The Egyptian Journal of Hospital Medicine (October 2024) Vol. 97, Page 4064-4074

Effect of Increasing Preoperative Steroid Therapy Duration on Surgical Field Visibility in Patients with Chronic Rhinosinusitis with Nasal Polyps

Ahmed Yehia Abo Elenen, **Ahmed Magdy Gamal Afifi*,**
Sherif Maher El Aini, Mohamed Abdulmottaleb, Mogahed Ibrahim Eweda
Department of Otorhinolaryngology, Armed Forces College of Medicine, Egypt
***Corresponding author:** Ahmed Magdy Gamal Afifi, **Mobile:** (+20)1005166989, **E-mail:** ahmedafcm110@gmail

ABSTRACT

Background: Chronic rhinosinusitis (CRS) can be described as inflammation of the nasal cavity and one or more of the paranasal sinuses, and it is thought to afflict around 15% of adults. The prevalence of CRS ranges from 1% to 4%, however other studies have found rates as high as 32%.

Objective: The current work aimed to compare the effect of short duration (5 days) and long duration (15 days) of preoperative steroid therapy on surgical field visibility, bleeding during surgery and operative time in patients with Chronic rhinosinusitis with nasal polyps (CRSwNP) undergoing functional endoscopic sinus surgery (FESS).

Patients and methods: This randomized controlled trial study was conducted at the Department of Otorhinolaryngology, Ghamra Military Hospital and Kobri Elkobba Military Medical Complex. This study was carried on 74 patients with chronic rhinosinusitis with nasal polyps (CRSwNP) undergoing FESS, divided into two groups: group 1 (37 patients received 10 mg prednisone daily for 5 days before surgery) and group 2 (37 patients received 10 mg prednisone daily for 15 days before surgery). **Results:** There were significant differences regarding operative time, blood loss, and surgical field visibility. Group 2 had shorter operating times, better surgical field visibility scores, and lesser blood loss during the operation than group 1.

Conclusion: It could be concluded that the mean operating time, the mean amount of blood loss, and the mean Boezaart score are shorter in patients with CRSwNP who received a longer duration of steroid therapy when compared to patients with CRSwNP who received a shorter duration of steroid therapy. Also, 10 mg prednisone for 15 days can reduce blood loss during FESS more efficiently than treatment with 10 mg prednisone for 5 days.

Keywords: Preoperative steroid therapy, Surgical field visibility, Chronic rhinosinusitis, nasal polyps.

INTRODUCTION

CRS can be described by nasal cavity and paranasal sinuses inflammation. It is thought to affect around 15 percent of adults [(1)].

The prevalence of CRS is about (1% - 4%), but in some studies reported rates reached about 32% [(2)].

The nasal polyps in the middle meatus are inflammatory growths. From mucosa of the paranasal sinus, mostly benign, bilaterally, occur in adulthood, and are characterized by inflammation (3,4). They generate an aberrant remodeling process and inadequate immunoregulation, resulting in imbalance and inflammation (5).

Clinically, patients with nasal polyps suffer from nasal blockage, reduced smelling, runny nose, and decreased quality of life. Diagnosis of CRSwNP can be made clinically by symptoms and signs as polyps can be seen by direct nasal examination or by nasal endoscopy, CT nose and paranasal sinuses is indicated and can confirm the diagnosis. Treatment options for rhinosinusitisvary, but typically entail a combination of medications, including corticosteroids, decongestants, antibiotics, saline irrigation, and mucolytics.

FESS is a successful option for patients who don't respond to medicinal management. It has been found to increase quality of life and reduce symptoms immediately and on long term in 85% of patients [(6, 7)].

Improved surgical skills, technological advancements, and a deeper comprehension of the disease's pathophysiology have all contributed to better FESS outcomes [(8)]. Cerebrospinal fluid (CSF) leaks, meningitis, bleeding, and orbital trauma are among major complications [(9)]. Previous data on the frequency of FESS complications varies, with reports varying from 0% to 2% [(10, 11)]. **Kennedy *et al.*** [(12)] in the United States and **Cumberworth *et al.*** [(9)] early independent studies of surgeons applying the FESS procedure were carried out in the United Kingdom, and the results showed that rates of serious complications were 0.2% and 0.4%, respectively [(9, 12)]. Previous studies reported that pre-operative combination of local and systemic corticosteroids prior to FESS in groups of patients with CRSwNP resulted in considerably lower blood loss, shorter operating time, and enhanced surgical field visibility as compared to control groups that hadn't use preoperative steroids before undergoing FESS [(13)].

In this study, the aim will be to know if there is a difference between giving patients with CRSwNP corticosteroids for 15 days versus giving corticosteroids for only 5 days before FESS in improving surgical field, decreasing operation time, decreasing blood loss and decreasing incidence of complications.The aim of the study was to compare the effect of short duration (5 days) and long duration (15days) of preoperative steroid therapy on surgical

Received: 19/06/2024
Accepted: 20/08/2024

field visibility, bleeding during surgery and operative time in patients with CRSwNP undergoing FESS.

PATIENTS AND METHODS

This randomized controlled trial study included a total of 74 patients with chronic rhinosinusitis with nasal polyps (CRSwNP) who had undergone functional endoscopic sinus surgery (FESS), at the Department of Otorhinolaryngology, Ghamra Military Hospital and Kobri Elkobba Medical Complex.

Inclusion criteria: Patient aged ≥ 18 years, both sexes and disease duration ≥ 12 weeks and not responding to medical treatment.

Exclusion criteria: Patient aged < 18 years, patients who were contraindicated to steroids, patients who were unfit for surgery, patients who refused to participate in the study and uncooperative patients.

Sample type: Convenient sample

Randomization: Block Randomization techniques were used to acquire an equal number of patients in control and intervention groups. The Block size was 4; selection of blocks was made by Computer-based Randomization.

Blinding: Double blinded trial

Based on prior data and by considering comparison of Boezaart surgical field grading scale in patients with low dose and high dose steroids perioperative as indicating the comparison regarding the short and long duration as primary outcome. The G-Power initiative The sample size was determined using the independent t test comparison of the means of the two groups in 3.1.9.4. Considering 80% power, the effect size measure is 0.69, the 0.05 level of significance is assumed, and the ratio is 1:1. For each group, a minimum sample size of 34 was needed to identify a statistically significant difference. Given that this is the very minimum needed for this research, after adding 10 % drop out rate it was 37 patients with short duration and 37 with longer duration.

All patients were subjected to:

Complete history taking: Personal history; name, age, sex, residence, occupation, special habits of medical importance specially smoking. History of sensitivity to drugs. Medical history; cardiac problems, hypertension, chest diseases, renal diseases, liver diseases, blood diseases or bleeding tendency. Past Surgical history of previous operations.

Complaint & its duration.

Clinical manifestations: Nasal obstruction, nasal congestion, nasal discharge, loss of smell, reduced lung function, sneezing and itching, cough and headache.

Clinical examinations.

- **General examination:** Vital signs including blood pressure, temperature, heart rate, respiratory rate.
- **Physical examinations:**
  - **Nasal Inspection:** visually inspecting the patient's nasal passages. Look for the presence of nasal polyps, which appear as fleshy, pale gray, teardrop-shaped growths. A nasal speculum and good lighting are typically used for this examination.
  - **Evaluation of Sense of Smell:** Assess the patient's olfaction. This can be done by presenting common odors and document any loss or reduction in the sensation of smelling
  - **Assessment of Nasal Discharge:** Note the color and consistency of nasal discharge, if present. Thick, discolored mucus is often associated with CRSwNP.
  - **Palpation of Facial Areas:** Gently palpate the patient's face, particularly around the eyes, cheeks, and forehead, to check for tenderness or pain, which can be indicative of sinus involvement.
  - **Assessment of Breathing:** Evaluation the patient's ability to breathe through the nose. Chronic congestion and nasal obstruction are common in CRSwNP, and this can be observed during the examination
  - **Lung Examination:** In some cases, it's important to assess lung function, specifically in cases when the patient previously had asthma or if there are concerns about lower airway involvement.
  - **Throat Examination:** Check the throat for signs of postnasal drip, which can lead to throat irritation and cough.
  - **Assessment of Complications:** Be vigilant for complications of CRSwNP, such as acute sinusitis or worsening asthma. Signs of acute infection, such as fever or purulent nasal discharge, should be noted.
- **Endoscopic nasal examination:**

Findings

- **Nasal Polyps:** Nasal polyps are typically the primary finding in CRSwNP. They appear as soft, pale gray, teardrop-shaped growths within the nasal passages or sinus openings. The size, number, and location of the polyps can vary among patients.
- **Nasal Congestion:** The examination may reveal marked nasal congestion, with swollen and inflamed nasal mucosa. This congestion can extend throughout the nasal cavity, causing obstruction and difficulty breathing through the nose.

- **Mucosal Edema:** In addition to polyps, you may observe generalized mucosal edema, which is characterized by swollen and reddened nasal tissue. This edema contributes to nasal obstruction and discomfort.
- **Pus or Mucus Accumulation:** In cases of infection or acute exacerbations, you may see pus or thick mucus within the nasal passages or sinuses. This can indicate the presence of an active infection.
- **Crusting:** The nasal passages may have crusting, which can result from chronic inflammation and discharge. Crusting can further contribute to discomfort and nasal obstruction.
- **Discolored Mucus:** The nasal discharge may be discolored, typically yellow or green, indicating infection or prolonged inflammation.
- **Scarring:** In advanced or longstanding cases of CRSwNP, may observe scarring within the nasal passages or sinus cavities. Scarring can affect the anatomy and may complicate surgical management.
- **Difficult visualization of nasal turbinates:** In severe cases, nasal turbinates (particularly the middle turbinate) may be difficult to visualize due to extensive polyp growth or inflammation.
- **Allergic Features:** In some cases, there may be signs of allergic rhinitis, such as pale and swollen mucosa, particularly in patients with coexisting allergies.
- **Preoperative CT nose and paranasal sinuses:** It is important that the patient is positioned supine with their head immobilized and centered in the gantry.

CT Scan Parameters:

Slice Thickness: The recommended slice thickness for a CT scan of the nose and paranasal sinuses is typically between 0.625–1.0 mm. Thinner slices provide higher resolution and better detail.

Field of View (FOV): The FOV should cover the entire region of interest, including the nasal cavity and all paranasal sinuses. FOV vary depending on the specific scanner and protocol but is usually around 140–160 mm.

Tube voltage and tube current: 125 kV and 80–160 mAs

Scan Mode: High-resolution imaging is essential, so a helical or spiral scan mode is often used to acquire continuous slices without interruption.

Scan Angle: The scan should be performed in the axial plane, parallel to the hard palate. This orientation ensures optimal visualization of the sinuses.

Gantry Tilt: In some cases, a slight gantry tilt may be used to align with the anterior skull base, particularly for evaluating the frontal sinuses.

Procedures:

Patients were examined clinically, endoscopically and by using CT nose and paranasal sinuses (Lund Mackay scoring, table 1) before undergoing surgery (FESS).

Table (1): Lund-Mackay scores.

Lund-Mackay CT scan assessment
Paranasal sinuses
Maxillary (0, 1, 2)
Anterior ethmoid (0, 1, 2)
Posterior ethmoid (0, 1, 2)
Sphenoid (0, 1, 2)
Frontal (0, 1, 2)
Ostiomeatal complex (0, 2)*
Total
0 - With no abnormalities
1 - Partial opacification
2 - Total opacification
* 0: Without obstruction; 2: Obstructed.

The Lund-Mackay staging method employs a scale of 0 (no opacification), 1 (partial opacification), and 2 (complete opacification) to assess each sinus, which includes the maxillary, frontal, sphenoid, anterior, and posterior ethmoid sinuses.

After the left and right sides are staged independently and their results added together, each patient's total Lund-Mackay score may vary from 0 to 24.

Then the included subjects were randomly divided into two groups: Group 1 (conventional): including 37 patients with CRSwNP received short term steroid therapy (10 mg prednisone for only 5 days) before FESS, and **Group 2 (intervention group):** including 37 patients with CRSwNP received longer duration of steroid therapy (10 mg prednisone for 15 days) before FESS.

- The operating surgeon being same for both groups.

Comparing the two groups in terms of operative time, surgical field visibility and bleeding during surgery using Boezaart surgical field grading scale which is a 6-point validated scale developed to give a systematic manner of documenting bleeding in ESS (Table 2) [(14)].

Furthermore, blood loss during surgery was determined volumetrically using suction jars after accounting for the amount of irrigation used.

Table (2): Boezaart surgical field grading scale [(14)].

Grade	Description
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 threatened and surgery usually not possible

Technique of FESS

Anesthesia: CRSwNP FESS was performed under general anesthesia.

Surgical Steps:

- **Endoscopic Visualization:** The surgeon inserts an endoscope (zero degree), a thin, flexible tube with a camera and light source, into the nasal passages to visualize the sinonasal anatomy.
- **Localization and Mapping:** Identify key anatomical landmarks and map the extent of nasal polyps and sinus disease.
- **Preparation of the Surgical Site:** Administer a vasoconstrictor and local anesthetic to reduce bleeding and improve visibility. Place a piece of gauze soaked with local anesthetic and decongestant inside the nasal passages.
- **Creation of Surgical Openings (antrostomy):** Use specialized instrument such as microdebriders or traditional surgical instruments, to create small openings (ostia) throughout the sinuses' natural drainage channels. These openings allow better drainage, aeration, and entry to the diseased areas.
- **Polyp Removal and Disease Clearance:** Carefully remove nasal polyps and diseased tissue while preserving healthy mucosa. Use microdebriders, forceps, or other instruments to remove the source of chronic inflammation and obstruction.
- **Sinus Exploration:** Thoroughly inspect and assess the entire sinonasal cavity, including frontal, maxillary, ethmoid, and sphenoid sinuses, also nasal septum. Address any additional abnormalities, such as concha bullosa or septal deviations.
- **Hemostasis:** Control any bleeding using cautery or other hemostatic techniques to maintain a clear surgical field.
- **Verification of Adequate Opening:** Ensure that the newly created sinus openings are adequate for proper drainage and ventilation.
- **Closure of the Surgical Site:** Depending on the surgeon's preference, dissolvable nasal packing or stents may be placed to aid healing and support the surgical sites.

Ethical considerations:

This study was ethically approved by the Research Ethics Committee of AFCM, Egypt. Written informed consent from all the participants was obtained after study details, and the nature of the investigations were explained to all patients. Patients had the right to withdraw or refuse to participate in this study at any time. The study protocol conformed to the Helsinki Declaration, the ethical norm of the World Medical Association for human testing.

Potential risks: Most common complications of FESS include minor complications such as hemorrhage, orbital injuries and synechia, major complications as cerebrospinal fluid (CSF) leak and meningitis, lastly recurrence of allergic nasal polypi.

Confidentiality of data: Patients' data was handled with complete confidentiality, and only the study's investigators had access to their medical information. After the research was completed, patients were informed regarding their results and further information regarding their health status.

Statistical analysis

For statistical analysis, pre-coded data was input into the computer using SPSS version 21.0. The quantitative variables' mean±SD, median, and IQR, and the qualitative variables' number and percentage, were used to summarize the data. Whereas the independent test was used to compare quantitative variables between two groups, the one-way Anova test was used for quantitative variables between more than two normally distributed categories, and the nonparametric Kruskal-Wallis and Mann-Whitney tests were used for quantitative variables that were not normally distributed. The X^2-test was used for qualitative variables. Additional statistical tests are employed as necessary. A P-value of less than 0.05 was deemed statistically significant.

RESULTS

Age distribution: The mean age of group I was 43.6 ± 9.8 years, ranging from 26 to 60 years. In the control group, the mean age was 44 ± 10.3 years, ranging from 24 to 59 years.

Gender distribution: Group I included 34 (92%) males and 3 (8%) females, and group II included 32 (87%) males, and 5 (13%) females.

Table (3): Baseline Demographic Data (N = 74)

Variables	Group I (n=37)	Group II (n=37)	P value
Age, years			0.909*
Mean ± SD	43.6 ± 9.8	44 ± 10.3	
Range	26 – 60	24 – 59	
Gender			0.454**
Male	34 (92%)	32 (87%)	
Female	3 (8%)	5 (13%)	
Comorbidities			
Diabetes	8 (22%)	10 (27%)	0.588**
Hypertension	9 (24%)	7 (19%)	0.572**
Ischemic heart disease	3 (8%)	5 (13%)	0.454**
Smoking			0.791**
No	27 (73%)	28 (76%)	
Yes	10 (27%)	9 (24%)	
* **Independent sample t test,** ** **Chi-square test.**			

Table 4 summarizes the sinonasal symptoms of each group. No statistically significant differences were found between groups regarding nasal obstruction, anterior nasal discharge, postnasal drip, facial pain, and loss of smell sensation.

Table (4): Sinonasal Symptoms (N = 74)

Variables	Group I (n=37)		Group II (n=37)		P value*
	No.	%	No.	%	
Nasal Obstruction	35	94.6	36	97.3	0.556
Anterior Nasal Discharge	33	89.2	29	78.4	0.207
Postnasal Drip	34	91.9	30	81.1	0.174
Facial Pain	34	91.9	33	89.2	0.691
Loss of Smell Sensation	32	86.5	34	91.9	0.454
* **Chi-square test.**					

Nasal obstruction was reported in 35 (94.6%) patients in group I and 36 (97.3%) patients in group II. Anterior nasal discharge was reported in 33 (89.2%) patients in group I and 29 (78.4%) patients in group II. Postnasal drip was reported in 34 (91.9%) patients in group I and 30 (81.1%) patients in group II. Facial pain was reported in 34 (91.9%) patients in group I and 33 (89.2%) patients in group II. Loss of smell sensation was reported in 32 (86.5%) patients in group I and 34 (91.9%) patients in group II.

Table 5 summarizes the CT findings according to the Lund Mackay Score. No statistically significant differences were found between groups regarding the distribution of opacification in maxillary, ethmoidal, sphenoidal, and frontal sinuses and ostiomeatal complex (Chi-square test, P > 0.05).

Table (5): Lund-Mackay Score (N = 74)

Variables	Group I (n=37)				Group II (n=37)				P value* (Rt)	P value* (Lt)
	Rt		Lt		Rt		Lt			
	No.	%	No.	%	No.	%	No.	%		
Maxillary									0.944	0.250
No opacification	7	18.9	11	29.7	8	21.6	11	29.7		
Partial opacification	19	51.4	16	43.2	19	51.4	10	27.0		
Complete opacification	11	29.7	10	27.0	10	27.0	16	43.2		
Anterior Ethmoidal									0.086	0.194
No opacification	13	35.1	8	21.6	6	16.2	15	40.5		
Partial opacification	14	37.8	14	37.8	13	35.1	12	32.4		
Complete opacification	10	27.0	15	40.5	18	48.6	10	27.0		
Posterior Ethmoidal									0.344	0.301
No opacification	16	43.2	14	37.8	10	27.0	9	24.3		
Partial opacification	11	29.7	7	18.9	14	37.8	12	32.4		
Complete opacification	10	27.0	16	43.2	13	35.1	16	43.2		
Sphenoidal									0.834	0.723
No opacification	12	32.4	6	16.2	10	27.0	6	16.2		
Partial opacification	15	40.5	9	24.3	15	40.5	12	32.4		
Complete opacification	10	27.0	22	59.5	12	32.4	19	51.4		
Frontal									0.185	0.101
No opacification	11	29.7	9	24.3	18	48.6	9	24.3		
Partial opacification	12	32.4	11	29.7	11	29.7	19	51.4		
Complete opacification	14	37.8	17	45.9	8	21.6	9	24.3		
Ostiomeatal Complex									0.244	0.815
No opacification	20	54.1	17	45.9	15	40.5	16	43.2		
Complete opacification	17	45.9	20	54.1	22	59.5	21	56.8		
*** Chi-square test.**										

The mean total Lund-Mackay score of group I was 12.2 ± 2.9, ranging from 8 to 18. In the control group, the mean score was 13.1 ± 3.5, ranging from 6 to 21.

Compare between the groups as regards the average scores of each nasal sinus on the right and left sides, respectively.

No statistically significant difference was found between groups regarding the subtotal and total Lun-Mackay scores (Independent sample t test, P > 0.05).

Table 6 summarizes the endoscopic findings according to the Lund and Kennedy Score. No statistically significant difference was found between groups regarding the distribution of polyps, oedema, nasal discharge, scarring, and crusting (Chi-square test, P > 0.05).

Table (6): Lund and Kennedy Score (N = 74)

Variables	Group I (n=37)				Group II (n=37)				P value* (Rt)	P value* (Lt)
	Rt		Lt		Rt		Lt			
	No.	%	No.	%	No.	%	No.	%		
Polyp									0.611	0.641
Absent	0	0	0	0	0	0	0	0		
In middle meatus only	25	67.6	16	43.2	27	73.0	18	48.6		
Beyond middle meatus	12	32.4	21	56.8	10	27.0	19	51.4		
Oedema									0.452	0.734
Absent	16	43.2	13	35.1	11	29.7	14	37.8		
Mild	10	27.0	12	32.4	11	29.7	9	24.3		
Severe	11	29.7	12	32.4	15	40.5	14	37.8		
Discharge									0.729	0.539
No discharge	3	8.1	13	35.1	5	13.5	14	37.8		
Thin clear discharge	18	48.6	13	35.1	18	48.6	16	43.2		
Thick purulent discharge	16	43.2	11	29.7	14	37.8	7	18.9		
Scarring									0.959	0.224
Absent	11	29.7	14	37.8	12	32.4	18	48.6		
Mild	13	35.1	16	43.2	13	35.1	9	24.3		
Severe	13	35.1	7	18.9	12	32.4	10	27.0		
Crusting									0.718	0.161
Absent	14	37.8	7	18.9	15	40.5	13	35.1		
Mild	11	29.7	13	35.1	8	21.6	14	37.8		
Severe	12	32.4	17	45.9	14	37.8	10	27.0		
*** Chi-square test.**										

The mean total Lund and Kennedy score of group I was 10.8 ± 2.7, ranging from 6 to 18. In the control group, the mean score was 10.6 ± 2.2, ranging from 5 to 14. Compare between the groups as regards the average scores of each nasal sinus on the right and left sides, respectively. No statistically significant difference was found between groups regarding the subtotal and total Lund and Kennedy scores (Independent sample t test, P > 0.05).

Table 7 summarizes the comparison of the operative outcomes between groups, including operating time, total blood loss, and Boezaart surgical field score.

The mean operating time was 71.7 ± 13.8 minutes (range, 51 to 95) in group I and 58.1 ± 12.6 minutes (range, 40 to 80) in group II. A statistically significant difference was observed regarding the operating time in favour for group II (Independent sample t test, P < 0.001).

The mean amount of blood loss was 420 ± 30 ml (range, 205 to 594) in group I and 202 ± 57 ml (range, 100 to 297) in group II. A statistically significant difference was observed regarding the total amount of blood loss in favour for group II (Independent sample t test, P < 0.001).

Table (7): Operative Outcomes (N = 74)

Variables	Group I (n=37)	Group II (n=37)	P value*
Operative Time, min			0.000
Mean ± SD	71.7 ± 13.8	58.1 ± 12.6	
Range	51 – 95	40 – 80	
Total Blood Loss, ml			0.000
Mean ± SD	420 ± 30	202 ± 57	
Range	205 – 594	110 – 297	
Boezaart Score			0.000
Mean ± SD	3.9 ± 0.8	1.1 ± 0.7	
Range	3 – 5	1 – 3	
* **Independent sample t test**			

DISCUSSION

CRS is a very common inflammatory disorder of the sinus and nasal lining that persists for at least 12 weeks and is objectively shown to cause inflammation of the mucosa [15]. About 4% of people worldwide suffer from CRSwNP, an inflammatory disease that significantly reduces quality of life (QoL). It is linked to a significant burden for patients as well as for medical resources and lost productivity, that is increased in individuals with poorly managed diseases [16].

Regretfully, CRSwNP is still difficult to treat due to the difficulties in managing symptoms and frequently occurring relapses, particularly in a subset of patients whose type 2 inflammatory reaction drives their CRSwNP [17].

For a number of years, the usual approach to managing CRSwNP involved a comprehensive diagnostic work-up, medication therapy, close monitoring, and, in certain cases, repeated operations. Since steroids often decrease chronic inflammation, systemic and local steroids have long been a mainstay in the treatment of CRSwNP [18, 19].

Systemic steroids generate vasoconstriction of microcirculation by reacting on adrenergic receptors which decreases tissue oedema by acting as an anti-inflammatory throughout the nasal cavity lining [20].

Patients' symptoms can be relieved with long-term local steroids as the size of the polyp shrinks. In more severe situations, short-term systemic steroids can be used. Surgical management could be necessary if the patient's condition cannot be resolved by medical therapy. For persistent CRSwNP, FESS is the most effective method [21].

Bleeding is one of the most frequent problems of FESS. Bleeding during surgery worsens the surgical field and raises the possibility of complications such as orbital injury or skull base issues [22].

Bleeding prolongs the operation since suction and packing must be done often during the procedure. Using pre-operative steroids can help minimize blood loss during surgery by decreasing the size of polyps, that can facilitate maneuvering through small spaces and also decrease inflammation of mucosa [23].

The main results of this study were as follows:

The mean age of group I was 43.6 ± 9.8 years, ranging from 26 to 60 years. In the control group, the mean age was 44 ± 10.3 years, ranging from 24 to 59 years. Group I included 34 (92%) males and 3 (8%) females, and group II included 32 (87%) males, and 5 (13%) females. Regarding medical comorbidities, in the group I, eight (22%) patients were diabetic, nine (24%) patients were hypertensive, and three (8%) had an ischemic heart disease. In group II, ten (27%) patients were diabetic, seven (19%) were hypertensive and five (13%) had ischemic heart disease. Smoking was reported in ten (27%) patients in group I, and nine (24%) patients in group II. There were no statistically significant differences were found between the two groups regarding age, gender, medical comorbidities, and smoking.

These results were in line with **Atighechi *et al.*** [24] who aimed to compare the effects of a 5-day prednisolone regimen (1 mg/Kg/day prior to operation) to a preoperative single-dose (1 mg/Kg/dose one day prior to operation) on the amount of bleeding and the quality of the surgical field during FESS. Regarding age, sex, and medical comorbidities, they discovered no statistically significant differences between two groups

Our results were also consistent with **Akiyama *et al.*** [25] who aimed to assess the effectiveness of short-term, low-dose oral prednisolone (oPSL) therapy in patients with CRSwNP. Before surgery, those with CRS identified by prior biopsies were given a low dosage of oPSL for three days (PSL 3) or seven days (PSL 7). They discovered that no statistically significant difference in smoking, age, gender, or medical comorbidities among two groups

As well, our results were consistent with **Hong *et al.*** [26] who aimed to examine and assess the clinicopathological parameters linked to the outcome of ESS following preoperative systemic steroid (PSS) therapy for CRSwNP. This research included 124 patients in total, 42 of whom were female and 82 of

whom were male. A total of 40 patients were part of the PSS group, whereas 84 individuals were not part of any PSS group. Regarding age, gender, and medical comorbidities, they discovered that there was no statistically significant difference among two groups

As regards sinonasal symptoms, results of our study showed that nasal obstruction was reported in 35 (94.6%) patients in group I and 36 (97.3%) patients in group II. Anterior nasal discharge was reported in 33 (89.2%) patients in group I and 29 (78.4%) patients in group II. Postnasal drip was reported in 34 (91.9%) patients in group I and 30 (81.1%) patients in group II. Facial pain was reported in 34 (91.9%) patients in group I and 33 (89.2%) patients in group II. Loss of smell sensation was reported in 32 (86.5%) patients in group I and 34 (91.9%) patients in group II. There was no statistically significant difference was found among groups regarding nasal blockage, anterior nasal discharge, postnasal discharge, facial pain, and smell

Our results are consistent with, **Akiyama *et al.*** [25] who reported that regarding sinonasal symptoms, nasal obstruction was 4.2±2.0 in group I and 4.1±1.8 in group II. Anterior nasal discharge was 3.4±1.5 in group I and 3.6±1.7 in group II. Postnasal drip was 3.2±2.1in group I and 1.3±1.5 in group II. Smell was 5.2±1.4 in group I and 4.4±2.1 in group II. There was no statistically significant difference was found between groups regarding nasal blockage, anterior nasal discharge, postnasal discharge and smell.

Also, our results were consistent with **Jagannath *et al.*** [27] who aimed to investigate and contrast the impact on intra-operative bleeding in FESS for nasal polyposis between pre-operative intra-nasal topical steroid and oral steroid. Sixty individuals with nasal polyps were included in the study, and they were split into two groups in turn. For seven days, Group B received oral steroids while Group A received intranasal topical steroid. They discovered that no statistically significant difference in the groups' nasal symptoms, which included sneezing, nasal irritation, blockage, and discharge. Ocular symptoms that were present were eye watering and itching. Wheezing, coughing, chest congestion, post-nasal discharge, and throat discomfort were other usual symptoms

As well, our results were consistent with **Hissaria *et al.*** [28] who aimed to determine whether taking prednisolone orally for a brief period of time effectively relieves sinonasal polyposis symptoms. Those with endoscopically confirmed symptomatic sinonasal polyposis were given either a placebo or 50 mg of prednisone everyday for a period of 14 days. They found that no statistically significant difference was found among groups regarding symptom scores.

Furthermore, **Ecevit *et al.*** [29] aimed to evaluate the impact of oral prednisone usage prior to surgery for advanced diffuse nasal polyposis. They found that no statistically significant difference was found among groups regarding nasal blockage, discharge, facial pain, and smell.

In our study we found that the mean total Lund-Mackay score of groups I was 12.2 ± 2.9, ranging from 8 to 18. In the control group, the mean score was 13.1 ± 3.5, ranging from 6 to 21. No statistically significant difference was found among groups regarding the subtotal and total Lun-Mackay scores (P > 0.05).

Our results were consistent with, **Atighechi *et al.*** [24] who reported that no statistically significant difference was found among groups regarding Lund-Mackay scores (P > 0.05).

As well, our results are consistent with **Gunel *et al.*** [30] who aimed to ascertain if the osteitis score could be utilized to predict the amount of intraoperative bleeding, as well as to look into the impact of preoperative oral steroids on intraoperative bleeding and surgical field quality during ESS. They found that no statistically significant differences among two groups with respect to Lund-Mackay score (p=0.968).

Also, our results were consistent with **Hong *et al.*** [26] who found that no statistically significant difference was found among groups regarding the Lun-Mackay scores (P =0.477).

In our study we found that the mean total Lund and Kennedy score of groups I was 10.8 ± 2.7, ranging from 6 to 18. In the control group, the mean score was 10.6 ± 2.2, ranging from 5 to 14. No statistically significant difference was found among groups regarding subtotal and total Lund and Kennedy scores (P > 0.05).

Our results were consistent with, **Gunel *et al.*** [30] who reported that no statistically significant differences among two groups with respect to Lund-Kennedy score (p=0.723).

Our results were also consistent with **Sieskiewicz *et al.*** [31] who aimed to look into the possibility of using oral steroids to enhance the operative field during FESS. Before the procedure, one group was given 30 mg of prednisone every day for five days. The other group functioned as a control. They found that no statistically significant difference among two groups regarding Lund-Kennedy score.

In our study we found that mean operating time was 71.7 ± 13.8 minutes (range, 51 to 95) in group I and 58.1 ± 12.6 minutes (range, 40 to 80) in group II. A statistically significant difference was observed regarding operating time in favour for group II (P < 0.001). Mean amount of blood loss was 420 ± 30 ml (range, 205 to 594) in group I and 202 ± 57 ml (range, 100 to 297) in group II. A statistically significant difference was observed regarding total amount of blood loss in favour for group II (P < 0.001). Mean Boezaart score was 3.9 ± 0.8 (range, 3 to 5) in group I and 1.1 ± 0.7 (range, 1 to 3) in group II. A statistically significant difference was observed regarding surgical field visibility score in favour for group II (P < 0.001).

Our results are consistent with, **Atighechi *et al.*** [24] who found that during the procedure, the mean bleeding volume in group A was 266.5 ± 96.31 ml, while in group B it was 206 ± 52.81 ml. A significant difference (P value = 0.038) was observed in this regard among groups.

As well, our results were consistent with **Hwang *et al.*** [32] who sought to evaluate the effect of preoperative steroids in reducing intraoperative hemorrhage in patients with NPs undergoing ESS. When doing ESS, they discovered that steroid group experienced considerably less intraoperative hemorrhage and operative time than control group. Furthermore, during sinus surgery, preoperative systemic steroid significantly improved endoscopic surgical field quality

Our results were also consistent with **Pathak *et al.*** [33] who aimed to evaluate how steroids affect polyps and sinonasal mucosa during surgery, as well as how steroids affect intraoperative hemorrhage and surgical field quality. They stated that intraoperative bleeding was assessed using the Boezaart-Vandermerwe Grading System, and that moderate to severe bleeding was significantly (p=0.01) greater in the non-steroid group than in steroid group

As well, our results are consistent with **Ecevit *et al.*** [29] who found that the mean operating time was 71.67 ± 13.5 minutes in group I and 61 ± 10 minutes in group II. A statistically significant difference observed regarding the operating time in favour for group II (P= .046). The mean amount of blood loss was 384.2 ± 237.5 ml in group I and 141 ± 90ml in group II. A statistically significant difference observed regarding the total amount of blood loss in favour for group II (P =.022).

Also, **Sieskiewicz *et al.*** [31] who found that for the patients who took steroids, the average duration of the surgical operations was 78 minutes, whereas for the patients who did not take steroids, it was 89 minutes. There was a statistically significant difference (p =.041).

Giordano *et al.* [34] aimed to look at how bleeding and quality of surgical field are affected throughout endoscopic ethmoidectomy for CRSwNP after a brief course of oral steroid therapy. Forty participants were included in a prospective research. Twenty-one of them (group B) received prednisolone treatment for seven days at a dose of 1 mg/kg per day prior to surgery. The 19 additional patients (group A) were contrasted with them. They stated that group B had a shorter surgical procedure (72 min vs. 85 min, p = 0.05).

Furthermore, **Albu *et al.*** [35] aimed to determine if continuous preoperative steroid usage may, in fact, enhance the quality of the surgical field and reduce bleeding during ESS. It was discovered that the steroid group showed statistically significant reductions in blood loss , including total blood loss (TBL), shorter operating times, and better visibility in the surgical field. There was a 27.7 mL (95% confidence interval [CI] 3.5-51.92) difference in blood loss. The groups' operation times differed by 11.17 minutes (95% CI 2.82-19.51).

CONCLUSION

It could be concluded that the mean operating time, the mean amount of blood loss, and the mean Boezaart score are shorter in patients with CRSwNP who received a longer duration of steroid therapy when compared to patients with CRSwNP who received a shorter duration of steroid therapy. Also, 10 mg prednisone for 15 days can reduce blood loss during FESS more efficiently than treatment with 10 mg prednisone for 5 days.

Further studies are needed with larger scales are needed for confirming our results.

Conflict of interest: None.
Financial disclosures: None**.**

REFERENCES

1. **Collins J (1997):** Prevalence of selected chronic conditions: United States, 1990-1992. Vital and Health Statistics. Series 10, Data from the National Health Survey. Pp. 1–89. https://stacks.cdc.gov/view/cdc/6280
2. **Akhtar S, Ikram M, Azam I *et al.* (2010):** Factors associated with recurrent nasal polyps: a tertiary care experience. JPMA. The Journal of the Pakistan Medical Association, 60 (2): 102–104.
3. **Fokkens W, Lund V, Hopkins C *et al.* (2020):** European position paper on rhinosinusitis and nasal polyps 2020. Rhinology, 58(29):1. doi: 10.4193/Rhin20.600.
4. **Koennecke M, Klimek L, Mullol J *et al.* (2018):** Subtyping of polyposis nasi: phenotypes, endotypes and comorbidities. Allergo Journal International, 27 (2): 56–65.
5. **Chiarella E, Lombardo N, Lobello N *et al.* (2020):** Nasal Polyposis: Insights in Epithelial-Mesenchymal Transition and Differentiation of Polyp Mesenchymal Stem Cells. International Journal of Molecular Sciences, 21(18): 6878. doi:10.3390/ijms21186878.
6. **Soler Z, Mace J, Smith T (2008):** Symptom-based presentation of chronic rhinosinusitis and symptom-specific outcomes after endoscopic sinus surgery. American Journal of Rhinology, 22(3): 297–301.
7. **Damm M, Quante G, Jungehuelsing M *et al.* (2002):** Impact of functional endoscopic sinus surgery on symptoms and quality of life in chronic rhinosinusitis. The Laryngoscope, 112(2): 310–315.
8. **McMains K (2008):** Safety in endoscopic sinus surgery. Current Opinion in Otolaryngology & Head and Neck Surgery, 16(3): 247–251.
9. **Cumberworth V, Sudderick R, Mackay I (1994):** Major complications of functional endoscopic sinus surgery. Clinical Otolaryngology and Allied Sciences, 19(3): 248–253.

10. **Wigand M, Hosemann W (1991):** Results of endoscopic surgery of the paranasal sinuses and anterior skull base. The Journal of Otolaryngology, 20(6): 385–390.
11. **Keerl R, Stankiewicz J, Weber R *et al.* (1999):** Surgical experience and complications during endonasal sinus surgery. The Laryngoscope, 109 (4): 546–550.
12. **Kennedy D, Shaman P, Han W *et al.* (1994):** Complications of ethmoidectomy: a survey of fellows of the American Academy of Otolaryngology-Head and Neck Surgery. Otolaryngology Head and Neck Surgery, 111 (5): 589–599.
13. **Pundir V, Pundir J, Lancaster G *et al.* (2016):** Role of corticosteroids in Functional Endoscopic Sinus Surgery--a systematic review and meta-analysis. Rhinology, 54(1): 3–19.
14. **Boezaart A, van der Merwe J, Coetzee A (1995):** Comparison of sodium nitroprusside- and esmolol-induced controlled hypotension for functional endoscopic sinus surgery. Can J Anaesth., 42(5 Pt 1):373-6.
15. **Boztepe F, Ural A, Paludetti G *et al.* (2020):** Pathophysiology of chronic rhinosinusitis with nasal polyps. All Around the Nose: Basic Science, Diseases and Surgical Management, pp. 373-379. https://link.springer.com/chapter/10.1007/978-3-030-21217-9_43
16. **Marglani O, Al Abri R, Al Ahmad M *et al.* (2023):** Management of Chronic Rhinosinusitis with Nasal Polyps (CRSwNP): in the Pan-Arab Region: Consensus Recommendations from a Multidisciplinary Expert Working Group. Journal of Asthma and Allergy, 16: 1055-1063.
17. **Naclerio R, Baroody F, Bachert C *et al.* (2020):** Clinical research needs for the management of chronic rhinosinusitis with nasal polyps in the new era of biologics: a National Institute of Allergy and Infectious Diseases workshop. J Allergy Clin Immunol Pract., 8(5): 1532-1549.
18. **De Corso E, Pipolo C, Cantone E *et al.* (2022):** Survey on use of local and systemic corticosteroids in the management of chronic rhinosinusitis with nasal polyps: identification of unmet clinical needs. Journal of Personalized Medicine, 12(6): 897. doi: 10.3390/jpm12060897.
19. **Mullol J, Azar A, Buchheit K *et al.* (2022):** Chronic rhinosinusitis with nasal polyps: quality of life in the biologics era. J Allergy Clin Immunol Pract., 10(6): 1434-1453.
20. **Tamene S, Dalhoff K, Schwarz P *et al.* (2023):** Systemic corticosteroids in treatment of chronic rhinosinusitis—A systematic review. European Clinical Respiratory Journal, 10(1): 2240511. doi: 10.1080/20018525.2023.2240511.
21. **Hox V, Lourijsen E, Jordens A *et al.* (2020):** Benefits and harm of systemic steroids for short-and long-term use in rhinitis and rhinosinusitis: an EAACI position paper. Clinical and Translational Allergy, 10: 1-27.
22. **Ganesan S, Al Duhirat E, Al Saey H *et al.* (2021):** Complications of Functional Endoscopic Sinus Surgery. Textbook of Clinical Otolaryngology, 21: 299-316.
23. **Kristensen M, McGuire B (2020):** Managing and securing the bleeding upper airway: a narrative review. Canadian Journal of Anesthesia, 67(1): 128-140.
24. **Atighechi S, Azimi M, Mirvakili S *et al.* (2013):** Evaluation of intraoperative bleeding during an endoscopic surgery of nasal polyposis after a pre-operative single dose versus a 5-day course of corticosteroid. European Archives of Oto-Rhino-Laryngology, 270: 2451-2454.
25. **Akiyama K, Makihara S, Uraguchi K *et al.* (2019):** Impact of preoperative systemic corticosteroids on the histology and diagnosis of eosinophilic chronic rhinosinusitis. International Archives of Allergy and Immunology, 179(2): 81-88.
26. **Hong S, Lee J, Lee H *et al.* (2014):** Availability of Preoperative Systemic Steroids on Endoscopic Sinus Surgery for Chronic Rhinosinusitis with Nasal Polyposis. Yonsei Med J., 55(6):1683–1690.
27. **Jagannath B, Pillai N, Kumar B (2021):** Comparative study on the effects of pre-operative intranasal steroid spray versus oral steroid on intraoperative bleed in FESS for nasal polyposis. International Journal of Otorhinolaryngology and Head and Neck Surgery, 7(5): 782. https://doi.org/10.18203/issn.2454-5929.ijohns20211569
28. **Hissaria P, Smith W, Wormald P *et al.* (2006):** Short course of systemic corticosteroids in sinonasal polyposis: a double-blind, randomized, placebo-controlled trial with evaluation of outcome measures. J Allergy Clin Immunol., 118(1):128-33.
29. **Ecevit M, Erdag T, Dogan E *et al.* (2015):** Effect of steroids for nasal polyposis surgery: a placebo-controlled, randomized, double-blind study. The Laryngoscope, 125(9):2041–45.
30. **Gunel C, Basak H, Bleier B (2015):** Oral steroids and intraoperative bleeding during endoscopic sinus surgery. B-ent., 11(2): 123-128.
31. **Sieskiewicz A, Olszewska E, Rogowski M *et al.* (2006):** Preoperative corticosteroid oral therapy and intraoperative bleeding during functional endoscopic sinus surgery in patients with severe nasal polyposis: a preliminary investigation. Annals of Otology, Rhinology & Laryngology, 115(7): 490-494.
32. **Hwang S, Seo J, Joo Y *et al.* (2016):** Does the preoperative administration of steroids reduce intraoperative bleeding during endoscopic surgery of nasal polyps? Otolaryngology–Head and Neck Surgery, 155(6): 949-955.
33. **Pathak R, Kumar N, Bagde M (2020):** A Study on the Effect of Preoperative Systemic Corticosteroids on Intraoperative Outcome in Patients Undergoing Functional Endoscopic Sinus Surgery for Sinonasal Polyposis. OSR Journal of Dental and Medical Sciences, 19(1): 19-24.
34. **Giordano J, Darras J, Chevalier D *et al.* (2009):** Preoperative corticosteroid treatment and nasal polyposis. Ann Otolaryngol Chir Cervicofac., 126(3):120-4.
35. **Albu S, Gocea A, Mitre I (2010):** Preoperative treatment with topical corticoids and bleeding during primary endoscopic sinus surgery. Otolaryngology—Head and Neck Surgery, 143(4): 573-578.