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Assessing the role of chronic hyperventilation in patients with nasal congestion: Our experience in 118 patients

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Dear Editor,

When assessing patients complaining of nasal obstruction/congestion, the possibility of a dysfunctional breathing pattern should be considered in addition to restricted nasal airflow. This has been aptly demonstrated by Bartley[1] who discovered a high prevalence of chronic hyperventilation syndrome among a group of patients in whom surgery had failed to relieve the symptom of nasal congestion. A simplified physiological definition of hyperventilation is breathing in excess of metabolic requirements, a pathophysiological process which can be acute or chronic.[2] An extrapolation of Bartley's finding is that the initial surgery may not have been performed if the chronic hyperventilation syndrome had been detected earlier. We therefore introduced the Nijmegen Questionnaire (for chronic hyperventilation syndrome) to our initial assessment of patients whose main presenting complaint was nasal obstruction or congestion. Of course, chronic hyperventilation could coexist with other inflammatory and structural nasal problems. Ogata *et al.*[3] found 25% of patients with allergic rhinitis to have a positive Nijmegen score. In such cases, the clinician has to make a subjective judgement about the extent to which the nasal obstruction can be attributed to chronic hyperventilation. Over a period of 1 year we audited not only how many patients had a positive Nijmegen score, but also the number of cases in which this lead to a significant change in diagnosis and/or treatment.

Method

A prospective audit was performed for 1 year after the introduction of the Nijmegen Questionnaire for the routine assessment of new patient referrals with nasal blockage at a general ENT clinic in Northern Ireland. The Nijmegen Questionnaire assesses 16 complaints related to different organ systems affected by hyperventilation and has been previously validated.[4] It has been found to be a quick, easy to administer and low-impact assessment tool for chronic hyperventilation[5] and its use in a routine ENT clinic has been previously published.[3] The questionnaire was completed either before the consultation or when waiting for nasal endoscopy. However, the questionnaire was not scored until after the history and examination were complete and the clinician had recorded a provisional diagno-

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sis and treatment plan. The Nijmegen score, age, sex and alteration to diagnosis and/or treatment were recorded. The questionnaire was used for patients aged 16 and over.

Results

Over 12 months, 118 new patients with nasal obstruction presented to a general ENT clinic. 64 were men and 54 women. The age range was 16 to 80 with a mean of 38. The Nijmegen score was positive in 28 patients (25%), 11 male and 20 female. The initial diagnosis was changed to exclusively hyperventilation syndrome in 12 patients (10%).

The proportion of Nijmegen-positive patients in the five most common diagnostic categories is shown in Fig. 1.

Allergic rhinitis was diagnosed in 22 patients on the basis of history, examination and skin prick tests. Four also had a positive Nijmegen score. This did not alter the prior diagnosis of allergic rhinitis. Therapy for hyperventilation syndrome was recommended to two patients with seasonal allergies but perennial nasal obstruction and normal-sized inferior turbinates at the time of examination.

An isolated diagnosis of septal deviation was initially reached in 28 patients. Four also had a positive Nijmegen score. In two of these patients, the septal deviation was graded as mild to moderate and hyperventilation syndrome was thought more likely to be the cause of the symptom of nasal blockage. The deviation was subsequently deemed insignificant.

Seven patients were felt to have a functional or psychosomatic illness on initial examination owing to unusual symptoms and a normal examination. Facial pain syndromes with nasal obstruction (negative Nijmegen scores) were included in this group. Four of these patients had high Nijmegen scores. One had previously undergone septoplasty in another hospital that had resulted in a straight septum but no change to his nasal obstruction. His Nijmegen score was 48. Hyperventilation syndrome was thought to adequately explain all of the symptoms in these four patients and their diagnosis was changed accordingly.

Twenty patients fitted the criteria for chronic rhinosinusitis defined by the European position paper on rhinosinusitis and nasal polyps, fourteen of whom had nasal polyposis. One patient with polyps had a positive Nijmegen score. This did not seem to be contributing significantly to the nasal symptoms and his diagnosis and management were unchanged. Four patients without polyps had a positive Nijmegen score. Again this was deemed insignificant from a rhinology perspective and did not change the diagnosis of chronic rhinosinusitis or therapy.

A diagnosis of non-specific rhinitis was reached in 26 patients. This diagnostic category was used for patients complaining of nasal obstruction who had erythema or engorgement of the nasal mucosa on examination but no other symptoms of allergic rhinitis, negative skin prick tests, no mucopus or polyps on endoscopy, no other symptoms of vasomotor rhinitis, no medications with recognised rhinitic side effects, no known hormonal manipulation and no irritant exposure that could be identified (occupational or otherwise). Nine of these patients had a positive Nijmegen score. The diagnosis was changed to hyperventilation syndrome in six. In the remaining three, hyperventilation syndrome was deemed to be a contributing factor but insufficient to explain the full clinical picture. The change in management was not only the

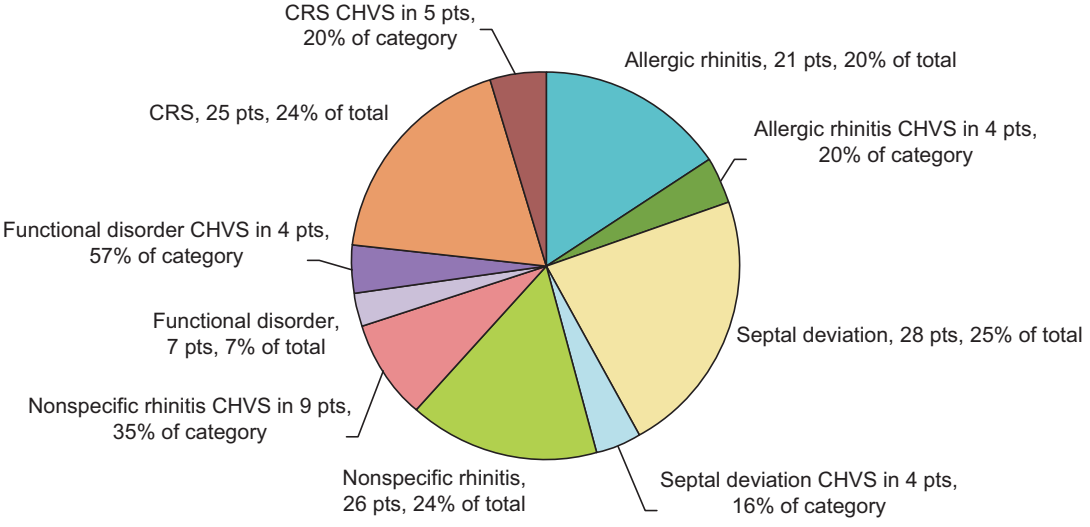

Fig. 1. Proportion of Nijmegen positive patients (CHVS) in each of the five most common diagnostic categories. CHVS: chronic hyperventilation syndrome; pts: patients; CRS: chronic rhinosinusitis.

recommendation of therapy for hyperventilation syndrome but the omission of a trial of topical steroid therapy in the six patients with a change in diagnosis.

Three patients with vasomotor rhinitis had a positive Nijmegen score and this was thought to be contributing sufficiently to nasal symptoms in one case to alter management. The diagnosis of vasomotor rhinitis was unchanged.

Three patients had rhinitis medicamentosa and one also had a positive Nijmegen score. It was thought that nasal obstruction because of hyperventilation syndrome may have lead to the abuse of nasal decongestants, and again, therapy for hyperventilation syndrome was recommended.

Of the remaining nine patients in the audit, two had alar collapse. One of these patients had a positive Nijmegen score but this was not deemed relevant to the nasal obstruction symptom and the diagnosis and management were not changed. None of the seven patients left had a positive Nijmegen score. Two were thought to have nasal obstruction as a medication side effect, two had enlarged inferior turbinates, two had acute infections at the time of clinic attendance and one had a septal perforation.

Discussion

Hyperventilation

Acute hyperventilation causes lowering of the alveolar pressure of carbon dioxide, lowering of the arterial pressure of carbon dioxide and a respiratory alkalosis. The resulting symptoms can usually be reproduced by a hyperventilation provocation test. In contrast, although chronic hyperventilation syndrome can be associated with sustained arterial and alveolar hypocapnia, patients may present with resting levels of carbon dioxide in the normal range. The respiratory rate may be elevated or the tidal volume increased, often accompanied by deep sighing respirations. It is an idiopathic fluctuating disorder which is identified by a combination of symptoms and is therefore not able to be contained within a single diagnostic measurement. The wide range of symptoms includes breathlessness, dyspnoea, light-headedness, paraesthesia, a variety of pains especially chest pains, palpitations, sweating, anxiety, excessive sighing/yawning and nasal congestion. The diagnosis was more common in the past as hyperventilation syndrome lacks a single diagnostic measure for today's era of testing technology.[6] An elaborate study by Howell comparing the hyperventilation provocation test to a placebo test has demonstrated that this test is invalid as a diagnostic test for chronic hyperventilation syndrome.[7] The Nijmegen Questionnaire has been validated. It consists of 16 complaints relating to different organ systems in which their frequency is indicated on 5-point ordinal scale (0 = never, 4 = very frequently). The maximum score is 64 and a score of >23 is considered diagnostic for chronic hyperventilation syndrome.[4]

Implications of chronic hyperventilation syndrome

This audit demonstrated that a significant proportion of patients presenting with nasal obstruction or congestion who would otherwise be diagnosed with a functional disorder or non-specific rhinitis can be reclassified as hyperventilation syndrome according to the Nijmegen Questionnaire. But what is the benefit? The therapy we recommended was breathing awareness and retraining via a self-help programme. In Bartley's study, breathing retraining was partially successful with two of five patients enrolled having relief of their nasal congestion. We did not audit the results of the self-help therapy. Perhaps the greater benefit is the avoidance of trials of medical therapy. When the diagnosis is uncertain, the clinician may prescribe a trial of topical steroid which can cause epistaxis and, if it ultimately fails, may reduce the patient's confidence in the clinician. Perhaps more importantly, when the role of a mild to moderately deviated septum is uncertain, the significance of the patient's nasal congestion in the context of hyperventilation syndrome may reveal that a septoplasty is not indicated. The patient is spared an unnecessary and unhelpful procedure and the overall success of surgery is improved through better patient selection. Only a small proportion of patients with allergic rhinitis were recommended self-help breathing exercises because of nasal congestion persisting beyond the allergen exposure season and not accounted for by hypertrophied inferior turbinates. In general though, the Nijmegen Questionnaire was not a beneficial exercise in patients with chronic rhinosinusitis or allergic rhinitis.

Chronic hyperventilation syndrome and non-specific rhinitis

The diagnostic category of non-specific rhinitis used in this audit illustrates the challenge that the clinician faces when forced to reach a diagnostic decision. Some of these patients were subsequently reclassified as hyperventilation syndrome. We do not know if the mild nasal erythema and congestion found in these patients was a variation of normal or a consequence of the hyperventilation syndrome. The Mayo Clinic described an inverse relationship between nasal resistance and Pco2 levels and presumably the elevated resistance was achieved by vascular engorgement/congestion.[8]

Conclusion

Although the interpretation of the significance of the results of the Nijmegen Questionnaire is subjective, we propose that it is useful for those patients with mild to moderately deviated septums and those who appear to have a functional disorder or non-specific rhinitis.

Key points

- Hyperventilation syndrome has been demonstrated to cause the symptom of nasal congestion/obstruction and to be a reason for failed nasal surgery.
- Routine use of the Nijmegen Questionnaire to detect hyperventilation syndrome in all new patients attending a general ENT clinic produced positive results in a significant proportion of patients (25%).
- Determining when the hyperventilation syndrome was contributing significantly to a patient's nasal congestion was a subjective clinical decision reached in 10% of the patients in this audit.
- The Nijmegen score was deemed useful for achieving a more accurate diagnosis in a significant number of patients who would otherwise have been diagnosed as a functional disorder or non-specific rhinitis.
- The Nijmegen Questionnaire was also deemed to have improved patient selection for septoplasty.

Conflict of interest

None to declare.

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The down-up bone bridge approach for cochlear and middle ear implants: Our experience in 34 patients

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Dear Editor,

Over the last few years, different authors in various countries[1–4] have proposed several minimal invasive approaches for the fashioning of the bony recess and fixation of cochlear and middle ear implants. The above-mentioned approaches offer reduced surgical morbidity related to wound complications and reduced hospital stay as compared to wider access operations[5]. However, disagreement still exists between authors about the best way to secure the implants, either with a tie-down ligature[1–3] or just by closure of the overlying periosteum[4], particularly in teenage patients.

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