

Outcome of Conservative Management of Chronic Rhinosinusitis in Adults: An Observational CT-Controlled Study

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Abstract: Objectives: To evaluate short-term outcome of conservative treatment of chronic rhinosinusitis (CRS) and the frequency of need for surgical conversion. **Patients & Methods:** The study included 120 CRS patients; 71 males and 49 females with mean age of 37.4 ± 7.2 years. All patients underwent nasal endoscopy and endoscopic findings were graded according to Lund-Kennedy scoring system. CT scan of paranasal sinuses was performed and assessed according to Lund-Mackay scale. All patients completed the Rhinosinusitis Disability Index (RSDI) and the chronic sinusitis score (CSS) quality of life questionnaires. All patients were prescribed fluoroquinolones as first line for 14 days and cases were divided into responders and non-responders according to the obtained response. Non-responders were prescribed high-dose amoxicillin-clavulanate as alternative line for 14 days. Non-responders and responders had recurrent attack were prepared for surgical treatment. All responders had to complete post-treatment RSDI and CSS questionnaire and those remained free of recurrence for at least 6 months underwent CT imaging. **Results:** At the end of 3-months, 70 patients (58.3%) responded to treatment with evident improvement of complaints and significant improvement of health quality of life scores compared to their pretreatment scores. Twenty-nine patients had recurrent symptoms after a mean duration of 6 ± 1.3 months, while 41 patients completed free follow-up for a mean duration of 8 ± 3.1 months. The relapsed patients received the alternative line of conservative treatment and 10 of them responded to the second episode of treatment, while 19 patients were converted to surgical management. Response to conservative treatment was assured by post-treatment CT examination showing resolution of sinuses opacity and significant decrease of Lund-Mackay scale. Non-responders received the alternative line and 17 patients responded, while 33 patients were converted to surgical treatment. Collectively, 41 patients (34.2%) responded to first line of management, 27 patients (22.5%) responded to the alternative line of management and 52 patients (43.3%) were converted to surgery. **Conclusion:** Trials of conservative management for patients with CRS allowed CT-confirmed resolution of infection in about 35% of patients with significant improvement of quality of life scores and spares surgical interference, so relieving patients' apprehension and minimized cost with high benefit and restoring surgery for non-responders.

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Key word: Chronic rhinosinusitis, CT, Conservative treatment

1. Introduction

Chronic Rhinosinusitis (RS) is defined as inflammation of the nose and paranasal sinuses characterized by two or more symptoms including nasal obstruction or discharge along with either facial pressure/pain or reduction or loss of smell. Confirmation of sinus-nasal mucosal inflammation via either endoscopic inspection or imaging is recommended to confirm the clinical diagnosis. Chronicity is arbitrarily defined by the persistence of symptoms beyond 12 weeks (Bhattacharyya & Lee, 2010).

Rhinosinusitis poses a major health problem, substantially affecting quality of life, productivity, and finances. According to recent analysis of US National Health Interview Survey data, RS affects approximately 1 in 7 adults and the number of workdays missed annually because of RS was 5.67 days. Chronic RS (CRS) affects certain general

health domains including social functioning, bodily pain more than more severe chronic diseases as angina, chronic heart failure or chronic back pain (Bhattacharyya *et al.*, 2009; Pleis *et al.*, 2009; Ryan & Brooks, 2010).

The recognition of CRS as multifactorial in origin and not simply a persistent bacterial infection has led to a re-evaluation of the role of antibiotics in treatment. It is appreciated that impaired sinus drainage can lead to secondary bacterial infection in all CRS forms, and patients benefit from antibiotic intervention for acute exacerbations of CRS. However, the role of antibiotics beyond this role is currently under debate. The use of antibiotics in CRS can be examined in terms of 'short term' and 'long term' use. However, the evidence base for such use is not clear cut, and has been hampered by clinical studies where the patient groups within CRS are again not clearly defined and often lack radiological

confirmation of disease (Nagi & Desrosiers, 2005; Pawankar *et al.*, 2004; Wood & Douglas, 2010).

The present prospective study aimed to evaluate the short-term outcome of conservative treatment of chronic rhinosinusitis and the frequency of need for surgical conversion.

2. Patients and Methods

The present study was designed to include CRS patients free of nasal polypi and attending the outpatient's clinic since Oct 2008 till June 2010 so as to allow a minimum follow-up period of 3 months for the last enrolled case. Enrollment criteria included clinical signs of CRS including facial pain; sinus headache, nasal congestion, discolored rhinorrhea and/or cough, for more than 3 months. After obtaining written fully informed patients' consent, all patients underwent full medical history, general and physical ENT examination. Patients with CRS who have cystic fibrosis, known primary or secondary immunodeficiency or illness involving major organs were excluded off the study.

All patients underwent nasal endoscopy using rigid optical fiber of 2.7 mm, 0-30° endoscope under surface anesthesia. Endoscopic findings were graded according to Lund-Kennedy scoring system (Lund & Kennedy, 1995) to assess the following parameters: nasal mucosa edema (absent=0, mild-moderate=1 or polypoid degeneration=2), presence of secretion (absent=0, hyaline=1 or thick &/or mucopurulent=2) and presence of polyps (absent=0, limited to the middle meatus=1 or extended to the nasal cavity=2). The assessment was performed bilaterally, with the total points corresponding to the sum of values obtained in both sides. Excluding patients with nasal polypi, thus, the score ranged from 0-8 and the endoscopic result was considered positive for CRS if Lund-Kennedy score was >2.

CT scan of paranasal sinuses was performed using sections at coronal and axial plans with continuous sections of 2.0 and 3.0 mm thickness. CT scans were assessed according to Lund-Mackay scale (1993). Each paranasal sinus was graded from 0 to 2 depending on the level of opacification as follows: 0=no obstruction, 1=partial obstruction and 2=total obstruction. As regards scoring of ostiomeatal complex: 0=no obstruction and 2=obstructed. Assessment was conducted bilaterally for a total score range of 0-24 points, and the highest value corresponded to greater severity of the disease.

All patients were asked to complete two quality of life questionnaires: the Rhinosinusitis Disability Index (RSDI) and the chronic sinusitis score (CSS). Patients were asked to complete each questionnaire at time of enrollment and after 3-months of start of conservative treatment. The RSDI contains 30

questions (score range: 0-120) and consists of three subscales that measure disease-specific patient status in the physical, functional, and emotional domains (Benninger & Senior, 1997). The physical subscale contains 11 questions (score range: 0-44), the functional subscale contains 9 questions (score range: 0-36), and the emotional subscale contains 10 questions (score range: 0-40). Lower RSDI total and subscale scores represent a lower impact of sinus disease. The CSS is a six-item questionnaire used to measure sinusitis-specific symptom and medication use during the preceding 8-week period (Gliklich & Metson, 1995). The aggregate and subscale scores each range from 0 to 100 with lower scores representing a greater impact of sinus disease.

All patients were prescribed respiratory fluoroquinolones, either moxifloxacin, or levofloxacin; nasal douching and painkiller if required, treatment was given as intensive course for 14 days and then patients were maintained on nasal douching only for the remainder of 3 months duration. Cases were divided into responders and non-responders according to the obtained response at the end of the first 2-weeks duration. Non-responders were prescribed high-dose amoxicillin-clavulanate (2 g of amoxicillin/day and 125 mg of clavulanate/day) in addition to nasal douching and local steroids and painkiller if required till achieve response and corticosteroid was gradually withdrawn and other lines were continued for 14 days or prepared for surgical treatment according to situation. Responders were followed up monthly for recurrence of symptoms and those had recurrent attack were managed as non-responders.

All responders had to complete another set of RSDI and CSS questionnaire for evaluation of the impact of conservative management on patients' quality of life. All responders remained free of recurrence for at least 6 months underwent CT imaging for confirmation of resolution of infection

Statistical analysis

Obtained data were presented as mean±SD, ranges, numbers and ratios. Results were analyzed using Wilcoxon's test for unrelated data (Z-test) and Chi-square test. Statistical analysis was conducted using the SPSS (Version 10, 2002) for Windows statistical package. P value <0.05 was considered statistically significant.

3. Results

The study included 120 CRS patients fulfilling the inclusion criteria, 71 males (59.2%) and 49 females (40.8%) with mean age of 37.4±7.2; 25-51 years. Endoscopic examination was positive for all patients with a total Lund-Kennedy score was >2, but

owing to exclusion of patients had nasal polyposis the calculated maximum score was ranged between 3 and 7 and no patient had score of 8. Seventy-four patients (61.7%) had score of 3, 26 patients (21.7%) had score of 4 and 20 patients (16.6%) had score in range of 5-7. Mean Lund-Mackay scale of pretreatment CT was 11.8 ± 2.2 ; range: 6-16. Detailed pretreatment data of enrolled patients are shown in table 1.

At the end of 3-months of conservative treatment, 70 patients (58.3%) responded to treatment with evident improvement of complaints and significant improvement of health quality of life scores compared to their pretreatment scores. These 70 patients continued a follow-up period of 7.2 ± 2.7 ; 3-14 months. Unfortunately, 29 patients had recurrent symptoms after a mean duration of 6 ± 1.3 ; range: 3-10 months, while the other 41 patients completed their follow-up for a mean duration of 8 ± 3.1 ; range: 5-14 months without evidence of recurrence. The relapsed patients received the alternative line of conservative treatment and 10 of them responded to the second episode of treatment, while 19 patients were converted to surgical management, (Table 2). Response to conservative treatment was assured by

post-treatment CT examination showing resolution of sinuses opacity and significant decrease of Lund-Mackay scale compared to scale estimated prior to initiation of conservative treatment, (Figs. 1 & 2).

The remaining 50 patients did not respond to conservative treatment and received the alternative line of conservative treatment and 17 patients responded to the alternative therapy, while the remaining 33 patients were converted to surgical treatment, (Table 2). Collectively, 41 patients responded to first line of management with a successful response rate of 34.2%, 27 patients responded to the alternative line of management with successful response rate to the second line of treatment of 22.5% and 52 patients were converted to surgery with a conversion rate of 43.3%, (Fig. 3).

For responders, mean post-treatment RSDI score (31.7 ± 7.8 ; range: 20-55) was significantly ($Z=7.276$, $p<0.001$) lower compared to pre-treatment score (49 ± 8.6 ; range: 35-65), (Fig. 4). Similarly, mean post-treatment CSS score (59.4 ± 9.6 ; range: 45-85) of responders was significantly ($Z=7.253$, $p<0.001$) higher compared to pre-treatment score (35.5 ± 6.8 ; range: 23-55), (Fig. 5).

Table (1): Pretreatment data of enrolled patients

Data			Findings
Age (years)			37.4 ± 7.2 (25-51)
Gender	Males		71 (59.2%)
	Females		49 (40.8%)
Lund-Kennedy score for endoscopic findings	Strata	Score=3	74 (61.7%)
		Score=4	26 (21.7%)
		Score=5	5 (4.1%)
		Score=6	7 (5.8%)
		Score=7	8 (6.7%)
	Mean total score		3.7 ± 1.2
Lund-Mackay score for CT findings	Strata	Score=6	1 (0.9%)
		Score=8	6 (5%)
		Score=10	43 (35.8%)
		Score=12	31 (25.8%)
		Score=14	31 (25.8%)
	Score=16	8 (6.7%)	
Mean total score		11.8 ± 2.2	

Data are presented as mean \pm SD & numbers; ranges & percentages are in parenthesis

Table (2): Patients' distribution according to their outcome after conservative treatment

Data			Finding
Responders	No recurrence		41 (34.2%)
	Recurrence	Responders to alternative line	10 (8.3%)
		Conversion to surgery	19 (15.8%)
Non-responders	Responders to alternative line		17 (14.2%)
	Conversion to surgery		33 (27.5%)

Data are presented as numbers; percentages are in parenthesis



Fig 1a: Pre-treatment CT Scan PNS coronal sections shows chronic sinusitis including all Para-nasal sinuses



Fig 1b: Post-treatment CT Scan PNS coronal sections showing clear paranasal sinuses.

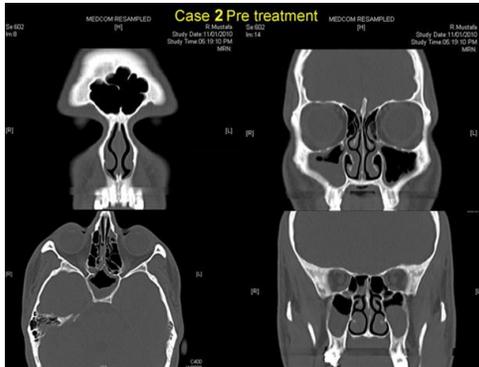


Fig 2a: Pre-treatment CT Scan PNS coronal sections shows chronic sinusitis including maxillary, ethmoidal and sphenoid sinuses

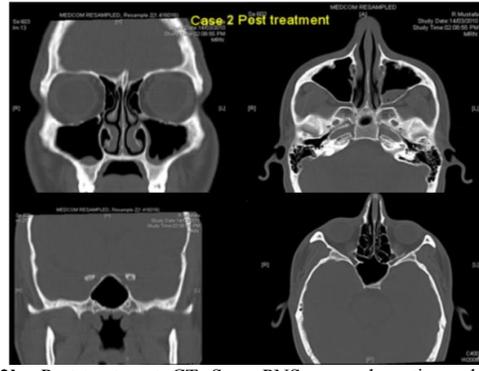


Fig 2b: Post-treatment CT Scan PNS coronal sections showing clear paranasal sinuses.

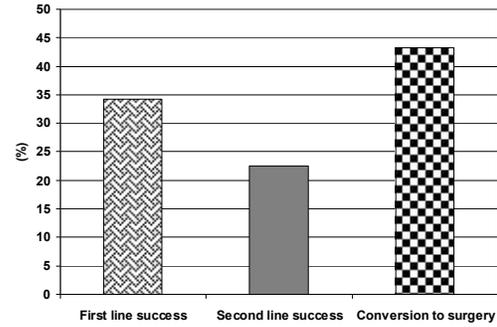


Fig. (3): Outcome of conservative management

Fig 3: Outcome of conservative management

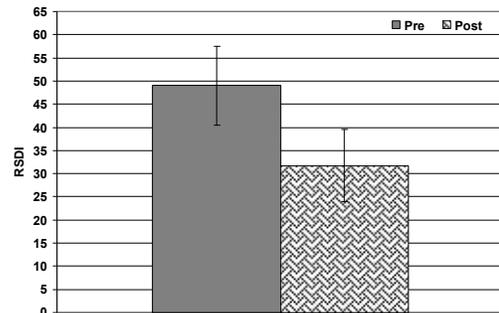


Fig. (4): Mean (±SD) RSDI of responders to conservative management estimated pre- and post-treatment

Fig 4: Mean (±SD) RSDI of responders to conservative management estimated pre- and post-treatment

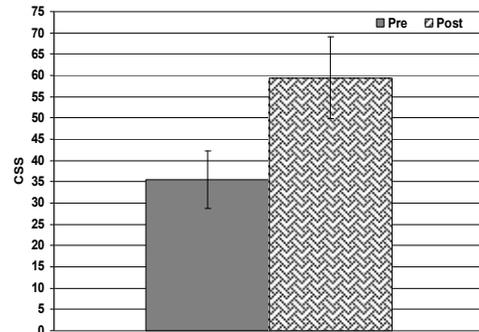


Fig. (5): Mean (±SD) CSS of responders to conservative management estimated pre- and post-treatment

Fig 5: Mean (±SD) CSS of responders to conservative management estimated pre- and post-treatment

4. Discussion

Rhinosinusitis is a common medical problem that interferes with patient quality of life and loss of work productivity. Because of the heterogeneity that underlies its pathology, no one treatment regimen exists for the management of rhinosinusitis. Moreover, the outcome of management with the possibility of recurrence after successful surgery and the financial burden of repeated need for surgery with its subsequent load on both patients' and hospital resources renewed the idea for repeated courses of conservative management as a definite policy for management of patients with CRS (Chan & Kuhn, 2009; Rosenfeld *et al.*, 2007).

Enrollment and cure criteria relied on both subjective findings defined as the frequency and intensity of symptoms, and health quality of life questionnaires and objectively on post-treatment CT. Policy was dependent on the previous findings that imaging studies are not necessary to confirm the diagnosis of clinical rhinosinusitis for the purposes of treatment, but should be reserved for cases in which the diagnosis is in doubt or a complication is suspected, and for patients with recurrent or chronic rhinosinusitis and under these circumstances, computed tomography is the preferred evaluation (Esposito *et al.*, 2007). Also, Pearlman & Conley (2008) documented that chronic rhinosinusitis is likely when symptoms persist for greater than 12 weeks, with computed tomography being the gold standard for diagnostic testing.

Therapeutic policy depended on the application of intensive oral antibiotic course using either of the two documented preparations; either respiratory fluoroquinolones or amoxicillin-clavulanate combination, both lines are well documented for management of acute rhinosinusitis and proved effective (Anon, 2005). Moreover, Tomás *et al.* (2008) documented that in mild acute maxillary rhinosinusitis without previous antibiotic treatment, the treatment of choice is amoxicillin/clavulanate or cefditoren, while when it is moderate or mild in patients previously treated with antibiotics, levofloxacin or moxifloxacin are preferable, the amoxicillin/clavulanate or cefditoren drugs remaining as good alternatives. In the severe forms, third generation cephalosporins, such as cefotaxime or ceftriaxone, are indicated and amoxicillin/clavulanate or ertapenem are good options in the non-polypoidal chronic forms.

Topical corticosteroids were preserved for non-responders to be used in conjunction with an alternative line of antimicrobial to aid to reduce nasal edema and improve ostial drainage and ventilation of the sinus (Leo *et al.*, 2009); such policy supports that experimentally proven by Sebeyaz *et al.* (2008) who

reported that administering corticosteroids as an adjunct to antibiotics may accelerate the healing process in experimentally induced rhinosinusitis. In total, the applied policy of using antimicrobials, nasal douches and topical corticosteroids goes with the guidelines previously documented by Scheid & Hamm *et al.* (2004) and Chan & Kuhn, (2009) as line of management of CRS prior to taking a decision for endoscopic sinus surgery.

The applied policy for conservative management resulted in conversion to surgery in 43% and spared surgery in 53% of studied patients irrespective of response to either line of treatment and postponed surgery in 15.8% of patients who required surgical interference after recurrence of symptoms after first trial and failure of the second trial. Concomitantly, both RSDI and CSS post-treatment scores were significantly improved in responders compared to their pre-treatment scores, a finding indicating the impact of CRS on quality of life and manifesting the beneficial effect of treatment on it. These findings obtained by intensive use of empirical antimicrobial therapy go in hand with Alobid *et al.* (2008) reported that CRS has a considerable impact on a patient's quality of life but co-morbidities, such as asthma and atopy, have an accumulative negative effect and both medical and surgical treatments lead to a similar improvement on the quality of life of CRS and nasal polyp patients.

Moreover, Randhawa *et al.* (2009) reported a 23% decrease in total CSS scores in patients received medical treatment for CRS with significant difference compared to pre-treatment CSS up to $p=0.01$ and a 38% reduction in total CSS scores after endoscopic surgery but with less significant improvement reaching only to $p=0.02$. The more significant improvement of CSS reported by Randhawa *et al.* (2009) that confirmed by the current study could be attributed not only to the relief of symptoms but also to the sense of at least postponing the decision for surgical interference if not sparing it.

In hand with the obtained results, Chin *et al.* (2010) tried empirical antibiotic-based medical therapy for 172 CRS patients and reported that 69.8% of patients were treated successfully and 30.2% of patients did not respond to medical treatment and eventually underwent FESS. Moreover, Chin *et al.* (2010) reported that *Staphylococcus aureus* was the most common pathogen and the rate of sensitivity of the cultured microbes to amoxicillin with clavulanate and cephalosporins was 78% and 70%, respectively. Iseh & Makusidi (2010) reported that rhinosinusitis in north western Nigeria was more of chronic (83.6%) variety than acute (16.4%) variety and about 86.3% were amendable to medical treatment while surgical treatment was carried out in 13.7% of the

cases so rhinosinusitis should be managed medically first before recourse to surgical measures in carefully selected cases.

In support of the applied policy, Guilemany *et al.* (2010) documented that in CRS with and without nasal polyps, medical treatment, including nasal corticosteroids, is the first therapeutic option and endoscopic sinus surgery is only recommended when medical treatment fails.

It could be concluded that trials of conservative management for patients with CRS allowed CT-confirmed resolution of infection in about 35% of patients with significant improvement of quality of life scores and spares surgical interference, so relieving patients' apprehension and minimized cost with high benefit and restoring surgery for non-responders. Thus, it is imperative to try medical treatment with the applied regimen as a first choice for CRS patients and preserve surgery as a final decision after failure of conservative trials.

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