

# Concha bullosa related headache disability

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**Abstract. – OBJECTIVE:** Rhinogenic headache (RH) is a headache or facial pain syndrome secondary to mucosal contact points in the sino-nasal cavities, in the absence of inflammatory signs, hyperplastic mucosa, purulent discharge, sino-nasal polyps or masses. It may result from pressure on the nasal mucosa due to anatomical variations among which the pneumatization of the middle turbinate, concha bullosa, a variant of the development of ethmoidal cells, is the most commonly observed. Clinical practice suggests a close correlation between concha bullosa, mucosal contacts and rhinogenic headache, with high impact on the QoL. However diagnostic and therapeutic difficulties still remain. Aim of the present study is to evaluate the impact of medical or surgical care on the QoL of patients suffering from concha bullosa related headache from the patients' perspective.

**PATIENTS AND METHODS:** One-hundred-two subjects with concha bullosa and headache anamnesis were randomized into two groups and given medical or surgical treatment. To assess the Quality of life (QoL) we used visual analogue scale and for the first time, the migraine disability score before and after treatment.

**RESULTS:** After treatment the severity of the headache decreased as well as the discomfort in the surgical group compared with medical group.

**CONCLUSIONS:** The improvement of symptoms and QoL suggests that the endoscopic surgical plastic may promote the rapid resolution of concha bullosa related headache improving the and reducing health care costs.

*Key Words:*

Rhinology, Quality of life, Turbinate Surgery.

## Introduction

Rhinogenic Headache (RH) has received an increased amount of attention in the literature over the past twenty years<sup>1</sup>. As a somewhat unsettled topic, there is very little information regarding this subject. The International Headache

Society recognizes RH, but states that the evidence for its existence is limited<sup>2</sup>.

RH is a headache or facial pain syndrome secondary to mucosal contact points in the sino-nasal cavities, in the absence of inflammatory signs, hyperplastic mucosa, purulent discharge, sino-nasal polyps or masses<sup>3</sup>. Typical RH is localized to the periorbital region, specifically in the medial supraorbital canthus or temporo-zygomatic region. The pain is usually unilateral due to the more common occurrence of unilateral expansion and compression, although bilateral pain is also possible. Pain is intermitted, lasts for hours and recurs frequently<sup>1</sup>.

Recent studies on trigeminal activation demonstrate that mucosal contact between structures of the nasal cavity may stimulate some "trigger" points, determining facial painful crises<sup>3</sup>. For instance, Greenfield<sup>4</sup> suggests that afferent fibres of nasal trigeminal cutaneous branches reach the cerebral cortex. This observation would explain the painful sensation following nasal stimulation. The cortical centres don't discern the peripheral origin of these stimuli and can cause facial pain.

RH may result from pressure on the nasal mucosa due to anatomical variations among which the pneumatization of the middle turbinate (MT), concha bullosa (CB), a variant of the development of ethmoidal cells, is the most commonly observed<sup>5</sup>. MT is a thin bone lamina present in the lateral wall of the nose, whose functions are deflection of inspired air superiorly towards the olfactory epithelium, lamination of air flow, heating and humidification of inspired air. When MT is increased in size it interferes with respiration and may predispose to sinuses dysfunction.

Although the aetiology of CB is not yet clear, the most credited hypothesis are trauma, intra-uterine, peri- and post-natal developmental defects, growth abnormalities of the maxillary bone and congenital deformities<sup>6</sup>.

Some studies report the considerable impact of headache on social activities. Indeed, the reduc-

tion in quality of life (QoL) and work productivity due to headache can be profound, with the intensity of pain being the most important factor. Clinical practice suggests a close correlation between CB, mucosal contacts and RH, with high impact on the QoL; however diagnostic and therapeutic difficulties still remain.

The aim of this study was to evaluate (1) the impact and the burden of RH related disability on the QoL using visual analogue scale (VAS) and, for the first time the migraine disability score (MIDAS)<sup>7</sup>, (2) the effectiveness of endoscopic plastic of CB in the treatment of RH.

## Patients and Methods

We enrolled 102 patients with CB at CT scan and headache anamnesis (54 males and 48 females) aged from 22 years to 67 years (mean age 38.5 years) at Neuroscience, Reproductive and Dentistry Science Department, ENT section, of University of Naples Federico II from January 2010 to May 2013. All patients gave their consent to the study which was approved by the Ethics Committee of the structure afferent. Before treatment, each patient underwent neurological assessment, ENT examination, nasal endoscopy with 2,7 mm 30° rigid instrument (Storz, Tuttlingen, Germany), high resolution CT without contrast, visual analogue scale (VAS) for headache and facial pain and MIDAS questionnaire. The CT scans were assessed for sinus abnormality, recorded as Lund-Mackay score and analyzed by an otolaryngologist blinded to the headache histories<sup>8</sup>. The VAS questionnaire, a continuous scale comprised of a horizontal line, 10 cm in length, anchored by 2 verbal descriptors one for each symptom extreme (0 = Not troublesome, 10 cm = worst thinkable troublesome), served to evaluate the total severity of symptoms (headache and facial pain). The headache could be divided into *mild*, *moderate* and *severe* based on total severity VAS score: mild = VAS 0-3, moderate = VAS > 3-7 and severe = VAS >7-10. A VAS > 5 affects the patient QoL<sup>9</sup>. MIDAS questionnaire based on information which covered the last 3 months (score 0 to 21), evaluated the impact of RH on QoL. It was divided in 4 degree: 0-5 minimum or infrequent disability (grade 1), 6-10 mild or infrequent disability (grade 2), 11-20 moderate disability (grade 3), > 21 severe disability (grade 4)<sup>9</sup>. We considered the following inclusion criteria: presence of chronic

headache (>2 months), or pain, or pressure feeling over the nasal bridge, glabella, or forehead; presence of CB at CT scan; visible mucosal contact points between CB and the lateral wall of the nasal cavity and absence of concomitant causes of headache (other anatomical variants, inflammation, ophthalmologic, orthopaedic, neurological, dental or systemic disorders).

The diagnosis was confirmed by the lidocaine test. When a pledget of cotton soaked with a 10% solution of lidocaine was placed on the point of contact, the patients reported immediate pain relief<sup>10</sup>.

All subjects were randomized into two groups and given the treatment. The investigational arm (group I), comprising 53 subjects underwent endoscopic surgical plastic of CB, making a sagittal incision along the anterior surface of the CB, removing the lateral lamella and gently pushing the remaining of middle turbinate far from septum. Plastic of CB was performed by the same surgeon. The control arm (group II), comprising 49 age matched subjects, was treated with Fluticasone nasal spray, 125 µg per puff, 2 puffs Q 24 hours in each nasal cavity for 3 courses of 15 consecutive days per month for 6 months. The postoperative follow-up, including nasal endoscopy, VAS, and MIDAS was performed at 3 and 6 months.

## Statistical Analysis

Data were analysed using a commercially available statistical software package (SPSS for Windows, version 12.0, 2003; SPSS, Inc., Chicago, IL, USA) and expressed as mean ± SD. The results at all of the study's time points were compared using a paired t-test, with a *p* value of less than 0.05 considered statistically significant. Changes in MIDAS score, number of headache days and headache severity from baseline to the end of the treatment period were analyzed for statistical significance using the Wilcoxon method.

## Results

The preoperative VAS was  $7.9 \pm 2.5$  for headache and  $7.5 \pm 1.6$  for facial pain in group I and  $7.5 \pm 1.2$  and  $7.4 \pm 1.4$  respectively in group II. The preoperative MIDAS score showed a grade 2 headache in 28% of cases, a grade 3 in 47% and a grade 4 in 25% in group I, a grade 2 headache in 31% of cases, a grade 3 in 48% and a grade 4 in 21% of cases in group II. At follow-

up after 3 and 6 months the VAS for headache and facial pain and MIDAS score were significantly different between the two groups with better outcomes in the investigational arm (Table I).

## Discussion

RH is an important item in the wide field of headaches. Several anatomical variations of the nasal cavities may determinate contact points between nasal structures stimulating some “trigger” points and determining facial painful crises. CB is the most known cause of RH and there is often a concomitant septal deviation<sup>11</sup>.

The existence and the best treatment for contact point headache is a controversial issue. RH may be treated by surgical or medical interventions. Corticosteroid spray and decongestants are used in medical treatment, whereas various methods of endoscopic surgery, removing the lateral wall of the CB, removing of fronto-inferior part of CB, and turbinoplasty are the surgical options<sup>12</sup>. This study tried to evaluate the response of the patients suffering from RH, to medical or surgical treatment. For instance, we evaluated the impact of medical or surgical care determined and recorded either with the VAS or with MIDAS, on the QoL from the patients’ perspective. There is now mounting evidence underlining that the patient’s perspective on treatment outcomes is a crucial element for improving high quality care<sup>13</sup>. Indeed, patient-rated therapeutic outcomes in terms of symptoms can provide a much more realistic picture of the effectiveness of a treatment than those of clinician-rated outcomes. To the best of our knowledge, this study is the first to investigate the RH related to CB and contact points using the MIDAS in such a large cohort of patients.

In our study, 102 patients with CB referred concomitant pain, supporting the hypothesis of a close relationship between headache and the presence of CB. Nevertheless, this relationship implies the existence of a contact point. In our study the existence of contact points was confirmed in CT scan and in nasal endoscopy. Moreover, a positive Lidocaine test was another important factor for selecting patients.

The subjects enrolled were divided into two groups: group I was treated with endoscopic plastic of CB, and group II was treated with Fluticasone nasal spray. To remove the contact between nasal structures and CB, we performed endoscopic surgery removing the lateral lamella, a simple procedure with short operative time.

Before and after surgical or medical treatments we analyzed the severity of headache and facial pain with VAS scale and the impact of headache on QoL with the MIDAS, to evaluate whether the treatment of CB could significantly reduce the painful symptoms and improve QoL.

We found that VAS and the MIDAS were significantly reduced in the third ( $p < 0.05$ ) and even more in the sixth month after treatment ( $p < 0.05$ ) in the group I, contrary to group II. The improvement of symptoms and QoL after surgical management suggests that the endoscopic plastic of CB represents a possible treatment in patients with RH related to CB. Nevertheless, the preoperative study should imply a careful nasal endoscopy and a CT scan, in addition to the Lidocaine test.

Headache is a highly impacting disease due to the high prevalence and significant costs of care. Despite its general effectiveness in the management of the symptoms, the pharmacotherapy is often associated with relevant adverse effects and, depending on the severity of the pain, may entail long-term treatments which can result in

**Table I.** VAS score and MIDAS at baseline and after treatment at 3 and 6 months.

	Baseline		3 M		6 M	
	Group I	Group II	Group I	Group II	Group I	Group II
VAS headache	7.9 ± 2.5	7.5 ± 1.2	2.5 ± 0.7	6.5 ± 2.99	1.5 ± 0.8	5.5 ± 1.2
VAS pain	7.5 ± 1.6	7.4 ± 1.4	1 ± 1.07	7.1 ± 1.4	0.5 ± 2.0	4.7 ± 1.8
			<b>MIDAS</b>			
No headache	0%	0%	24%	0%	44%	0%
Grade 1	0%	0%	41%	2%	38%	4%
Grade 2	28%	31%	20%	30%	18%	39%
Grade 3	47%	48%	11%	51%	0%	33%
Grade 4	25%	21%	4%	17%	0%	24%

considerable costs for the healthcare system. Moreover, the high occurrence of these conditions imposes a substantial economic impact on society, regarding both the direct (medical and non-medical) and the indirect costs (disability, reduced working capacity and absence from work). In this regard, the surgical treatment of CB has a strong impact on economy system as it promotes the rapid resolution of disease which, if untreated or pharmacologically treated, would be expensive for a long time, with few and exclusively short-term benefits, and without a final resolution. Furthermore, the abuse of drugs for headache may result in a chronic disorder with an increasing frequency and intensity of pain crisis and in a reduction of their effectiveness. The widely used in clinical practice drug is the paracetamol that, sometimes and in predisposed patients, can cause the medication-overuse headache (MOH), also known as rebound headache<sup>14-15</sup>.

## Conclusions

Our data emphasize the importance of an adequate study of patients suffering from rhinogenic headache in order to unequivocally identify those forms related to the presence of CB. Only in this way a decisive surgical therapy can be performed to improve symptoms, and the discomfort of the patient, according to the current guidelines for reducing health care costs.

## Conflict of Interest

The Authors declare that there are no conflicts of interest.

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