60(85.71%)	29(41.43%)
1	26(37.14%)	10(14.29%)	34(48.57%)
2	44(62.85%)	0(0%)	7(10%)
Total	70(100%)	70(100%)	70(100%)

Table 3 shows involvement of paranasal sinuses on NCCT (Lund and Mackay scoring), In all patients bilateral involvement was seen. OMC was blocked in 69 cases (98.57%), maxillary antrum in 64 cases (91.4%). Sphenoid involvement was seen only in 1 case (1.43%).

Table 3: Involvement of paranasal sinuses on NCCT (Lund and Mackay)

CT Scan Right and Left						
	MA	OMC	AE	PE	FS	SS
No inflammation (0)	6(8.57%)	1(1.43%)	28(40%)	50(71.43%)	65(92.86%)	69(98.57%)
Partial inflammation (1)	3(4.29%)	0(0%)	8(11.43%)	2(2.86%)	3(4.29%)	0(0%)
Complete inflammation (2)	61(87.14%)	69(98.57%)	34(48.5%)	18(25.71%)	2(2.86%)	1(1.43%)
Total	70(100%)	70(100%)	70(100%)	70(100%)	70(100%)	70(100%)

Table 4 shows age distribution in steroid and non steroid group, both groups are almost similar.

Table 4: Age Distribution in steroid and non steroid group

Age distribution	Steroid	Non-Steroid
11-20 years	3(8.57%)	4(11.43%)
21-30 years	12(34.29%)	6(17.14%)
31-40 years	12(34.28%)	15(42.86%)
41-50 years	7(20%)	6(17.14%)
51-60 years	1(2.86%)	4(11.43%)
Total	35(100%)	35(100%)

Table 5 shows the intraoperative bleeding and surgical field quality in both steroid and non steroid group. Intraoperative bleed was less in steroid group and surgical field quality was better in steroid group.

Table 5: Intraoperative bleeding and surgical field quality in steroid and non steroid group

Intraoperative bleeding	Steroid Group	Non steroid Group
Grade 1	4(11.43%)	0(0%)
Grade 2	20(57.14%)	12(34.29%)
Grade 3	9(25.71%)	14(40%)
Grade 4	2(5.71%)	9(25.71%)
Total	35(100%)	35(100%)

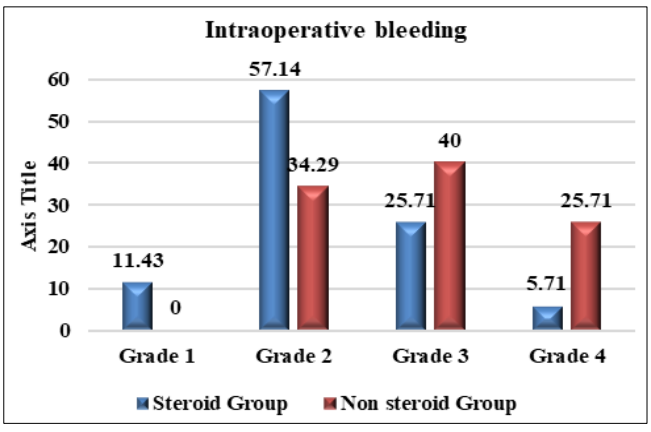

Fig 2: Intraoperative bleeding and surgical field quality

Discussion

In the present study the age limit of the patients was from 10 years to 60 years. Maximum patients (27 patients, 38.57%) were found in 3rd decade. Least incidence (5 patients, 7.14%) was seen in 5th decade. In a study done by Settipane *et al*. (1996) [7], it is found that nasal polyps predominantly affect adults and usually present in patients older than 20So this finding correlates with my study. In other study done by Larsen *et al*. (2002) [8]; among 252 patients they found nasal polyps affecting mostly 40-60 years of age group.

Among the 70 patients, 45 patients (64.29%) were male; rest 25 patients (35.71%) were female. Male: Female ratio was 1.8: 1. Settipane *et al*. (1996) [7] and. Larsen *et al*. (2002) [8] also found that the disease is more prevalent among males.

Radiological study of the 70 patients was done by non-contrast CT scan of the nose and paranasal sinuses. 3mm axial, coronal and saggital cut was done. Extent of the involvement of the disease was evaluated by Lund- Mackay Scoring [5]. According to the finding of my study, osteomeatal complex was most commonly involved in the patients presenting with sino-nasal polyps, followed by maxillary antrum and anterior ethmoid. According to Hamilos DL *et al*. (2000) [9] the most commonly involved sinuses in both acute and chronic sinusitis are the maxillary and the anterior ethmoid sinuses. AC Jyothi *et al*. (2014) [10] The most common site of involvement was osteomeatal complex followed by maxillary antrum. G L Fadda *et al*. (2012) [11]; The maxillary sinus was most commonly involved, followed by the anterior ethmoid, frontal sinus, posterior ethmoid and sphenoid sinus.

In the steroid group, 20 patients (57.14%) had grade 2 bleeding. 9 patients (25.71%) had grade 3 bleeding. Only 2 patients (5.71%) had grade 4 bleeding which was very difficult to control. In the control group 14 patients (40%) had grade 3 bleeding. 9 patients (25.71%) had grade 4 bleeding. 12 patients (34.29%) had grade 2 bleeding. Chance of moderate and heavy bleeding higher in non-steroid group than the steroid group and this association is statistically significant (p=0.009). For statistical analysis, we have further divided the bleeding into two groups i.e. moderate and heavy bleeding (grade 3, 4, 5) and mild and no bleeding (grade 0, 1, 2). The grading of bleeding is based on Boezaart-Vandermerwe Grading [6]. Castro *et al*. (2013) [12]. Had found preoperative systemic steroids to be useful to control intra operative bleeding. Sieskiewicz *et al*. (2006) [13] showed that use of a 5 day course of prednisolone at the dose of 30 mg can improve the surgical field visibility significantly. Atighechi S *et al*. (2013) [14] found that the 5

day prednisolone (1 mg/Kg/day) course before operation can reduce blood loss during surgery. Fraire *et al*. (2013) [15] conducted a non-randomized clinical trial in CRS patients with or without NP, showed that all the parameters decreased with the preoperative administration of SS, but only operative bleeding was significantly reduced in patients with CRS with NP.

Conclusion

The use of short course of preoperative systemic corticosteroids (oral prednisolone @ 1mg/kg for 5 days before the scheduled date of endoscopic sinus surgery) which efficiently reduces blood loss during ESS, improves the visibility of surgical field, lessens the operative time and prevents injury to important anatomical structures.

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