

ORIGINAL RESEARCH

Efficacy of corticosteroid solution administration via Mygind's position for the management of chronic rhinosinusitis with nasal polyps

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Abstract

Objective: To investigate whether direct steroid application via Mygind's position improved objective and subjective measures of chronic rhinosinusitis with nasal polyposis (CRSwNP).

Methods: A retrospective chart review was performed on patients seen by the senior author in a Rhinology Clinic of a tertiary academic center over a 2 year period. Patients whose only change in medical regimen was initiation of corticosteroid administration via Mygind's position were included for this analysis. The main subjective and objective outcome measures were Sino-nasal Outcome Test-22 (SNOT-22) and endoscopy scores, respectively. Patient scores before and after the change in treatment were compared and analyzed using Student's *t* test and Wilcoxon signed-rank test.

Results: Twenty-two patients were identified for inclusion. There was a statistically significant decrease in overall nasal endoscopy scores for both the right ($P = .001$) and left ($P = .001$) sides. A statistically significant and clinically meaningful decrease in total SNOT-22 scores (12.7 points, $P = .008$) was also seen. Intolerance to the regimen was observed in 5/48 patients reviewed for inclusion (10.4%), with issues including neck pain, burning, pressure, and thrush.

Conclusion: The direct application of topical corticosteroids, specifically via Mygind's position, may improve both objective exam findings and clinical symptomatology in patients with CRSwNP compared to indirect application. Intolerance to the regimen can be observed.

Level of Evidence: 4—Case series (with or without comparison).

KEYWORDS

chronic rhinosinusitis, clinical outcomes, Mygind's, nasal polyps, steroids

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1 | INTRODUCTION

The effectiveness of intranasal steroids in chronic rhinosinusitis (CRS) remains a topic of study, with one recent systematic review finding low quality of evidence¹ but another supporting its use as first line therapy.² Expert opinion and current clinical practice guidelines as reflected by the EAACI Position Paper on Rhinosinusitis and Nasal Polyps Executive Summary support the use of topical steroids as a mainstay of medical therapy in CRS, especially in chronic rhinosinusitis with nasal polyposis (CRSwNP).^{3,4} The best method to ensure delivery of topical steroids to areas within the nasal cavity and paranasal sinuses has also been the subject of much study. Intranasal steroid sprays introduced in the 1970s were followed by second generation sprays and concentrated corticosteroid drops in the 1980s. A variety of head positions to administer the drops have been described. The position described by Mygind in 1985 as illustrated in Figure 1 involves lying recumbent with the head allowed to hang back and dangling over the edge of a surface such that the nostrils face upward.⁵ Other described head positions include Ragan (lying head lateral), Mecca (kneeling, vertex to floor), and upright "head back" positions. For patients undergoing therapy for CRSwNP, high volume delivery in the head down and forward position has been our standard method when administering steroids to the postoperative bed. Unfortunately, not all patients progress as expected or are desirous of revision surgery when surgical attempts have been made elsewhere. In this instance, additional concentrated steroid instillation may be necessary to avoid oral administration. As such, it has become our practice to augment certain patients' regimen with a separate instillation of steroid drops.

Although previous studies have shown that steroid application via Mygind's position can successfully deliver topical steroids to the middle meatus, data has been lacking that assesses its impact on quality of life (QOL). There is also a lack of data exploring the impact of Mygind's on endoscopic findings in patients who cannot tolerate or



FIGURE 1 Demonstration of Mygind's position for delivery of corticosteroid drops to the nasal cavity. Patient should be lying recumbent with the head allowed to hang back and dangle over the edge of a surface such that the nostrils face upward

do not derive benefit from high volume irrigation. Thus, the current study investigates whether the addition of application of topical steroids via Mygind's position leads to an improvement in subjective clinical and objective endoscopic measures in patients with CRSwNP already treated with corticosteroid-based nasal irrigations.

2 | MATERIALS AND METHODS

2.1 | Ethical considerations

This study was a retrospective analysis of patients seen in clinic as a part of normal practice. These patients were refractory to treatment with conventional nasal steroid irrigations, and thus, Mygind's position was added as an adjunct. Approval was obtained from the Institutional Review Board for Health Sciences Research at the University of Virginia.

2.2 | Methods

A retrospective chart review was conducted identifying patients with CRSwNP seen in the Rhinology clinic over a 2 year period. In postoperative patients with continued clinical or endoscopic symptoms after other medical treatment, the standard practice was to change the patient's prior medication regimen, normally consisting of saline rinses with or without steroids, to once daily steroid irrigation and once daily application of steroids via the Mygind's position. Patients were prescribed compounded budesonide, mometasone, or betamethasone solution at a concentration of 0.6 mg/5 mL. They would use 5 mL in their morning irrigation. In the evening, at least 30 minutes after a second daily saline only irrigation, they would then instill 2.5 mL of this solution in each nostril. Rarely, patients were prescribed budesonide respules (0.5 mg/2 mL) if their insurance covered this in which case 1 mL was instilled in each nostril. Patients were then asked to remain in the head back position for 3 minutes. Patients were included in the study if they had been treated with a corticosteroid-based nasal irrigation and were switched to at least a once a day Mygind's position application of a corticosteroid solution. Patients were excluded however if this switch occurred within 180 days of their most recent sinus surgery. Patients with either an endoscopy score > 0 prior to Mygind's initiation or available Sino-nasal Outcome Test-22 (SNOT-22) scores were included. Those patients failing to have a complete set of pre-/postobjective (endoscopic) or subjective (SNOT-22) scores were excluded. Analyses were performed only on the available measure. Patients were excluded from the study if they were less than 18 years old, suffered from cystic fibrosis, discontinued Mygind's position prior to follow-up or had less than 40 days of follow-up after Mygind initiation.

The primary outcome of the study was assessment of the change in the patient's QOL after instituting Mygind's. This was assessed using the sinonasal outcomes test-22 (SNOT-22). This 22-question survey is a well-established, reliable tool for assessing symptoms and

QOL in patients with CRS.⁶ Any information regarding intolerance of Mygind's position was also recorded. We also assessed the change in endoscopic polyp score after instituting Mygind's. In the score utilized, the examiner stages the right and left nasal cavities individually as 0, 1, 2, 3, and 4 depending on severity of polyposis.^{7,8}

Pre- and post-treatment data treated as parametric (SNOT-22) were analyzed with student's *t* test and nonparametric, ordinal data (endoscopic score) were evaluated with the Wilcoxon Signed-Rank test. Analysis was performed using SPSS version 25 (IBM Corp, Armonk, New York).

3 | RESULTS

Forty-eight patients in whom Mygind's position was initiated were identified. Twenty-two patients met all inclusion criteria; detailed frequencies of patients excluded from analysis can be found in Table 1. Of these, 20/22 patients had matching (pre and post) endoscopy scores while 17 patients had matching SNOT-22 scores. Overall, mean age was 50.8 (SD = 15.0). The group was comprised of 54.5% (12/22) women and all included patients were Caucasian. Of those included, 59% (13/22) had a concurrent asthma diagnosis. All included patients were postoperative from functional endoscopic sinus surgery, with postoperative time ranging from 184 days to 19 years. Time to

TABLE 1 Sample inclusion/exclusion criteria details

	Count
Initial sample	48
Exclusion criteria	
<180 days postop when switched to Mygind's	10
No history of prior nasal corticosteroid based irrigation	6
Discontinued Mygind's due to intolerance	4
Inadequate follow-up time	2
Incomplete data	4
Final sample included for analysis	22

TABLE 2 Demographic data for included patients

Patient characteristics	
Age, Mean (SD)	50.8 (15.0)
Gender	
Male (%)	10 (45.4%)
Female (%)	12 (54.5%)
Race	
Caucasian	22
Other	0
Asthma (%)	13 (59.1%)
Days postop, median (range)	717 (184 days to 19 years)
Days follow-up, median (range)	91 (44-210 days)

follow-up after initiation of Mygind's ranged from 44 to 210 days, with a median of 91 days. Demographic data are detailed in Table 2.

The prior medication regimens for patients ranged from nasal saline irrigation to oral steroids, detailed in Table 3. All 22 patients were initiated to using Mygind's position for direct steroid delivery once daily. Eighteen patients added budesonide 0.6 mg/5 mL (2.5 mL per nostril), three patients added mometasone 0.6 mg/5 mL (2.5 mL per nostril), and one patient added betamethasone 0.5 mg/2 mL, 1 mL per nostril. Choice of steroid was dictated by insurance coverage. No other changes were made to medication regimens.

Patient SNOT-22 scores improved significantly following Mygind's initiation. Mean scores improved by 12.7 points ($P = .008$, 95% confidence interval = 3.9-21.5) from pre-Mygind's (mean = 33.1, SD = 20.6) to post-Mygind's (mean = 20.4, SD = 18.4) (Figure 2). Subsequent analysis of domains revealed significant ($P < .05$) decreases in "postnasal discharge," "reduced productivity," "reduced concentration," "frustrated/irritable," and "sad," as detailed in Table 4.

A Wilcoxon signed-ranks test indicated that post-Mygind endoscopic score was statistically significantly lower than pre-Mygind endoscopic score on the right ($Z = -3.2$, $P = .001$) and the left ($Z = -3.3$, $P = .001$) nasal cavities. On the right side, the frequency of a score of 0 increased from four patients to eight patients; median score decreased from 2 points to 1 point. On the left side, frequency of a score 0 increased from three patients to seven patients; median score decreased from 2 points to 1 point. Median scores from both sides are detailed in Table 5. A small subset of all patients initially reviewed for inclusion, 5/48, (10.4%), cited issues with intolerance to

TABLE 3 Pre-Mygind's medication regimens of included patients

Zileuton	1
Montelukast	5
H1-blocker	6
Steroid spray	5
Antibiotic NSI	7
Steroid NSI	22
Oral steroid	1

Abbreviation: NSI, nasal saline irrigations.

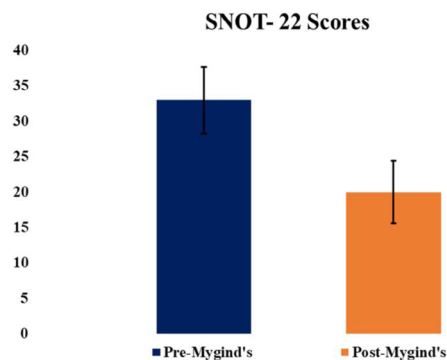


FIGURE 2 Change in SNOT-22 scores with Mygind's application of corticosteroid. Error bars with SE. SNOT-22, Sino-nasal Outcome Test-22

TABLE 4 Improvement of specific questions from SNOT-22

Question	Mean improvement	SD	t value	df	95% CI	P value
5: Postnasal discharge	1.1	2.0	3.1	16	0.13-2.1	.028
16: Reduced productivity	0.6	1.1	2.4	16	0.07-1.2	.03
17: Reduced concentration	0.7	1.2	2.5	16	0.11-1.3	.023
18: Frustrated/restless/irritable	0.7	1.4	2.1	16	0.00-1.4	.049
19: Sad	0.8	1.1	3.0	16	0.22-1.3	.009

Abbreviation: CI, confidence interval.

TABLE 5 Post-Mygind change in endoscopy score

Right					Left				
Pre-Mygind		Post-Mygind		Change	Pre-Mygind		Post-Mygind		Change
Median	IQR	Median	IQR		Median	IQR	Median	IQR	
2	1.25	1	1.25	-1	2	1	1	1.25	-1

Abbreviation: IQR, interquartile range.

the regimen; four of these patients self-discontinued Mygind's position due to these issues. Reasons for intolerance included neck pain, burning, pressure, and thrush.

4 | DISCUSSION

The current study represents the first study in the literature to report upon a patient-centered clinical improvement with direct application of high-concentration steroid solution using a particular head position during delivery. Patients did not change any other aspect of their medication regimen, enabling patients to be used as their own controls. Direct corticosteroid administration via the Mygind's position was found to improve both objective endoscopy scores and subjective symptoms. Polyp burden and overall inflammation were objectively improved by the use of Mygind's position. Patients reported an improvement in QOL based on total SNOT-22 scores, with an average improvement of 12.7 points; exceeding the minimally clinical important difference of 8.9 points; further analysis revealed independently significant improvement in domains addressed by 5/22 questions.⁶

The use of topical corticosteroids in the treatment of CRS is widely accepted.⁴ Systematic reviews demonstrate a range of effectiveness data, from declarations of low quality of evidence¹ to support for widespread use.² Mygind's position has been shown to be objectively superior to the Mecca and "head back" positions in delivering drops to the middle meatus as measured by direct visualization.⁹ Although delivery of drops using Mygind's position has been shown to be effective at objectively decreasing nasal polyposis,¹⁰ high volume (>50 mL) delivery of saline with corticosteroid utilizing a head down and forward position is supported by systematic review as being most effective for the delivery of steroids to the sinuses. The same systematic review supports Mygind's as the preferred head position if low volume devices are used.¹¹ There exists a paucity of other data in the literature exploring the effect of direct application of

concentrated corticosteroids to the nasal cavity, especially when considering clinical outcome for a certain position.

Our study represents the first to supply data on improvement in objective and subjective clinical outcomes after initiation of delivery of highly concentrated corticosteroid solution in the head-hanging-back position. These objective and subjective improvements are likely related to improved drug delivery to the superior aspect of the middle meatus and adjacent structures including the frontal recess. Mygind's position is particularly effective at delivering intranasal medication to the middle meatus⁹ and is generally well tolerated. Our results confirmed that Mygind's position is well tolerated with only 10.4% of patient reporting issues with intolerance.

While our results meet statistical and clinical significance, the study's main limitation is its retrospective nature eliminating possibility for randomization and blinding by the surgeon. The endoscopic and SNOT-22 data were acquired prospectively however which should minimize effect of recall bias. The biggest limitation of our study is that we are not able to determine if it was an improvement in steroid distribution or overall dose given the higher concentration of the instilled drops which is responsible for the improvement seen. We suspect that it is likely a combination of both factors, and recommend further study to differentiate these effects.

Previously published data has shown that saline irrigation with corticosteroids does not lead to decreased levels of serum or urine cortisol¹² and that steroid irrigation is generally accepted as a safe treatment for CRS. As our study was retrospective, we cannot determine if the prolonged contact of a more highly concentrated corticosteroid with the nasal and sinus mucosa affected their pituitary axis or not so we cannot specifically speak to its safety per se. However, as these patients were already postsurgical and medically optimized, the next step in therapy in most cases would have been oral prednisone. As such, any corticosteroid administration that avoids systemic distribution is putatively preferred.

5 | CONCLUSIONS

Corticosteroid administration via Mygind's position is a helpful adjunct for patients with CRSwNP unresponsive to other medical management as documented by improvement in both objective and subjective measures. This treatment option is generally well tolerated by patients but additional studies are required regarding its safety.

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CONFLICT OF INTEREST

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