Quality of Life in Patients with Chronic Rhinitis after Radiofrequency Inferior Turbinate Reduction

Wish Banhiran MD*,
Pongsakorn Tantilipikorn MD*, Choakchai Metheetrairut MD*,
Paraya Assanasen MD*, Chaweewan Bunnag MD*

** Department of Oto-Rhino-Laryngology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*

Objective: *This prospective, before-and-after study was aimed to demonstrate the effectiveness of radiofrequency (RF) inferior turbinate reduction in patients with chronic rhinitis refractory to medication on quality of life.*
Material and Method: *From April 2007 to April 2008, there were 28 patients enrolled in the present study. The temperature-controlled radiofrequency (RF) was applied at inferior turbinate on both sides. To compare before and at the 8th weeks after RF treatment, the patients were given Rhinoconjuctivitis Quality of Life questionnaires (Rcq-36) and questionnaires using visual analog scales (0-10) to assess subjective symptoms such as the frequency and severity of nasal obstruction, nasal discharge, hyposmia, and sneezing. The acoustic rhinometry and active rhinomanometry were also done to evaluate objective outcomes.*
Results: *At the 8th week after RF treatment, the patient's quality of life in every dimension of Rcq-36 and all symptoms revealed a significant improvement ($p < 0.05$). Particularly, the severity and frequency of nasal congestion were reduced from 6.8 ± 2.5 and 6.3 ± 2.5 to 2.6 ± 2.2 and 2.5 ± 2.1 respectively ($p < 0.001$). However, there was no statistically significant change in objective findings. All patients reported only minimal pain and no complication.*
Conclusion: *This is the first study to show that radiofrequency inferior turbinate reduction can improve quality of life of the patients with chronic rhinitis in all dimensions. It is a simple and minimal invasive procedure, and thus will be a good alternative treatment.*

Keywords: *Radiofrequency turbinate reduction, Chronic rhinitis, Quality of life*

J Med Assoc Thai 2010; 93 (8): 950-60
Full text. e-Journal: *http://www.mat.or.th/journal*

Chronic rhinitis is a very common problem which can be caused by allergic or non-allergic diseases. Its symptoms include nasal obstruction, rhinorrhea, sneezing, excessive sputum due to post nasal discharge, and a reduction of smell sensation. Although not life-threatening, the disease can significantly interfere with the patient's quality of life[1]. In addition, it can have a significant impact on sleep quality and even aggravate obstructive sleep apnea in some patients[2]. Most of these patients have a good response to non-pharmacological measures such as allergen avoidance or environmental control and various medications including antihistamines, decongestants and nasal steroids. However, when conservative and medical treatment has failed, nasal surgery may have a role.

The temperature-controlled radiofrequency volumetric reduction (RFVTR) has been applied to treat several upper airway diseases especially chronic rhinitis[3] and obstructive sleep apnea[4,5]. Its major mechanism is to produce thermal coagulation necrosis in the submucosal tissue by releasing specific radiofrequency (460 kHz) energy through a special probe under well-controlled temperature (60°-90°C). Its advantages are 1) it can be done simply and quickly under local anesthesia in an out-patient environment without nasal packings, 2) it can preserve a good mucocilliary function, and 3) it causes only minimal postoperative pain[6-10]. Although, the efficacy and safety of radiofrequency turbinate reduction have been confirmed in the literature, most of the studies were based on only subjective symptoms and objective outcomes[10-15]. To best of the authors' knowledge, the effectiveness of this procedure on improvement

Correspondence to:
Banhiran W, Department of Oto-Rhino-Laryngology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.
Phone: 0-2419-8040, 0-2419-8046, Fax: 0-2419-8044
E-mail: wishbanh@gmail.com

of patient's quality of life has not been reported. Therefore, it is the authors' objective to demonstrate the effects of RF treatment on this outcome in patients with chronic rhinitis who have failed medication.

Material and Method

Population

This present prospective study was approved by Siriraj Institutional Review Board (SIRB). Written informed consent was obtained from all participants.

From April 2007 to April 2008, 28 patients were enrolled in the present study at the ENT outpatient clinic, Siriraj Hospital, Bangkok, Thailand. The inclusion criteria were patients aged over 18 years old who complained of chronic nasal obstruction with a diagnosis of chronic rhinitis refractory to medical therapy (subjective improvement less than 50% after regular treatment with antihistamine, oral decongestants, and intranasal corticosteroids for at least 1 month). The exclusion criteria were patients who had other sinonasal disorders such as acute or chronic rhinosinusitis, nasal polyps, severe deviated nasal septum, nasal valve collapses or history of previous intranasal surgery. The authors also excluded the patients who are allergic or intolerant to xylocaine and oxymetazoline, patients with underlying hematologic disease, unstable cardiovascular problems, psychiatric or emotional problems, language or cognitive difficulties which might reduce the reliability of self-administered questionnaires, and patients who did not complete the follow up protocol. Although not mandatory, the authors advised all the patients to have allergy skin tests for the best treatment plan. However, no distinction was made between patients who have allergic rhinitis or non-allergic rhinitis because both of them can present with nasal congestion and surgical reduction of the inferior turbinate has been advocated with quite similar results in both groups[11,15].

Subjective evaluation

Patients who met the eligible criteria and consented to participate in the present study were asked to assess their quality of life in a self-administered questionnaire called Rcq-36 or Rhinoconjuctivitis Quality of Life questionnaire. It consisted of 36 questions covering six dimensions and two independent items[16,17] (see Appendix). There were 17 items in the dimension of symptoms (4 in rhinitis symptoms (RS), 4 in eye symptoms (ES), and 9 in other symptoms (OS)). The other dimensions consisted of 3 items in physicalfunctioning (PF), 3 in rolelimitation (RL), 3 in sleep problems (Sleep), 3 in social functioning (SF), and 5 items in emotions (E) dimension. The last 2 independent questions included 1 item about overall health (OH), and 1 item about absent day (s) from work per month due to the disease or absenteeism. Each item had numeric scores ranging from 1 to 5 (the lower score indicated the better quality of life) except for absenteeism which is an open-ended question. All patients were also given questionnaires using standard visual analog scales or VAS (0-10) to assess the severity of symptoms including frequency and severity of nasal obstruction, anterior nasal discharge, sneezing, hyposmia, and postnasal drip before and after treatment with radiofrequency (RF). The authors defined score 0 as no symptom and score 10 as maximal symptom severity. The patients were also asked about side effects from the treatment by an open-ended question and the severity of postoperative pain by VAS (0-10) questionnaires.

Objective evaluation

All patients underwent intranasal endoscopy before and after RF treatment to exclude other pathology and to follow-up. Acoustic rhinometry or ARM (Eccovision Acoustic Rhinometry System V 3.54, Germany) and active anterior rhinomanometry or RMM (ATMOS 300, Germany) were done to measure intranasal minimal cross sectional area (MCA) which is most likely at nasal valve area or anterior end of inferior turbinates, volumes of nasal cavities (VOL), and nasal airway resistance (NAR) at pressure difference of 75 and 150 Pascals before and at the 8th weeks after RF treatment. Intranasal findings were assessed with endoscope by the first author to observe any postoperative changes or complication at each visit.

Surgical procedures

The operation was performed on every patient under local anesthesia by using cottonoids soaked with 1% xylocaine packed for 5 minutes and 0.5% xylocaine with adrenaline 1:200,000 injection along the inferior turbinates of both nasal cavities. A probe of temperature-controlled radiofrequency (Somnoplasty model S2, Sunnyvale, CA) was applied at 3 points each side to the submucosal area of the anteromedial, anteroinferior, and middle portion of the inferior turbinates. The energy was set at 350 Joules, 85C, and 15W with a total energy of 1,050J each side. Estimated time to finish the procedure in each patient

was 15-20 minutes. After operation, all patients were observed in the recovery area for 1 hour then were discharged from the hospital. Home medication included oral antibiotics, acetaminophen, and topical decongestants (0.05% oxymetazoline). No postoperative nasal packing was required.

Data collection and analysis

The patient's quality of life in each dimension of the Rcq-36, VAS scores of various symptoms, and objective outcomes including MCA, VOL, NAR at pressure difference of 75 and 150 Pascal's were compared between before and at the 8th week after RF treatment. To closely monitor changes of the subjective symptoms, the authors also recorded VAS scores at the 1st, 4th and 8th week after RF treatment. The definition of subjective response in the present study was a reduction of VAS scores $\geq$ 1 at 8th week after RF treatment in each symptom. The data was analyzed with program SPSS 10.0 for Windows using Wilcoxon Signed Rank test for data with non-normality and Paired t-test for data with normality. A p-value of less than 0.05 was considered statistical significance.

Results

At first there were 35 patients enrolled in the present study but 28 patients completed the protocol. There were 18 men and 10 women with mean ages of 43.5 years, ranging from 30 to 71. All 7 patients with incomplete follow up had no complication from the operation.

The patient's quality of life in every dimension of the Rcq-36 showed a significant improvement ($p < 0.05$) at the 8th week after treatment (Table 1). In regard to the dimension of rhinitis symptoms in the Rcq-36 (Table 2) which is the primary goal of treatment, the authors found a significant change in all items ($p < 0.05$) particularly on the disturbances from stuffy nose ($p < 0.001$).

From the VAS (0-10), the mean score of all symptoms at the 8th week after treatment had a significant reduction (Table 3) particularly on nasal

Table 1. Comparison of the mean scores in each dimension of Rhinoconjunctivitis Quality of life questionnaires (Rcq-36) between before and after treatment (n = 28)

Symptoms	Mean scores before RF treatment	Mean scores after RF treatment	p-value
Rhinitis symptoms (RS)	10.7 $\pm$ 3.1	7.5 $\pm$ 2.0	<0.001**
Eye symptoms (ES)	7.2 $\pm$ 3.2	6.0 $\pm$ 2.3	0.014*
Other symptoms (OS)	23.1 $\pm$ 7.8	17.4 $\pm$ 6.0	<0.001**
Physical functioning (PF)	6.1 $\pm$ 2.7	4.2 $\pm$ 2.2	<0.001**
Role Limitation (RL)	6.5 $\pm$ 2.6	4.9 $\pm$ 2.4	0.02*
Sleep	8.6 $\pm$ 4.0	6.5 $\pm$ 2.3	0.04*
Social functioning (SF)	6.2 $\pm$ 3.0	4.5 $\pm$ 2.3	0.001**
Emotions (E)	15.0 $\pm$ 4.4	9.2 $\pm$ 3.8	0.001**
Overall health (OH)	3.2 $\pm$ 1.0	2.5 $\pm$ 0.8	0.001**
Absenteeism	1.8 $\pm$ 3.7	0.6 $\pm$ 1.5	0.045*

* $p < 0.05$, ** $p < 0.001$

Table 2. Comparison of the mean scores in each item of Rhinitis symptoms (RS)

Symptoms	Disturbance scores (mean $\pm$ SD) before RF	Disturbance scores (mean $\pm$ SD) after RF	p-values
Runny nose	2.3 $\pm$ 1.2	1.8 $\pm$ 0.8	0.029*
Itchy nose	2.4 $\pm$ 1.3	1.8 $\pm$ 0.7	0.006*
Stuffy nose	3.9 $\pm$ 1.0	2.3 $\pm$ 0.8	<0.001**
Sneezing	2.1 $\pm$ 1.0	1.6 $\pm$ 0.6	0.004*

* $p < 0.05$, ** $p < 0.001$

congestion severity and frequency which decreased from 6.8 ± 2.5 to 2.6 ± 2.2 or 67.7% change ($p < 0.001$) and from 6.3 ± 2.5 to 2.5 ± 2.1 or 60.3% change ($p < 0.001$), respectively. All of these significant changes were found during the first week after treatment except for rhinorrhea which showed a significant improvement at the 8th week. The proportion of patients who had subjective response in the severity and frequency of nasal congestion symptoms were 25/28 (89.3%) and 24/28 (85.7%) respectively. The response rate in other symptoms were 14/28 (50.0%) for rhinorrhea, 18/28 (64.3%) for sputum, 17/28 (60.7%) for sneezing, and 14/28 (50%) for improvement in smell sensation.

However, there were no statistically significant changes in the mean of MCA of both left and right sides ($p = 0.76$ and 0.70, respectively), VOL of left and right nasal cavities ($p = 0.40$ and 0.87, respectively), and NAR at pressure difference of 75 Pa and 150 Pa ($p = 0.35$ and 0.51, respectively) at the 8th week after RF therapy four weeks after treatment with RFj (Table 4). All patients reported minimal pain and needed acetaminophen occasionally after operation. Some thick mucous and worsening of symptoms were observed only within the first week after treatment. There was no other complication found.

Table 3. Comparison of the mean VAS scores in each symptom (0 = no symptom, 10 = maximal severity) between before and after RF treatment at 8th weeks

Symptoms	VAS scores	VAS scores	p-value
Congestion severity	6.8 ± 2.5	2.6 ± 2.2	<0.0001**
Congestion frequency	6.3 ± 2.5	2.5 ± 2.1	<0.0001**
Rhinorhea	2.7 ± 2.7	1.3 ± 1.3	0.034*
Sneezing	3.2 ± 2.4	1.2 ± 1.2	0.001*
Hyposmia	3.5 ± 3.2	1.7 ± 2.2	0.008*
Sputum	4.6 ± 3.5	2.7 ± 2.8	0.009*

* $p < 0.05$, ** $p < 0.001$

Discussion

Although, there are various procedures to effectively reduce nasal obstruction from chronic rhinitis when medical treatment has failed, most of them are associated with varying outcomes and post-operative complications[18]. The temperature-controlled radiofrequency (RF) inferior turbinate reduction is one of these viable choices. Its mechanisms are to create a scar formation in the submucosa of inferior turbinate and probably also obliterate small vessels, partially destroy secreting gland, and inhibit local immune response. The advantages of this procedure over other traditional turbinate surgeries are particularly regarding to preservation of mucociliary function and minimal postoperative pain[6,10]. While the effectiveness and safety of RF turbinate reduction has been reported with good results on subjective symptoms and less effect on objective outcomes, this is the first study to demonstrate its favorable impacts on patients' quality of life.

In order to assess the outcomes of the RF turbinate reduction, the authors used the Rhino-conjunctivitis Quality of life questionnaires or Rcq-36 since it is the only disease-specific quality of life questionnaire in Thai language which has been

Table 4. Comparison of the mean ± standard deviation (SD) of various objective parameters before topical decongestant between before and after RF treatment at 8th week

Acoustic rhinometry	Before RF treatment Mean ± SD	After RF treatment at 8th week Mean ± SD	p-value
MCA _L	0.52 ± 0.22	0.53 ± 0.18	0.762
MCA_R	0.57 ± 0.20	0.59 ± 0.26	0.70
VOL_L	7.00 ± 2.05	7.41 ± 1.84	0.40
VOL_R	7.20 ± 2.47	7.27 ± 2.21	0.87
Active anterior Rhinomanometry			
RESIST 75_1	0.18 ± 0.08	0.25 ± 0.38	0.35
RESIST150_1	0.56 ± 0.45	0.45 ± 0.46	0.51

MCA = minimal cross sectional area at 2 cm (I-notch) each side (L-Left, R-Right); VOL = volumes of nasal cavities each side (L-Left, R-Right); RESIST 75 = nasal airway resistance (NAR) at pressure difference of 75 Pascals, RESIST 150 = nasal airway resistance (NAR) at pressure difference of 150 Pascals

validated[16]. It has been shown to correlate with SF-36 in assessment of Thai patients with allergic rhino-conjunctivitis but the Rcq-36 had a better correlation with symptom scores than SF-36[17]. The authors also assess other subjective symptom scores with standard visual analog scales (VAS, 0-10) and the objective outcomes with the acoustic rhinometry (ARM) and active anterior rhinomanometry (RMM) because they are acceptable and most widely used in the literature[9,10,13].

The present results show that the patient's quality of life in every dimension of the Rcq-36 has indicated a significant improvement at the 8th week after treatment ($p < 0.05$). The highest improvement was seen in rhinitis symptoms, other symptoms, physical functioning, emotions, and overall health but the lowest improvement seemed to be in the role limitation and eye symptoms. When focusing on each item in the dimension of rhinitis symptoms of the Rcq-36, the authors found a significant change in every item particularly on the disturbances from nasal obstruction similar to the visual analog scales. These are not beyond the authors' expectation and means that it is not only the nasal obstruction that improved but also other health outcomes including sleep quality also improved.

From the VAS scores, all symptoms after treatment at the 8th week were significantly decreased. When using the response definition for subjective symptoms as a reduction of VAS scores ≥ 1 after treatment, the highest response was seen on the severity (89.3%) and frequency of nasal obstruction (85.7%) which are the primary outcomes desirable after the RF therapy. However, the response rates for all other symptoms such as rhinorrhea, sputum, sneezing, and smell sensation were also more than 50%. All of these significant changes were found during the first week after treatment except for rhinorrhea symptom which showed the slowest improvement. When the authors compared to the symptom scores from previous studies, it was found that the present findings were not different. For example, in the pilot study of Li et al, they reported that 21 in 22 patients (95.45%) had an improvement in 8 weeks after RF treatment[9]. In addition, response rates of 90-100% were reported in several studies[3,12,13] including a randomized-controlled trial by Nease and Krempl[15]. The authors did not compare between allergic or non-allergic rhinitis patients since it was found that the similar outcomes were reported with response rate of 91.1% (92/101) in patients with allergic rhinitis refractory to medical treatment[11]. The amount of medication used was not compared in the present study because all patients had failed previous medical treatment and it was not the authors' primary objective. However, Utley et al reported that 89% of their patients were able to cease medications used for nasal obstruction after RF treatment[12].

In regard to pain from the RF treatment, the mean scores (VAS 0-10) was only 1.5 ± 1.7 which correlated with the report of little pain and good tolerance by the patients. Thus, the presented data confirms the safety and effectiveness of this procedure. Although, there was a significant improvement in all subjective parameters, no significant change of objective parameters was found at the 8th week after RF therapy. This was not surprising because a poor correlation between objective findings and patient subjective symptoms of nasal obstruction has been frequently reported in the literature[19]. Despite scientific advance in methods to reliably assess nasal function, there is still to date no universal standard for objective measurement of nasal obstruction. ARM and RMM have often been used in several researches but their reliability and reproducibility are still questionable[19]. ARM results in a distortion of the nasal valve area during testing, and RMM has up to 50% day-to-day variation in results[20]. Thus, the present study demonstrated that the objective tests do not always predict the patient's perception on the benefit from the treatment.

The limitation of the present findings is that it was a short-term study with a small sample size. One of the reasons may come from the relatively high cost of the temperature-controlled RF equipment which was not attractive for the present patients. To improve this limitation, the authors will continue to monitor these outcomes for long-term although Porter et al reported that the improvement in their patients was the same between the 8th week and 2 years after treatment in all parameters[13]. Nevertheless, the presented study may at least confirm the effectiveness of RF treatment on another important final outcome, the patient's quality of life, which could have an impact on treatment decision for chronic rhinitis patients.

There are currently several types of radiofrequency equipment or other modalities in the treatment of chronic nasal blockage from inferior turbinate hypertrophy. The authors suggest that comparative studies among different treatment modalities, the number of treatment sites, and the different energy application should be assessed

adequately and comprehensively not only on the clinical outcomes or quality of life but also on the cost-effectiveness analysis.

Conclusion

This is the first study to show that radiofrequency inferior turbinate reduction can improve all dimensions of quality of life and symptoms of chronic rhinitis patients, although, not with objective outcomes. It is a simple outpatient procedure which produces minimal patient discomfort, thus, will be a good alternative treatment modality.

Authors Contribution

Wish Banhiran MD, study design, surgical procedures, data collection and interpretation, writer, corresponding author.

Pongsakorn Tantilipikorn MD, surgical procedures, data collection and interpretation, drafting the article

Choakchai Metheetrairut MD, study design, draft and critically review the article, final approval of the version to be published.

Paraya Assanasen MD, draft and critically review the article, final approval of the version to be published.

Chaweewan Bunnag MD, study design, draft and critically review the article, final approval of the version to be published.

Acknowledgements

The authors would like to thank Ms.Siriporn Voraprayoon for her technical assistance, Mr.Suthipol Udompunturak, our statistician for the data analysis, and all patients who had participated in this study. We declared no grant or financial support from any organization.

References

1. Bousquet J, Bullinger M, Fayol C, Marquis P, Valentin B, Burtin B. Assessment of quality of life in patients with perennial allergic rhinitis with the French version of the SF-36 Health Status Questionnaire. J Allergy Clin Immunol 1994; 94: 182-8.
2. Rappai M, Collop N, Kemp S, deShazo R. The nose and sleep-disordered breathing: what we know and what we do not know. Chest 2003; 124: 2309-23.
3. Fischer Y, Gosepath J, Amedee RG, Mann WJ. Radiofrequency volumetric tissue reduction (RFVTR) of inferior turbinates: a new method in the treatment of chronic nasal obstruction. Am J Rhinol 2000; 14: 355-60.
4. Powell NB, Zonato AI, Weaver EM, Li K, Troell R, Riley RW, et al. Radiofrequency treatment of turbinate hypertrophy in subjects using continuous positive airway pressure: a randomized, double-blind, placebo-controlled clinical pilot trial. Laryngoscope 2001; 111: 1783-90.
5. Guilleminault C, Chervin R, Palombini L, Powell N. Radiofrequency (pacing and thermic effects) in the treatment of sleep-disordered breathing. Sleep 2000; 23 (Suppl 4): S182-6.
6. Sapci T, Sahin B, Karavus A, Akbulut UG. Comparison of the effects of radiofrequency tissue ablation, CO2 laser ablation, and partial turbinectomy applications on nasal mucociliary functions. Laryngoscope 2003; 113: 514-9.
7. Rhee CS, Kim DY, Won TB, Lee HJ, Park SW, Kwon TY, et al. Changes of nasal function after temperature-controlled radiofrequency tissue volume reduction for the turbinate. Laryngoscope 2001; 111: 153-8.
8. Cavaliere M, Mottola G, Iemma M. Comparison of the effectiveness and safety of radiofrequency turbinoplasty and traditional surgical technique in treatment of inferior turbinate hypertrophy. Otolaryngol Head Neck Surg 2005; 133: 972-8.
9. Li KK, Powell NB, Riley RW, Troell RJ, Guilleminault C. Radiofrequency volumetric tissue reduction for treatment of turbinate hypertrophy: a pilot study. Otolaryngol Head Neck Surg 1998; 119: 569-73.
10. Coste A, Yona L, Blumen M, Louis B, Zerah F, Rugina M, et al. Radiofrequency is a safe and effective treatment of turbinate hypertrophy. Laryngoscope 2001; 111: 894-9.
11. Lin HC, Lin PW, Su CY, Chang HW. Radiofrequency for the treatment of allergic rhinitis refractory to medical therapy. Laryngoscope 2003; 113: 673-8.
12. Utley DS, Goode RL, Hakim I. Radiofrequency energy tissue ablation for the treatment of nasal obstruction secondary to turbinate hypertrophy. Laryngoscope 1999; 109: 683-6.
13. Porter MW, Hales NW, Nease CJ, Krempl GA. Long-term results of inferior turbinate hypertrophy with radiofrequency treatment: a new standard of care? Laryngoscope 2006; 116: 554-7.
14. Hirunwiwatkul P, Aeumjaturapata S, Oraphin P. Results of temperature-controlled radiofrequency tissue volume reduction for the turbinate hyper-

trophy. J Med Assoc Thai 2004; 87 (Suppl 2): S91-4.
15. Nease CJ, Krempl GA. Radiofrequency treatment of turbinate hypertrophy: a randomized, blinded, placebo-controlled clinical trial. Otolaryngol Head Neck Surg 2004; 130: 291-9.
16. Bunnag C, Leurmarnkul W, Jareoncharsri P, Ungkanont K, Tunsuriyawong P, Kosrirukvongs P, et al. Development of a health-related quality of life questionnaire for Thai patients with rhinoconjunctivitis. Asian Pac J Allergy Immunol 2004; 22: 69-79.
17. Bunnag C, Leurmarnkul W, Jareoncharsri P, Tunsuriyawong P, Assanasen P, Pawankar R. Comparison of the SF-36 and the rhino-conjunctivitis quality of life (Rcq-36) questionnaire in Thai patients. Allergy Clin Immunol Int - J World Allergy Org 2005; 17: 186-92.
18. Hol MK, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. Rhinology 2000; 38: 157-66.
19. Kim CS, Moon BK, Jung DH, Min YG. Correlation between nasal obstruction symptoms and objective parameters of acoustic rhinometry and rhinomanometry. Auris Nasus Larynx 1998; 25: 45-8.
20. Clement PA, Gordts F. Consensus report on acoustic rhinometry and rhinomanometry. Rhinology 2005; 43: 169-79.

Appendix. (English version) Rhinoconjunctivitis Quality of Life Questionnaire (Rcq-36)

This questionnaire is designed to find out how your health and well-being have been affected by rhinoconjunctivitis. The aim is to learn how your health and general life is affected in order to develop a treatment which can alleviate these problems, or symptoms, in the future. It should not take you long to complete the form.

Please answer each question by putting a check mark in the space provided on the right. If you are uncertain, please give the answer that best describes your condition. Response options for item 1-7:

Not at all = 1, Slightly = 2, Moderately = 3, A lot = 4, Extremely = 5

1. and 2. During the past 2 weeks, how much have you been bothered by the following symptoms?
   - 1.1 Runny nose (RS) _____
   - 1.2 Itchy nose (RS) _____
   - 1.3 Stuffy (congested} nose (RS) _____
   - 1.4 Sneezing (RS) _____
   - 1.5 Cough (OS) _____
   - 1.6 Dry throat/Dry mouth (OS) _____
   - 1.7 Phlegm (OS) _____
   - 1.8 Itchy eyes (ES) _____
   - 1.9 Irritated eyes (ES) _____
   - 1.10 Watery eyes (tears running) (ES) _____
   - 1.11 Tired (heavy) eyes (ES) _____
   - 2.1 Hard to think (Can't stay focused on idea) (OS) _____
   - 2.2 Fatigue (OS) _____
   - 2.3 Tired easily (OS) _____
   - 2.4 Body aches (all over) (OS) _____
   - 2.5 Headaches (OS) _____
   - 2.6 Sleepy all the time (OS) _____

3. During the past 2 weeks, have the symptoms in I and 2 caused you the following problems?
   - 3.1 Must stop work or studies (PF) _____
   - 3.2 Unable to concentrate on work or studies (PF) _____
   - 3.3 Causes a disturbance in work, such as interrupted working (PF) _____

4. In the past 2 weeks, how much have the symptoms in 1 and 2 caused you problems in the following activities?
   - 4.1 When playing sports or doing a heavy work or participating in an activity that requires a lot of strength or energy. (RL) _____
   - 4.2 When playing sports or having a regular work or participate in an activity that requires average strength or energy. (RL) _____
   - 4.3 When walking H kilometer (RL) _____

5. In the past 2 weeks, how have the symptoms in 1 and 2 affected your sleep?
   - 5.1 Sleep and wake up often during the night (Sleep) _____
   - 5.2 Difficulty getting to sleep (Sleep) _____
   - 5.3 Do not sleep deeply (Sleep) _____

6. In the past 2 weeks, how much do the symptoms in 1 and 2 cause problems when you are with others or meeting with others?
   - 6.1 Loss of confidence when meeting others (SF) _____
   - 6.2 Reduce the meetings or activities with others (SF) _____
   - 6.3 Feel like you do not want to go out (SF) _____

7. In the past 2 weeks, how much have the symptoms in 1 and 2 caused you to feel the following?
   - 7.1 Annoyed with self (E) _____
   - 7.2 Worried (anxious) (E) _____
   - 7.3 Frustrated (E) _____
   - 7.4 Irritated (E) _____
   - 7.5 Annoyed to have to carry tissue papers or handkerchief more than usual (E) _____

8. What do you think of your general health (OH) right now? (Please mark only one answer) Response options:
   1.Very Good 2.Good 3.Moderate 4.Poor 5.Very poor

9. How many days per month are you absent from work or school because of the symptoms in 1 and 2 that you have now? (Absenteeism) _____

Remark: Abbreviation: Rhinitis symptoms (RS), Eye symptoms (ES), Other symptoms (OS), Physical functioning (PS), Role Limitation (RL), Sleep problems (Sleep), Social functioning (SF), Emotions (E), overall health(OH)

แบบสอบถามนี้จัดทำขึ้นเพื่อสำรวจว่าอาการของโรคจมูกและตาอักเสบจากภูมิแพ้มีผลกระทบต่อสุขภาพและความเป็นอยู่ของคุณอย่างไร เพื่อนำไปสู่การรักษาที่ดีขึ้นต่อไปในอนาคต ขอให้คุณใช้เวลาสักครู่ตอบแบบสอบถามนี้

*โปรดตอบคำถามทุกคำถามโดยทำเครื่องหมาย **O** ลงในช่องทางขวามือของแต่ละข้อ ถ้าหากไม่แน่ใจให้เลือกคำตอบที่คุณคิดว่าใกล้เคียงที่สุด*

1. ในช่วง 2 สัปดาห์ที่ผ่านมา อาการเหล่านี้สร้างความรำคาญแก่คุณ มากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) น้ำมูกไหล	1	2	3	4	5
(2) คันจมูก	1	2	3	4	5
(3) คัดแน่นจมูก	1	2	3	4	5
(4) จาม	1	2	3	4	5
(5) ไอ	1	2	3	4	5
(6) คอแห้ง ปากแห้ง	1	2	3	4	5
(7) มีเสมหะ	1	2	3	4	5

2.ในช่วง 2 สัปดาห์ที่ผ่านมา อาการเหล่านี้สร้างความรำคาญแก่คุณ มากน้อยเพียงใด

ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด	
(1) คันตา	1	2	3	4	5
(2) เคืองตา	1	2	3	4	5
(3) น้ำตาไหล	1	2	3	4	5
(4) ไม่สบายตา	1	2	3	4	5
(5) สมองไม่โล่ง	1	2	3	4	5
(6) อ่อนเพลีย	1	2	3	4	5
(7) เหนื่อยง่าย	1	2	3	4	5
(8) ปวดเมื่อยตามตัว	1	2	3	4	5
(9) ปวดศีรษะ	1	2	3	4	5
(10) ง่วงนอนตลอดเวลา	1	2	3	4	5

สงวนลิขสิทธิ์ (พ.ศ.2544) ศ.พญ.ฉวีวรรณ บุนนาค ภาควิชาโสต นาสิก ลาริงซ์วิทยา คณะแพทยศาสตร์ศิริราชพยาบาล

3. ในช่วง 2 สัปดาห์ที่ผ่านมา อาการในข้อ 1 และ / หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้ ทำให้คุณมีปัญหา เหล่านี้มากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) ต้องหยุดงาน หรือ หยุดเรียนหนังสือ	1	2	3	4	5
(2) ไม่มีสมาธิในการทำงาน หรือ เรียนหนังสือ	1	2	3	4	5
(3) เป็นอุปสรรคต่อการทำงาน เช่น ทำให้ทำงานติด ๆ ขัด ๆ	1	2	3	4	5

4. ในช่วง 2 สัปดาห์ที่ผ่านมา อาการในข้อ 1 และ / หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้ ทำให้คุณมีปัญหาในการทำกิจกรรมต่อไปนี้มากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) เล่นกีฬาหรือออกกำลังกายหนัก ๆ หรือ ทำกิจกรรมที่ต้องใช้แรงมาก ๆ	1	2	3	4	5
(2) เล่นกีฬาหรือออกกำลังกายปานกลาง หรือ ทำกิจกรรมที่ใช้แรงปานกลาง	1	2	3	4	5
(3) เดินเป็นระยะทางครึ่งกิโลเมตร	1	2	3	4	5

5. ในช่วง 2 สัปดาห์ที่ผ่านมา อาการในข้อ 1 และ / หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้มีผลกระทบต่อการนอนหลับของคุณมากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) ต้องตื่นกลางดึกบ่อย ๆ	1	2	3	4	5
(2) นอนหลับยาก	1	2	3	4	5
(3) นอนหลับไม่สนิท	1	2	3	4	5

Appendix. (Thai version) (ต่อ)

6. ในช่วง 2 สัปดาห์ที่ผ่านมาอาการในข้อ 1 และ/หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้ทำให้คุณมีปัญหาเหล่านี้เวลาเข้าสังคม และพบปะสังสรรค์กับผู้อื่นมากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) รู้สึกสูญเสียความมั่นใจในการพบปะคนอื่น	1	2	3	4	5
(2) พบปะสังสรรค์กับเพื่อนหรือคนอื่นๆน้อยลง	1	2	3	4	5
(3) รู้สึกไม่อยากออกไปไหน	1	2	3	4	5

7. ในช่วง 2 สัปดาห์ที่ผ่านมา อาการในข้อ 1 และ/หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้ ทำให้คุณมีความรู้สึกเหล่านี้มากน้อยเพียงใด

	ไม่มีเลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
(1) รู้สึกรำคาญตนเอง	1	2	3	4	5
(2) กังวลใจ	1	2	3	4	5
(3) หงุดหงิด	1	2	3	4	5
(4) ไม่แจ่มใส เบิกบาน	1	2	3	4	5
(5) รำคาญที่ต้องพกกระดาษชำระ หรือ ผ้าเช็ดหน้ามากกว่าปกติ	1	2	3	4	5

8. คุณคิดว่า สุขภาพโดยรวมของคุณในขณะนี้ เป็นอย่างไร (โปรดทำเครื่องหมายลงในช่องว่างเพียงคำตอบเดียว)

- ☐ *ดีมาก*
- ☐ *ดี*
- ☐ *ปานกลาง*
- ☐ *แย่*
- ☐ *แย่มาก*

9. อาการในข้อ 1 และ / หรือ ข้อ 2 ที่คุณเป็นอยู่ขณะนี้ ทำให้คุณต้องหยุดทำงานหรือหยุดเรียนหนังสือ โดยเฉลี่ยประมาณกี่วันต่อเดือน .....

คุณภาพชีวิตของผู้ป่วยโรคเยื่อบุจมูกอักเสบเรื้อรัง ที่ได้รับการรักษาด้วยคลื่นความถี่วิทยุเพื่อลดขนาดของเทอร์บิเนทอันล่าง

วิชญ์ บรรณหิรัญ, พงศกร ตันติลิปิกร, ปารยะ อาศนะเสน, โชคชัย เมธีไตรรัตน์, ฉวีวรรณ บุนนาค

วัตถุประสงค์: *เพื่อศึกษาถึงประสิทธิผลของการใช้ความถี่วิทยุเพื่อลดขนาดของเทอร์บิเนตอันล่าง ต่อคุณภาพชีวิตของผู้ป่วยที่มีภาวะเยื่อบุจมูกอักเสบเรื้อรัง และไม่ตอบสนองต่อการรักษาทางยา*

วัสดุและวิธีการ: *ในช่วงเวลาระหว่าง เดือนเมษายน พ.ศ. 2550 ถึง เมษายน พ.ศ. 2551 มีผู้ป่วยจำนวน 28 ราย เข้าร่วมโครงการ และได้รับการรักษาด้วยคลื่นความถี่วิทยุชนิดควบคุมอุณหภูมิที่เยื่อบุเทอร์บิเนตอันล่างทั้ง 2 ข้าง โดยผู้ป่วยจะได้รับแบบสอบถามถึงคุณภาพชีวิต (Rcq-36) และอาการเกี่ยวกับจมูก เช่น ความรุนแรง และความถี่ของอาการคัดจมูก น้ำมูกไหล การได้กลิ่น อาการจาม และมีเสมหะ นอกจากนี้ผู้ป่วยยังได้รับการตรวจจมูกด้วยคลื่นเสียง (acoustic rhinometry) และเครื่องวัดความดันในโพรงจมูก (active rhinomanometry) ก่อนและหลังการรักษาในสัปดาห์ที่ 8*

ผลการศึกษา: *หลังการรักษาในสัปดาห์ที่ 8 พบว่าคุณภาพชีวิตของผู้ป่วยรวมถึงอาการต่าง ๆ ของผู้ป่วยดีขึ้นอย่างมีนัยสำคัญทางสถิติในทุกด้าน ($p < 0.05$) โดยเฉพาะอย่างยิ่งความรุนแรง และความถี่ของอาการคัดจมูก มีคะแนนลดลงจาก 6.8 ± 2.5 และ 6.3 ± 2.5 เป็น 2.6 ± 2.2 และ 2.5 ± 2.1 ตามลำดับ ($p < 0.001$) อย่างไรก็ตาม ไม่พบว่ามีการเปลี่ยนแปลงของค่าต่าง ๆ จากการตรวจจมูกด้วยเครื่องมือเฉพาะ ผู้ป่วยทุกรายไม่พบภาวะแทรกซ้อนแต่อย่างใด*

สรุป: *รายงานนี้เป็นการศึกษาฉบับแรกที่แสดงประสิทธิผลของการใช้คลื่นความถี่วิทยุ ในการรักษาเยื่อบุจมูกอักเสบเรื้อรังที่มีต่อคุณภาพชีวิตของผู้ป่วยในทุกด้าน เนื่องจากเป็นการรักษาที่มีความเสี่ยงน้อย และทำได้ง่าย จึงเชื่อว่าการใช้ความถี่วิทยุจะเป็นการรักษาทางเลือกที่ดีอีกวิธีหนึ่งต่อไป*