Aerosol Therapy in Acute Rhinosinusitis: A Retrospective Case Control Study

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ABSTRACT

Objective: The aim of our study is to evaluate aerosol therapy with two different types of corticosteroids (budesonide and beclomethasone) in patients suffering from acute rhinitis. Methods: 96 patients with acute rhinosinusitis (ARS) were enrolled. The population was divided randomly in two groups: 48 patients treated with aerosol budesonide vial 0.5mg / ml (group A), the other 48 treated with beclomethasone vial 0.8mg / 2ml (group B). All patients underwent control after 20 days of treatment. Data about olfactory function (Visual analogue Scale), Sino-Nasal Outcomes Test (SNOT-22) and total nasal resistance (rhinomanometry) were collected and analyzed. Results: Group A evidenced a reduction of total nasal resistance (p = 0.007) and of nasal symptomatology (p = 0.008). Olfactory function did not show statistically significant differences between the two groups. Conclusion: patients who have performed aerosol therapy with budesonide, compared to those who have used beclomethasone, have an improvement in nasal airflow and a reduction in obstructive symptoms statistically valid.

Keywords: Rhinosinusitis; budesonide; beclomethasone; aerosol therapy

1. INTRODUCTION

Rhinosinusitis is a pathology that occurs with inflammation of the nasal passages and sinuses, characterized by the presence of two or more symptoms, one of which must be or either blockage, obstruction, nasal congestion or nasal discharge (anterior or posterior rhinorrhea). Other symptoms would be pain, sensation of facial pressure and total or partial loss of the sense of smell.

According to data published in the United States, affects 2-5% of the general population and accounts for 5% of otorhinolaryngological consultations. Rhinosinusitis affects men more often than women in a ratio of 3:1, usually appears in the middle age of life. It is rarer in children and often goes unnoticed [1,2]. The aim of our study is to evaluate aerosol therapy with two different types of corticosteroids (budesonide and beclomethasone) in patients suffering from acute rhinitis.

2. METHODS

A retrospective study was carried out in the private clinic of Otorthinolaryngology directed by Doctor Sandro Gazia in Capo d’Orlando (Italy) from 2016 to 2017. Patients with an allergy diagnosis and patients with rhinosinusulase symptoms lasting longer than 3 months within one year were excluded from the study. 96 patients with acute rhinosinusitis (ARS) were enrolled. The whole population performed aerosol therapy with physiological solution (3ml) and fluimucil antibiotic (thiamphenicol and acetylcysteine 500mg ampopules) twice a day for 20 days. 48 patients added within the aerosol budesonide vial 0.5mg / ml (group A), the other 48 patients added beclomethasone vial 0.8mg / 2ml (group B). All patients underwent control after 20 days of treatment. Data about, olfactory function (Visual analogue Scale), Sino-Nasal Outcomes Test (SNOT-22) and total nasal resistance (rhinomanometry) were collected and analyzed.

Rhinomanometry pre and post- treatment

Anterior rhinomanometry was performed in all participants according to current recommendations of the Committee Report on Standardization of Rhinomanometry [3]. To analyze the degree of nasal airway obstruction, nasal air flow (mL/s) and nasal airway resistance (expressed in Pa/mL s) were measured by anterior rhinomanometry with NR6 Clinic Rhinomanometer Inventis BIOMEDICA of each nostril, calculated at a pressure of 150 Pa, with merging of values from the left and right nostril to measure total nasal resistance (TNR).

Visual Analogue Scale olfactory dysfunction pre and post- treatment

Self-rating scale on olfactory function was administered before the operation and after one year. A VAS (Visual Analogue Scale) was used to measure olfactory dysfunction; scores ranged from 0 to 10, where 0 indicated complete olfactory loss and 10 indicated normal function.

Sino-nasal Outcome Test (SNOT-22) pre and post-treatment

The SNOT-22 is a 22-item outcome measure applicable to sinonasal conditions and surgical treatments (score range, 0–110). It was derived from the SNOT-20, with two questions added to measure nasal blockage and sense of taste/smell. Higher total scores on the SNOT-22 imply greater impact of CRS on health-related quality of life (HRQoL) [4].

Statistical analysis

Statistical analyses were performed using SPSS 25.0 (IBM SPSS Statistics, New York, USA). The data are presented as means with standard deviations. Data normality was assessed using the Kolmogorov-Smirnov test of normality. The Man-Whitney-U-Test was used to compare measurements of VAS. The t student was used to compare the improvement TNR data, SNOT-22 and the ages of the groups. The chi-square test was used for comparisons of the gender distribution of the groups. Odds ratio and their corresponding 95 % confidence intervals were calculated. A p ≤ 0.05 was been considered significant.

3. RESULTS

Applying the inclusion and exclusion criteria, 48 patients of which 30 males and 18 females with mean age 44.15 ± 9.84 were selected in the A group and 48 patients of which 26 males and 22 females with mean age 46.72 ± 10.91 in the B group (Table 1).

Table 1: Characteristics of population

<table>
<thead>
<tr>
<th></th>
<th>Group A (N=24, N (%) M+SD)</th>
<th>Group B (N=24, N (%) M+SD)</th>
<th>P value</th>
<th>Odd ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30/48 (62.5%)</td>
<td>26/48 (54.2%)</td>
<td>0.40</td>
<td>1.41 (0.62-3.18)</td>
</tr>
<tr>
<td>Female</td>
<td>18/48 (37.5%)</td>
<td>22/48 (45.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>44.15 ± 9.84</td>
<td>46.72 ± 10.91</td>
<td>0.15</td>
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</tr>
</tbody>
</table>

N number, % percentage, M media, SD standard deviation, CI confidence interval

Age and gender no evidenced a statistical difference between two groups (p>0.05).

Thanks to the rhinomanometry before and after 20 days of treatment we were able to calculate the decrease in Total Nasal Resistance which was on average 0.52 ± 0.12 Pa/ml /s in the A group and 0.45 ± 0.12 Pa/ml /s in the B group, thus obtaining a statistically significant data (p=0.007).

The difference between the VAS for olfactory dysfunction after 20 days of treatment and the VAS before therapy was on average 7.68 ± 1.53 in group A and 7.37 ± 1.69 in group B. This data is not statistically significant (p=0.36), therefore the subjective recovery of the olfactory function does not vary according to different kind of corticosteroid.
Group A evidenced a reduction of nasal symptomatology (p=0.008) better than group B, using SNOT-22 pre and post-treatment (Table 2).

Table 2: Improvement of Visual Analogue Scale of Olfactory Disfunction, Reduction of Total Nasal Resistance (Pa/ml/s), Reduction of SNOT-22 expressed as mean ± Standard Deviation after 20 days of treatment.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>7.68 ± 1.53</td>
<td>7.37 ± 1.69</td>
<td>0.36</td>
</tr>
<tr>
<td>TNR</td>
<td>0.52 ± 0.12</td>
<td>0.45 ± 0.12</td>
<td>0.007</td>
</tr>
<tr>
<td>SNOT-22</td>
<td>56.18 ± 6.62</td>
<td>51.91 ± 8.63</td>
<td>0.008</td>
</tr>
</tbody>
</table>

M medium, SD standard deviation, VAS Visual Analogue Scale, TNR Total Nasal Resistance calculated at a reference pressure of 150 Pa. SNOT Sino-nasal Outcome Test

4. DISCUSSION

Our study shows that patients who have performed aerosol therapy with budesonide, compared to those who have used beclomethasone, have an improvement in nasal airflow and a reduction in obstructive symptoms. The impact of budesonide added to saline nasal lavage for the treatment of rhinosinusitis has been investigated with several prospective cohort studies. Sachanandani et al. [5] found clinically significant improvement in SNOT-20 scores and no change in adrenal function in 9 patients with rhinosinusitis treated with saline nasal lavage with budesonide for 30 days. Steinke et al. [6] performed a similar study evaluating budesonide saline nasal irrigation treatment in 8 patients with rhinosinusitis and demonstrated similar significant improvements in several objective and subjective sinus outcome measures. The conclusions from these studies, while promising, were largely speculative given the small sample sizes. Most recently, Snidvongs et al. [7] demonstrated significant and sustained objective and subjective clinical improvement in a large cohort of patients with rhinosinusitis treated after endoscopic sinus surgery with topical steroid nasal irrigations. All 3 of these studies have been limited, however, by lack of a control group. There are several studies that show excellent results on the use of beclomethasone in rhinosinusitis [8,9,10], but no studies have been found in literature that compare these two corticosteroids.

5. CONCLUSION

Aerosol therapy with antibiotics and corticosteroids shows excellent results in the treatment of acute rhinosinusitis. Our study shows that patients treated with budesonide have better nasal obstruction outcome than patients treated with beclomethasone.

REFERENCES