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THE IMPACT OF PREOPERATIVE STEROIDS ADMINISTRATION ON ENDOSCOPIC SINUS SURGERY: A COMPREHENSIVE SYSTEMATIC REVIEW

[1*]Satya Agung Nugroho, [2]Hasnan Habib Afifudin, [2]Rury Annida Rachman,[1]Handriono

[1]Dr. Soeroto Regional General Hospital, Ngawi, Indonesia
[2]Faculty of Medicine, Indonesia Islamic University, Indonesia

Correspondence Author:
agungfkums2015@gmail.com

ABSTRACT

Background: *Chronic rhinosinusitis (CRS) is one of the most common diseases in the world, affecting approximately 14% of people in the USA. It is defined as chronic inflammation of nasal and sinus cavities lasting longer than 12 weeks, it can be with or without nasal polyposis (CRSwNP or CRSsNP), primary and secondary, localized or diffuse disease regarding anatomic distribution, either type 2 or non-type 2, considering the endotype dominance, eCRS, and non-eCRS for eosinophilic and non-eosinophilic CRS.*

The aim: *This study aims to show about the impact of preoperative steroids administration on endoscopic sinus surgery.*

Methods: *By comparing itself to the standards set by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, this study was able to show that it met all of the requirements. So, the experts were able to make sure that the study was as up-to-date as it was possible to be. For this search approach, publications that came out between 2014 and 2024 were taken into account. Several different online reference sources, like Pubmed and SagePub, were used to do this. It was decided not to take into account review pieces, works that had already been published, or works that were only half done.*

Result: *In the PubMed database, the results of our search brought up 51 articles, whereas the results of our search on SagePub brought up 74 articles. The results of the search conducted for the last year of 2014 yielded a total 24 articles for PubMed and 48 articles for SagePub. The result from title screening, a total 5 articles for PubMed and 12 articles for SagePub. In the end, we compiled a total of 8 papers. We included five research that met the criteria.*

Conclusion: *Low dose preoperative systemic steroid (PSS) does not seem to have an effect on the long term outcome after endoscopic sinus surgery (ESS) in chronic rhinosinusitis (CRS) with nasal polyposis (NP). Eosinophilic infiltration and presence of asthma are important predictors of surgical outcome in such cases.*

Keyword: *Steroids, sinusitis, endoscopic sinus surgery.*

INTRODUCTION

Chronic rhinosinusitis (CRS) can be classified by phenotypical presentation as either CRS without nasal polyps (NP) or CRS with nasal polyps. CRS with NP is a distinct pathologic subtype of CRS, which has a greater burden of symptoms and a higher relapse rate after management. Despite the significant morbidity and the difficulty of treatment, the exact etiology of NP unfortunately has not been elucidated, and evidence to guide practitioners is also limited. [1,2]

NP decreases the surgical success rates considerably to 50-70%, and the management of CRS with NP typically requires multimodal therapy. Currently, steroid therapy (oral and topical) and surgery are the mainstays of therapy. Medical therapy using systemic corticosteroid bursts followed by long-term intranasal steroids is a primary treatment modality, and a short course of oral steroids is reported to improve subjective symptoms and objective findings in sinonasal polyposis. However, persistently symptomatic patients and those with advanced diffuse polyposis often require surgical therapy. Meanwhile, several studies have reported that intranasal steroids are effective for preventing polyp recurrence after endoscopic sinus surgery (ESS). [1,3]

Rhinitis is defined as an inflammation of the lining of the nose and is characterized by nasal symptoms including rhinorrhoea, sneezing, nasal blockage and/or itching of the nose. Allergic rhinitis (AR) is the best-known form of non-infectious rhinitis and is associated with an IgE-mediated immune response against allergens. However, a substantial group of rhinitis patients has no known allergy and they form a very heterogeneous non-allergic rhinitis (NAR) patient population suffering from drug-induced rhinitis, occupational rhinitis, irritant-induced rhinitis, hormonally linked rhinitis and idiopathic rhinitis. When inflammation of the nasal mucosa extends to the mucosa of the paranasal sinuses, the consensus term of rhinosinusitis is used. Rhinosinusitis has been shown to affect about 10% of the Western population. In addition to rhinitis symptoms, rhinosinusitis is characterized by postnasal drip, facial pressure and reduction or loss of smell. Acute rhinosinusitis (ARS) is a very common condition and mostly of viral origin. About 0.5–2% of the viral ARS are complicated by a bacterial infection. [4](Hox Valerie)

Glucocorticosteroids (GCS) are the oldest and most widely used anti-inflammatory therapy. Since their introduction in the 1950s, GCS have played a key role in the treatment of various inflammatory, allergic, and immunologic disorders. Consequently, they are known as a very effective drug for treating chronic airway inflammatory diseases involving both lower as well as upper airways. GCS can be administered topical or systemically. If possible topical GCS are preferred over systemic GCS treatment as it is well known that this systemic GCS treatment is linked to an extensive range of potential adverse effects (AE's) that have been well-described in the literature and vary from uncomfortable to life-threatening. Notably, reports on AE and/or toxicity of systemic GCS cover a heterogeneous group of GCS-treated diseases, which complicates the interpretation of the actual risk for the rhinitis/rhinosinusitis patients. [4,5](Hox Valerie)(tamene)

METHODS

Protocol

By following the rules provided by Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, the author of this study made certain that it was up to par with the requirements. This is done to ensure that the conclusions drawn from the inquiry are accurate.

Criteria for Eligibility

For the purpose of this literature review, we compare and contrast the impact of preoperative steroids administration on endoscopic sinus surgery. It is possible to accomplish this by researching or investigating the impact of preoperative steroids administration on endoscopic sinus surgery. As the primary purpose of this piece of writing, demonstrating the relevance of the difficulties that have been identified will take place throughout its entirety.

In order for researchers to take part in the study, it was necessary for them to fulfil the following requirements: 1) The paper needs to be written in English, and it needs to determine about the impact of preoperative steroids administration on endoscopic sinus surgery. In order for the manuscript to be considered for publication, it needs to meet both of these requirements. 2) The studied papers include several that were published after 2014, but before the time period that this systematic review deems to be relevant. Examples of studies that are not permitted include editorials, submissions that do not have a DOI, review articles that have already been published, and entries that are essentially identical to journal papers that have already been published.

Search Strategy

We used " the impact of preoperative steroids administration on endoscopic sinus surgery." as keywords. The search for studies to be included in the systematic review was carried out using the PubMed and SagePub databases by inputting the words: *((*"Steroids"*[MeSH Subheading] OR* "preoperative steroids"*[All Fields] OR* "endoscopic sinus surgery*" [All Fields]) AND (*"sinus surgery"*[All Fields] OR "* endoscopic sinus *"[All Fields]) AND (*"steroids administration on endoscopic sinus surgery"*[All Fields]) OR (*"Complications of sinus surgery" *[All Fields]))* used in searching the literature.

Data retrieval

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources for their article and selected those studies. After looking at a number of different research, which all seemed to point to the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.

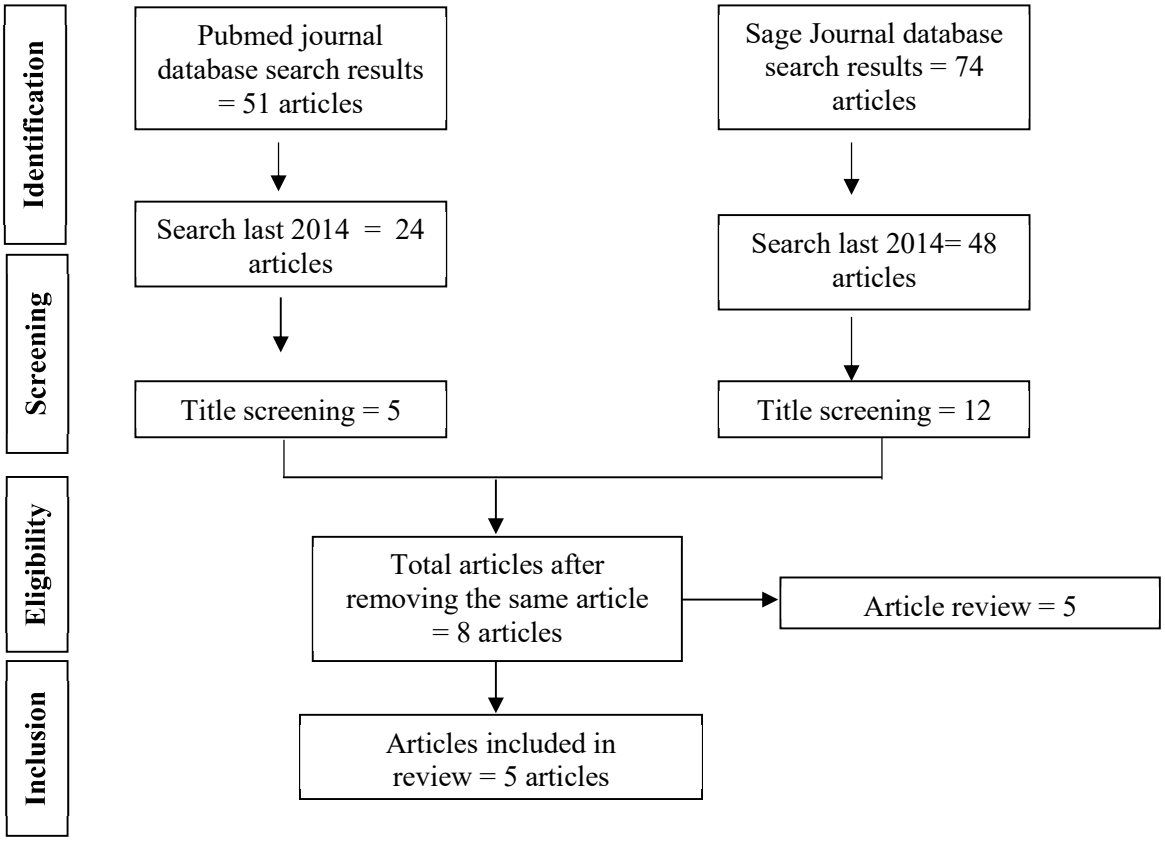

Figure 1. Article search flowchart

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analysed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

Quality Assessment and Data Synthesis

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilised in the process of selecting papers for further assessment. in order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

RESULT

In the PubMed database, the results of our search brought up 51 articles, whereas the results of our search on SagePub brought up 74 articles. The results of the search conducted for the last year of 2014 yielded a total 24 articles for PubMed and 48 articles for SagePub. The result from title screening, a total 5 articles for PubMed and 12 articles for SagePub. In the end, we compiled a total of 8 papers. We included five research that met the criteria.

Korkmaz, H *et al* (2016)[6] showed the use of preoperative steroids does not contribute to an improvement in both intraoperative blood loss and surgical time with routine use of topical concentrated epinephrine. Given the significant side effect profile of oral corticosteroids, routine use of corticosteroids prior to sinus surgery should be closely examined.

Radajewski, K *et al* (2021)[7] showed that systemic administration of 40 mg of prednisone for seven days decreased the number of eosinophils and decreased fibrosis in the nasal polyps tissue in CRSwNP patients. The use of oral steroid therapy does not significantly effect other components of tissue remodeling. It seems that there is a need for further research on drug influence on tissue remodeling in chronic rhinosinusitis.

Table 1. The litelature include in this study

Author	Origin	Method	Sample Size	Result
Korkmaz, H *et al*., 2016[6]	USA	Retrospective study	320	One hundred and forty-two patients were exposed to steroid, while the remaining 160 were steroid naive. No significant differences were found with respect to surgical time between the steroid-exposed (96.91 ± 25.97 min) and steroid-naive patients (91.24 ± 32.29 min, p = 0.100). The steroid-exposed group demonstrated a marginally increased blood loss (66.03 ± 55.81 ml) as compared to steroid-naive patients (55.00 ± 38.71 ml, p = 0.048).
Radajewski, K *et al*., 2021[7]	Poland	The prospective controlled study	65	Observed between group 1 and 2 were statistically significant decreases in tissue eosinophilia per 5HPF (57.14% group 1, 82.1% group 2; $p = 0.038$) and fibrosis (no fibrosis—57.14% group 1, 52.17% group 2; mild—30.95% group 1, 47.83% group 2, moderate—11.90% group 1, 0% group 2; $p = 0.014$). No significant differences were present in the percentage of total tissues oedema ($p = 0.49$), epithelium ($p = 0.96$), neutrophils ($p = 0.42$), basement membrane thickening ($p = 0.725$) and vessels ($p = 0.725$)
Fujimoto, C *et al*., 2019[8]	Japan	Retrospective study	92	To overcome the risk, we have adopted shortterm pre-operative systemic administration with low-dose of steroid and examined if our steroid administration makes a false-negative diagnosis. We performed a retrospective chart review of 42 patients with probable ECRS. Eleven patients were administered with 0.5 mg of bethametasone for 7 days before ESS, and other 31 patients were not administered. The average number of eosinophils in nasal polyps in patients who were administered with steroid was

				188 ± 167, which was not different from 199 ± 149 in the patients who were not administered. These findings suggest that short-term preoperative administration with low-dose of steroid has few risk of a false-negative diagnosis of definite
Chang, MT *et al*., 2021[9]	California	Prospective double-blinded, placebo-controlled, randomized clinical trial	81	72 patients (mean [SD] age, 49.4 [14.9] years; 36 men, 36 women) completed the study, with 33 in the prednisone arm and 39 in the placebo arm. When comparing longitudinal differences between treatment groups, there was no clinically meaningful difference observed in SNOT-22 total ($F[4254] = 1.71$, $\eta^2 = 0.01$ [95% CI, 0.00-0.05]) or Lund-Kennedy scores ($F[4247] = 1.23$, $\eta^2 = 0.02$ [95% CI, 0.00-0.50]). In SNOT-22 subdomain analyses, there was no clinically meaningful difference between treatment groups for rhinologic, extranasal rhinologic, ear/facial, or sleep subdomains. However, the prednisone group had worse longitudinal scores for psychological dysfunction compared with the placebo group ($F[4254] = 3.18$, $\eta^2 = 0.05$ [95% CI, 0.02-0.09]). Reported adverse effects were similar between the 2 treatment groups.
Assiri, K *et al*., 2022[10]	Saudi Arabia	A cross-sectional questionnaire study	94	A total of 94 subjects responded to the mailed survey. Of them, 72(76.6%) used preoperative steroids; 40 subjects believed that there is a strong supporting evidence while 32 reported that there is no solid evidence. The commonest indication was chronic rhinosinusitis with nasal polyp followed by allergic fungal rhinosinusitis. More than half of subjects (54.2%) preferred medium-dose prednisone (30–40 mg/day). A considerable number believed that steroids decreased surgical bleeding (n = 57, 79.2%), improved surgical field visualization (77.8%), decreased surgical time (77.8%), and decreased mucosal inflammation (61.1%). Thirteen studies

				including 1028 patients were eligible for the systematic review. Only three studies reported a statistically significant effect of steroids in reducing intraoperative hemorrhage, while only two studies revealed that steroids significantly improved surgical field quality. In two studies, steroids showed a significant effect in reducing eosinophil infiltration. There is a major number of rhinology experts using preoperative steroids for patients undergoing ESS but there is a wide variation among their practice patterns. The current potential advantages of steroids need to be supported by further large randomized clinical trials to establish clear guidelines.

Fujimoto, C *et al* (2019)[8] showed systemic administration with 0.5 mg of bethametasone for 7 days did not decrease the number of eosinophils in the nasal polyps in patients with probable ECRS. Thus, it is suggested that short-term preoperative administration with low-dose of steroid has few risk of a false-negative diagnosis of definite ECRS after ESS. However, a randomized prospective controlled study should be undertaken to confirm our conclusion. Furthermore, there is also a need to evaluate how short-term preoperative administration with low-dose steroid reduces the risk of complication after ESS.

Chang, MT *et al* (2021)[9] showed patients with CRS without polyps, oral prednisone following ESS conferred no additional benefit over placebo in terms of SNOT-22 total scores, SNOT-22 rhinologic subscores, or Lund-Kennedy endoscopy scores up to 6 months after surgery. Patients receiving prednisone, however, did demonstrate worse SNOT-22 psychologic subdomain scores. These results suggest that the risks of oral corticosteroids may outweigh the benefits; thus use of oral corticosteroids after ESS for CRS without polyps should be carefully considered.

Assiri, K *et al* (2022)[10] showed that preoperative steroids for patients undergoing ESS are beneficial in reducing intraoperative bleeding, surgical field visualization, operation time, and eosinophilic infiltration. However, these findings relied on a small number of studies. The analysis of responses of our survey revealed that although the majority of surgeons administer preoperative steroids, a large number of them reported that no solid evidence supporting these practices. CRSwNP and AFRS were the most common indications for preoperative steroids while more than half of respondents rarely or never used it for CRSsNP. In addition, there is a wide variation in terms of steroid dosage and administered duration. Therefore, further large randomized studies of preoperative steroids for CRSwNP, CRSsNP, and AFRS advocated by a subgroup analysis of subjects' age, gender, and drug regimen are recommended to help the policymakers establish standard practices.

DISCUSSION

Chronic rhinosinusitis (CRS) is a common disorder, with an estimated 15% of the general population being affected based on symptomatology. The socioeconomical burden of the disease in Europe is estimated to be €1501 per patient/year of total direct costs (outpatient department visits, hospitalization) and €5659 per patient/year of indirect costs (missed workdays, decreased productivity), more than than 20 billion US$ for joint direct and indirect costs in the US and £2.8 billion per million inhabitants in the UK. CRS with nasal polyps (CRSwNP) is known to have a significant impact on quality of life, greater in some respects than in other chronic diseases such as lower back pain or chronic obstructive pulmonary disease (COPD). Amongst nasal saline rinses, nasal corticosteroids remain the first-line conservative treatment option for CRSwNP. Previous studies have shown a positive impact on specific and general quality of life (SNQOL, GQOL) and the nasal polyp score (NPS) in patients with CRS. The effect of a course of systemic corticosteroids has been proven for CRSwNP patients in the preoperative phase, in combination with or without local corticosteroid treatment, and results in a significant reduction in the total symptom and nasal polyp score.[11]

Medical therapy forms the mainstay of management in CRS, but when this fails to improve symptoms or in the presence of actual or impending complications, surgery is usually considered. Endoscopic sinus surgery (ESS) is now considered standard practice, with open approaches rarely considered in uncomplicated disease.[12]

In order to assess the quality of surgical intervention, a variety of objective and subjective outcome measures exist to facilitate this practice and in recent years there has been a growing volume of published literature on outcomes in sinus surgery, particularly from UK and US centres. This review aims to discuss which outcome measures might be considered in the evaluation of endoscopic sinus surgery for CRS and what the published outcomes of surgery are to date. How ESS for CRS may positively influence the disease pattern in patients with asthma, and may decrease the incidence of new diagnoses of asthma will also be discussed. Finally, we consider how perioperative decision-making may alter surgical outcomes, with particular focus on patient selection, timing and extent of surgery, and the choice of post-operative care strategies.[12]

Patients who fail to respond to medical therapy are considered for Functional Endoscopic Sinus Surgery (FESS), which is one of the most common surgical procedure performed. Endoscopic sinus surgery was described by Stammberger in 1985 and Kennedy coined the term FESS to highlight its surgical philosophy of mucosal sparing . About 80% of patients have successful outcome but 20% patients suffer from relapse of sinusitis or complications warranting further surgical intervention.[13,14]

Corticosteroids have been used preoperatively, intraoperatively and postoperatively in FESS for rhinosinusitis. FESS creates a conduit for topical steroids to reach the deeper part of the sinus cavity and act on the mucosa which was previously inaccessible.Intranasal corticosteroids are therefore often included in postoperative treatment regimens. Both local and systemic corticosteroids have also been used preoperatively to reduce inflammation and intraoperative bleeding, thereby improving surgical field. It has also been shown that asthmatic patients who are given corticosteroids preoperatively have low incidence of pulmonary complications in the perioperative time period. Corticosteroids have also been postulated in pain control when used intraoperatively. There are several randomised controlled trials evaluating the role of corticosteroids in FESS, however, these studies have reported conflicting results.[9,15]

CONCLUSION

Low dose preoperative systemic steroid (PSS) does not seem to have an effect on the long term outcome after endoscopic sinus surgery (ESS) in chronic rhinosinusitis (CRS) with nasal polyposis (NP). Eosinophilic infiltration and presence of asthma are important predictors of surgical outcome in such cases.

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