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"A Study onthe Effect of Preoperative Systemic Corticosteroids on IntraoperativeOutcome in Patients Undergoing Functional Endoscopic Sinus Surgery for Sinonasal Polyposis".

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Abstract:Introduction: *The term polyp when applied to the nasal cavity is purely a descriptive one, referring to the appearance of an abnormal pedunculated lesion[1]. Functional endoscopic sinus surgery (FESS) offers surgery tailored to the disease of each individual in order to restore sinus function through maximal preservation of normal sinus anatomy[2] .Oral Steroids by exerting its anti-inflammatory effect within the nasal cavity lining, reduces tissue oedema and by activating on the adrenergic receptors, causes vasoconstriction of the microcirculation [3].**Objectives:**1).To assess the effect of steroids over sinonasal mucosa and polyp during operation.2).To assess the effect of steroids in intraoperative bleeding and surgical field visibility. **Design of study:**Hospital based longitudinal prospective interventional analytical study.**Materials and methods:**The entire study included recruitment, data collection, data analysis and reporting from March 2019 to December 2019 in the Department of ENT, Darbhanga Medical College & Hospital, Laheriasarai, Bihar. Patients were randomly assigned to two groups according to a table of random numbers. The group A(n=30) patients (corticosteroid group) had received oral prednisolone and the group B (n=30) patients had not received corticosteroid.**Results:**In the present study, we found among group A (n=30), 46.6%(n=14) had polyp within the middle meatus (score 1), 36.7%(n=11) presented with polyps beyond the middle meatus within the nasal cavity (score 2) & the rest 16.7%(n=5) had Polyp beyond the nasal cavity whereas among group B(n=30), 26.7% (n=8) had polyp within the middle meatus (score 1), 46.6% (n=14) presented with polyps beyond the middle meatus within the nasal cavity (score 2) and the rest 26.7% (n=8) had Polyp beyond the nasal cavity (score 3).In this study, among group A(n=30), 56.7% (n=17)had no discharge from their nose(score 0), 33.3% (n=10) had thin, hyaline discharge and only 10.0% (n=3) were found to have thick, purulent discharge from their nose whereas among group-B (n=30), we found, 36.7% (n=11)had no discharge from their nose(score 0), 46.7% (n=14) had thin, hyaline discharge and only 16.6%(n=5)were found to have thick, purulent discharge from their nose. In this study, among group A(n=30), 90.0%(n=27) had no oedema of nasal mucosa (Score-0), while the rest 10.0%(n=3) had mild oedema of the nasal mucosa (score-1) whereas, among group B(n=30), we found 70.0%(n=21)had no oedema of nasal mucosa (Score-0) while the rest (30.0%) (n=9) had mild oedema of the nasal mucosa (Score-1). In this study, among group A(n=30), 50.0%(n=15) had grade 2 bleeding, 26.6%(n=8) had grade 3 bleeding & 6.7%(n=2) had grade 4 bleeding which was very difficult to control whereas, in group B(n=30), 40.0%(n=12) had grade 2 bleeding, 46.7%(n=14) had grade 3 bleeding and only 13.3%(n=4) had grade 4 bleeding which was very difficult to control. There was no grade 0 and grade 5 bleeding found in our study.**Conclusion:**In those receiving steroids(group A), nearly half (46.6%) polyp lies within the middle meatus, (56.7%) had no nasal discharge and (90.0%) had no oedema of nasal mucosa . Moderate to heavy bleeding was higher in group B(1.2 times) than the group A.*

Keywords:*Sinonasal polyp, Functional Endoscopic Sinus Surgery (FESS),Oral Steroids, Intraoperative bleeding .*

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I. Introduction

Nasal polyps are oedematous, pearly white, painless, prolapsed, pedunculated benign mass arising from the mucosa of the nasal sinuses (commonly at its outflow tracts) or from the mucosa of the nasal cavity .

Depending on the site and sinus of origin, they can be ethmoidal or antrochoanal. Ethmoidal polyps are typically multiple in number usually occurring in both nostrils arising from the ethmoid sinuses through the middle and superior meatus although the sphenoidal and the frontal sinus can be involved.Whileantrochoanal polyps are usually single, unilateral polyps arising from the wall of the maxillary antrum, prolapsing into the nasal cavity through the maxillary ostium and into the nasopharynx through the choana. However rarely, one may encounter bilateral antrochoanal polyps[4].

Depending on the type and extent, nasal polyposis can present with a wide array of symptoms including variable amount of nasal obstruction, mass protruding from nose, nasal discharge, facial pain/pressure, disturbances in smell and taste and occasionally nasal bleed,thereby causing a significant reduction in quality of life. Polyp by itself being an outgrowth of the sinonasal mucous membranes, diagnosis may occur by looking up the nose or by means of a nasal endoscopy.

However it is important to rule out other differentials such as meningocoele, glioma, enlarged turbinates, huge choncha bullosa, angiofibroma, inverted papilloma etc. In the evaluation of nasal polyps, computerized tomography is helpful especially in determining the number and extent of polyps and in planning the surgical approach[5].

Management of nasal polyps typically requires a multimodal therapy. In cases of limited polyps, medical therapy alone may be a consideration, using topical or systemic corticosteroids with anti-allergics and antimicrobials. However, in persistently symptomatic patients and those with extensive polyposis often require surgical therapy which is aimed at decreasing the amount of inflammatory load making medical treatment more effective[6]. It also improves the symptom of nasal blockage, re-establishes ventilation and drainage of the sinuses thus contributing considerably to an overall improvement in the quality of life.

Although endoscopic sinus surgery is a relatively safe surgical procedure, both major and minor complications may occur[7] , a good surgical field visualization is essential for its successful outcomes and to prevent the potential complications including cerebro-spinal fluid leakage, orbital or intracranial injuries, profuse bleeding and post-operative synechiae formation, for which some surgeons advocate the use of preoperative systemic steroids[8].

Systemic Steroids by exerting its anti-inflammatory effect within the nasal cavity lining, reduces tissue oedema and by acting on the adrenergic receptors, causes vasoconstriction of the microcirculation. Hence in the pre-operative setting, the theoretic advantage of steroids is that it can reduce polyp size which can aid in navigation of narrow recesses and in addition, it can reduce intraoperative bleeding, which can improve visualization of the surgical field, thereby reduce the possibility of severe complications .

II. Materials and Methods

Study Design:
Hospital based longitudinal prospective interventional analytical study
Place of Study:
Department of ENT, Darbhanga Medical College & Hospital, Laheriasarai, Bihar.
Period of Study:
The entire study included recruitment, data collection, data analysis and reporting from March 2019 to December 2019.
Study Populationand patient's selection:
The 60 patients who were participating in the study, Verbal inform consent was obtained from each patient at the time of sample collection. Socio-demographic data was obtained by means of personal interviews.

Sampling Technique:
Information was collected from the patients on the basis of a predesigned data sheet and findings of relevant clinical examination, radiological and endoscopic investigations.
Patients were randomly assigned to two groups according to a table of random numbers. The group-(A) 30 patients (corticosteroid group) had received oral prednisolone (1 mg/kg) once daily for 5 days before the scheduled date of surgery and then tapered each day by 5mg down post operatively. The group-(B) 30 patients had not received corticosteroid.

Inclusion Criteria:
Patients with sinonasal polyposis refractory to conservative treatment for at least 3months.

Exclusion Criteria:
Patients not willing to participate in the study.
Nasal mass with history of recurrent epistaxis.
Nasal mass other than sinonasal polyposis (e.g. fungal polyposis, papilloma, malignancy, rhinosporiodiosis).
Patients with diabetes, hypertension, renal failure, history of cerebral stroke.
Patients with previous H/O FESS.

Methodology:
An informed written consent was obtained from each study participant. In case of adolescent subjects (between 12-18 yrs) consent would be provided by a legal guardian.

All the recruited patients, after detail history taking and thorough general and ENT examinations, were further evaluated by rigid Nasal Endoscopy and CT scan of the Para nasal sinuses.

Baseline assessment included collection of patient medical and surgical history and a nasal examination. Careful rigid nasal endoscopy was performed on all patients, and the endoscopic appearance was recorded according to the Lund-Kennedy Scoring System.[9] Additionally, the size of the nasal polyps was recorded during a diagnostic endoscopic examination by means of the total nasal polyp score (TNPS). A preoperative sinus CT scan was scored for each patient according to the radiological grading system proposed by Lund and Mackay Scoring System.[10] All CT scans were reviewed by a single observer who was blinded to the groups

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. The group A patients received oral prednisolone 1mg/kg/day for a period of 5 days prior to the surgerythen tapered each day by 5mg down post operatively. The Group B patients received no oral steroids.

All surgeries done under general anesthesia with the same protocol. The surgeon used topical vasoconstriction (1/10,000 epinephrine solution) and a 2-ml local injection of 1/100,000 epinephrine with 2% lignocaine solution to the middle and inferior turbinate and to the attachment of the middle turbinate to the lateral nasal wall. Endoscopic Sinus Surgery (EES) was performed by the same surgical team using the Messerklinger technique, as described by Kennedy.[11] . Intra operative bleeding was evaluated using BOEZAART-VANDERMERWE GRADING SYSTEM[12] as elaborated in the perfoma.Patients were discharged after 3 days removing the nasal packs. Post-operative saline nasal douching was advised in all the patients. No inhalation steroids were given till 1 month.These data were evaluated and compared in both the groups using suitable statistical method as required. The effect of steroids in these two groups was studied based on the results obtained. Statistical calculation is done using SPSS software.

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

Adapted from Boezaart et al. Can J Anaesth. 1995 May;42(5 Pt 1):373-6,

III. Results

Table 1. Shows patients were randomly assigned to two groups according to a table of random numbers. The group-A(n=30) corticosteroid group had received oral prednisolone (1 mg/kg) once daily for 5 days before the scheduled date of surgery and then tapered each day by 5mg down post operatively. The group B(n=30) had not received corticosteroid.

Table.1 :- Classification on the basis of those receiving oral steroids or not.

Groups	No. of patients	Percentage
Group –A Corticosteroid group	30	100
Group – B Non corticosteroid group	30	100

Table 2 shows, among 30 patients in Group A, 20 patients (66.6%) were male. Rest 10 patients (33.4%) were female. Male: Female = 2: 1. Maximum 18 patients(60%) were seen in 21-30 years of age group.

Table 2. Age & sex distribution of group A (Receiving oral steroids).

Age group	Total No of patients	Male		Female	
		No	%	No	%
10 – 20	06	04	13.3	02	6.7
21 – 30	18	12	40.0	06	20.0
31 – 40	05	03	10.0	02	6.7
41 – 50	01	01	3.3	00	00
Total	30	20	66.6	10	33.4

Table 3 shows, among 30 patients in Group B, 19 patients (63.3%) were male. Rest 11 patients (36.7%) were female. Male: Female = 1.72: 1. Maximum13 patients (43.3%) were seen in 21-30 years of age group.

Table 3. Age & sex distribution of group B (Not receiving oral steroids).

Age group	Total No of patients	Male		Female	
		No	%	No	%
10 – 20	08	05	16.7	03	10.0
21 – 30	13	07	23.2	06	20.0
31 – 40	07	05	16.7	02	6.7
41 – 50	02	02	6.7	00	00
Total	30	19	63.3	11	36.7

LUND-KENNEDY Endoscopic Scoring in both groups

Table 4 shows, Among Group-A, Total 14 patients (46.6%) had polyp within the middle meatus (score 1), 11 patients(36.7%) presented with polyps beyond the middle meatus within the nasal cavity (score 2) while Rest 5 patients (16.7%) had Polyp beyond the nasal cavity. Among Group-B, Total 8 patients(26.7%) had polyp within the middle meatus (score 1), 14 patients(46.6%) presented with polyps beyond the middle meatus within the nasal cavity (score 2)while Rest 8 patients (26.7%) had Polyp beyond the nasal cavity (score 3).

Table.4: Extent of the Polyp (Group-A & Group-B)

Extent of the Polyp	Score	Group- A (n=30)		Group-B (n=30)	
		No	%	No	%
Polyp within the middle meatus	1	14	46.6	08	26.7
Polyp beyond the middle meatus within the nasal cavity	2	11	36.7	14	46.6
Polyp beyond the nasal cavity	3	05	16.7	08	26.7

Table 5 shows, Among group-A, 17 patients (56.7%) had no discharge from their nose(score 0),10 patients(33.3%) had thin, hyaline discharge and Only 3 patients(10.0%) were found to have thick, purulent discharge from their nose. In group-B, 11 patients (36.7%) had no discharge from their nose(score 0), 14 patients(46.7%) had thin, hyaline discharge and Only 5 patients(16.6%) were found to have thick, purulent discharge from their nose.

Table.5: Type of discharge in both groups

Type of Discharge	Score	Group- A (n=30)		Group-B (n=30)	
		No	%	No	%
No Discharge	0	17	56.7	11	36.7
Clear Discharge	1	10	33.3	14	46.7
Purulent or thick Discharge	2	03	10.0	05	16.6

Table 6 shows, In group-A, we found 27 patients (90.0%) had no oedema of nasal mucosa (Score-0). Rest only 3 patient(10.0%) had mild oedema of the nasal mucosa (score-1). In Group- B, we found 21 patients (70.0%) had no oedema of nasal mucosa (Score-0). Rest only 9 patient(30.0%) had mild oedema of the nasal mucosa (Score-1).

Table.6: Type of Oedema in both groups.

Type of Oedema	Score	Group- A (n=30)		Group-B (n=30)	
		No	%	No	%
No oedema on nasal mucosa	0	27	90.0	21	70.0
Mild oedema	1	03	10.0	9	30.0

Table 7 shows, In group-A, we found the present study, 15 patients (50.0%) had grade 2 bleeding. 08 patients(26.6%) had grade 3 bleeding. Only 2 patients(6.7%) had grade 4 bleeding which was very difficult to control. In group-B, 12 patients (40.0%) had grade 2 bleeding. 14 patients(46.7%) had grade 3 bleeding. Only 4 patients(13.3%) had grade 4 bleeding which was very difficult to control. There was no grade 0 and grade 5 bleeding found in our study.

Table.7: Intra-operative Bleeding (Total Grade 6) in both groups

Grade	Group- A (n=30)		Group-B (n=30)	
	No	%	No	%
0	00	00	00	00
1	05	16.7	00	00
2	15	50.0	12	40.0
3	08	26.6	14	46.7
4	02	6.7	04	13.3
5	00	00	00	00

IV. Discusion

Bleeding during endoscopic sinus surgery was one of the important factors of the study. Excessive bleeding during surgery threatens the surgical field visibility which may cause more laceration to the nasal mucosa which may cause scarring, crust formation, synechia formation post operatively increasing the morbidity. Intra-operative bleeding was evaluated using the **BOEZAART-VANDERMERWE GRADING SYSTEM.** It has five grades as elaborated in the proforma.

In the present study,Moderate to heavy bleeding (grade 2,3 and 4) was higher in non-steroid group than the steroid group and this association is **statistically significant (p=0.01)** as Chi square value is 8.2353. Odds ratio-0.076.

Sieskiewicz et al (2006) in his study, also showed that use of a 5 day course of prednisolone at the dose of 30mg before surgery can improve the surgical field visibility significantly. Total blood loss and visualization of the surgical field during the surgical procedure were compared in 2 groups of 18 patients each with severe nasal polyposis. The groups were similar in respect to age, body mass index, general health status, incidence of allergy, bronchial asthma, aspirin triad, and stage of disease. One group received the steroid before the operation and the second group served as control.

In an another study, **Atighechi S et al(2013)**evaluated the effect of pre-operative single-dose prednisolone (1 mg/Kg/dose 24 h before surgery) versus 5-day prednisolone (1 mg/Kg/day before operation) on the bleeding volume and the surgery field quality during FESS. It was found that the 5 day course of steroid before the day of surgery can reduce blood loss during surgery more efficiently and may improve the surgery field quality [13]. So the findings of the above studies are correlating with my study.

Giordano et al (2009) in his prospective study conducted on 40 patients, where 21 of them (group B) were treated with 1 mg/kg per day of prednisolone for seven days before surgery and compared with the 19 other patients (group A) on intraoperative blood loss and surgery duration. It was found that preoperative treatment with systemic corticosteroids does not seem to reduce surgical blood loss [14].

The findings of the studies done by **Giordano et al** as mentioned above are not supporting my result. One of the likely possibilities behind this variance could be accounted to the methodological differences. In contrast to our endoscopic visibility assessment of the intraoperative bleeding, they measured the blood loss volume from the suctioned contents which can be inaccurate, as rinsing fluids are collected in suction bottles along with saline, tissue and blood. Moreover, the bloods absorbed by the surgical gauze are not taken into account in the blood loss volume and hence, it does not depict the actual volume. Another difference in the methodology would be the duration of the oral prednisolone given preoperatively.

V. Conclusion

Using the **BOEZAART-VANDERMERWE GRADING SYSTEM,** Intra-operative bleeding was evaluated and moderate to heavy bleeding was found to be significantly (p=0.01) higher in the non-steroid group than the steroid group. Other parameters like postoperative scarring and crusting along with subjective parameters like postnasal discharge, difficulty to feel smell etc. were also found to have a favorable results in the steroid group.

Thus, we recommend the use of a short course of oral steroids (prednisolone 1mg/kg for 5 days) before the scheduled date of endoscopic sinus surgery) as it reduces blood loss during FESS efficiently. This decrease in bleeding during surgery, improves the visibility of surgical field, minimizes the risk of excessive injury to the local mucosal and the various important surrounding anatomical structures. Concurrently, preoperative systemic steroid (PSS) is also beneficial in reducing postoperative crusting and scarring of nasal mucosa. Other subjective parameters of early postoperative outcome like post nasal discharge, difficulty to feel smell, running nose, need to blow nose etc. also showed better quality of life in the steroid group when compared to the non-steroid group.

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Conflicts Of Interest

There are no conflicts of interests.

Ethical Approval

The study was approved by Institutional Ethics Committee.

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