Characterisation of patients with endoscopy-negative, computer tomography-negative midfacial segment pain using the sino-nasal outcome test*

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Summary

Background: The purpose of this study was to qualitatively characterise patients with midfacial segment pain (MSP) using the Sino-Nasal Outcome Test (SNOT). The data will provide a detailed overview of the physical and psychological impact on patients' well-being, and how it compares with the normal, healthy population.

Methods: Suitable patients were prospectively identified from the Multi-disciplinary Facial Pain Clinic at the Royal Liverpool University Hospital, based on the diagnostic criteria for MSP. The pre-treatment SNOT-22 of these patients were also compared to patients with chronic rhinosinusitis and normal healthy volunteers.

Results: Twenty-nine consecutive patients with a diagnosis of MSP were identified, and compared with 30 CRS patients and 34 healthy volunteers. The average SNOT-22 scores of MSP and CRS patients were higher than normal healthy volunteers. Patients with CRS had the highest rhinological subscale SNOT scores compared to normal healthy volunteers and MSP. Conversely, the reported ear and facial symptoms of MSP patients were most unfavourable. A similar trend was observed in reported sleep function where MSP patients recorded higher subscale scores than the other two cohorts. The subscale mean score for psychological function of MSP patients was not significant when compared to the mean score of patients diagnosed with CRS.

Conclusion: MSP has an adverse impact on both physical and psychological well-being. The subtle differences in the SNOT subscores between MSP and CRS have provided greater insight into the character and disease impact of MSP. We propose that the SNOT may be suitably utilised in MSP to document disease severity and measure response to treatment.

Key words: facial pain, endoscopy, CT, sinusitis

Introduction

Facial pain is a common presentation in a dedicated rhinology clinic, affecting up to 42% of patients [1]. Many patients believe that their "sinus headaches" are due to underlying sinusitis, yet as few as 11% of patients with chronic rhinosinusitis report concomitant facial pain [2]. This has arguably led to patients receiving inappropriate treatment and even, in some cases, surgery [3]. In fact, the most common causes of facial pain were atypical facial pain, tension-type headache, migraine and cluster headache. A smaller proportion of patients have facial pain distribution confined to the second division of the trigeminal nerve. This has been described as midfacial segment pain [4].

Midfacial segment pain has the characteristics of tension-type headache, with the exception that it affects the midface (Figure 1). Patients typically describe a feeling of pressure, heaviness or tightness and in the absence of nasal airway obstruction they may say that their nose feels blocked. The symptoms are

symmetrical and may involve the nasion, the bridge of the nose, either side of the nose, the peri-orbital region, retro-orbitally or across the cheeks. In 60% of patients, the forehead and occipital region may also be affected. Normal endoscopy and computed tomography of the paranasal sinuses are typical in these patients [5].

The Sino-Nasal Outcome Test (SNOT) is a validated and widely adopted patient-reported outcome measure for a variety of sino-nasal procedures such as sinus surgery for chronic rhinosinusitis, septal surgery [6], rhinoplasty [7] and obstructive sleep apnoea [8]. Browne et al. [9] described four distinct subscales within the SNOT. The first covers rhinological symptoms and contains five questions: need to blow nose, sneezing, runny nose, postnasal discharge, and thick nasal discharge. The second covers ear and facial symptoms and contains four questions: ear fullness, dizziness, ear pain, and facial pain/pressure. The third covers sleep function and contains three questions: difficulty falling asleep, waking up at night, and lack of a good night's sleep. The fourth covers psychological issues and contains six questions: fatigue, reduced productivity, reduced concentration, frustration/restlessness/irritability, sadness, and embarrassment. The validity of these subscales was corroborated by Pynnonen et al. [10] who also suggested that reporting subscale scores might improve the precision of the SNOT-20 instrument, allowing discrimination between various treatments and their differential impact on sinonasal quality of life.

The purpose of this study was to qualitatively characterise patients with midfacial segment pain using the SNOT. The data will provide a detailed overview of the physical and psychological impact on patients' well-being, and how it compares with the normal, healthy population. In addition, this will provide baseline data as a reference point to facilitate comparison with treatment outcomes and also with other sinonasal pathologies (e.g. migraines, chronic rhinosinusitis).

Patients and methods

This study was approved by the Clinical Information and Audit Department (reference 3945-10/11) of our institution. Suitable patients were prospectively identified from the Multi-disciplinary Facial Pain Clinic at the Royal Liverpool University Hospital, based on the diagnostic criteria for midfacial segment pain (Table 1) [4]. This clinic was established in June 2011 and provides a tertiary service for patients with complex facial pain syndromes. Patients were usually referred from pain management and general ENT clinics after being assessed for sinonasal pathology, and were endoscopy-negative and computer tomography (CT)-negative at the time. Patients were re-assessed clinically against the International Headache Society classification for headache disorders, cranial neuralgia and facial pain [11]. Nasendoscopy

Figure 1. Distribution of facial discomfort indicated by a patient diagnosed with midfacial segment pain.

was repeated at the facial pain clinic to confirm the presence or absence of sinonasal pathology. All patients routinely completed the SNOT-22 prior to their consultation. In this study, the SNOT score prior to commencement of medical treatment for facial pain was evaluated and presented.

For comparison, healthy subjects were recruited from staff of the Royal Liverpool University Hospital. Volunteers with a history of facial trauma, smoking, chronic rhinosinusitis, allergic

Table 1. Definition of midfacial segment pain.

	Midfacial segment pain
1	A symmetric sensation of pressure or tightness. Some patients might say that their nose feels blocked, although they have no nasal airway obstruction.
2	Involves the areas of the nasion, under the bridge of the nose, either side of the nose, the peri- or retro-orbital regions, or across the cheeks. The symptoms of tension-type headache often coexist.
3	There might be hyperesthesia of the skin and soft tissues over the affected area.
4	Normal nasal endoscopy.
5	Normal CT of the paranasal sinuses.
6	The symptoms can be intermittent (<15 days/month) or chronic (>15 days/month).
7	No consistent exacerbating or relieving factors.
8	No significant nasal symptoms (note that approximately 20% of most populations have intermittent or persistent allergic rhinitis that may occur incidentally in this condition).

Table 2. Summary of patient demographics.

		Normal	Chronic rhinosinusitis	Midfacial segment pain	p
Gender	Male	14	15	6	N/A
	Female	20	15	23	
	Total	34	30	29	
Age (years)	Mean	38	47	48	NS
	Median	43.5	46.4	47.1	
	Range	23 - 74	29 - 76	23 - 77	
SNOT -22 (total)	Mean	7.3	57.2	52.2	N/A
	Median	5.5	56.5	51	
	Range	0 – 37	40 – 89	26 – 103	

N/A = not applicable, NS = not significant

rhinitis, nasal polyps or taking medication for rhinosinusitis were excluded, as were those with a history of septal, facial or sinonasal surgery. Subjects agreeing to participate were asked to complete the SNOT questionnaire. SNOT scores from random patients attending the rhinology clinics with chronic rhinosi-nusitis (CRS) were also used for comparison. Diagnosis of CRS was based on contemporary clinical guidelines [12]. Similarly, the pre-treatment SNOT scores of these patients were selected for analysis in this study.

Statistical analysis
Statistical analysis was performed using the SigmaPlot software package version 12 (Systat Software, Inc., CA, USA). Student's t test was used to compare the SNOT scores or when normality test (Shapiro-Wilk) failed, the Mann-Whitney U test was utilised instead. A p-value <0.05 was considered statistically significant for all analyses.

Results
A total of 29 consecutive patients (23 females) with a diagnosis midfacial segment pain (MSP) were identified from the Multi-Disciplinary Facial Pain clinic database of 94 patients (up to March 2013). The mean age of this group was 48 years (range 23 – 77). None of these patients had sinonasal operations previous-ly. Patient demographics of this cohort and that of the compara-tive CRS patients (n = 30, 15 females) and healthy volunteers (n = 34, 20 females) are summarised in Table 2.

Although the average SNOT-22 score of CRS patients was the highest amongst the three cohorts (Figure 2), this was not significantly higher than that observed in patients suffering with MSP. The average SNOT score for CRS patients was 57.2 (range

40 – 89), compared to 52.2 (range 26 – 103) in MSP patients. The average SNOT scores of MSP and CRS patients were expectantly higher (p < 0.05) than normal healthy volunteers (mean 7.3, range 0 – 37).

Patients with MSP had higher rhinological subscale SNOT scores compared to normal healthy volunteers but less than patients with CRS (Figure 3). The mean rhinological subscale SNOT score was 8 (median 7, range 0 - 25), which was significantly higher than that observed in the normal healthy cohort (mean 1.7, range 0 - 6). Nevertheless, the impact of MSP on reported rhi-nological symptoms appear to be less than CRS. In fact, patients with chronic rhinosinusitis reported the highest scores with an average rhinological subscale SNOT score of 17.2 (median 17.5,
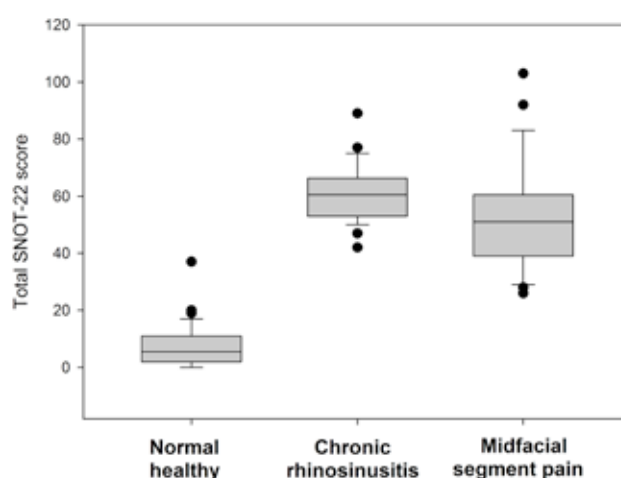

Figure 2. Box plot demonstrating total SNOT-22 scores between normal, chronic rhinosinusitis and midfacial segment pain patients.
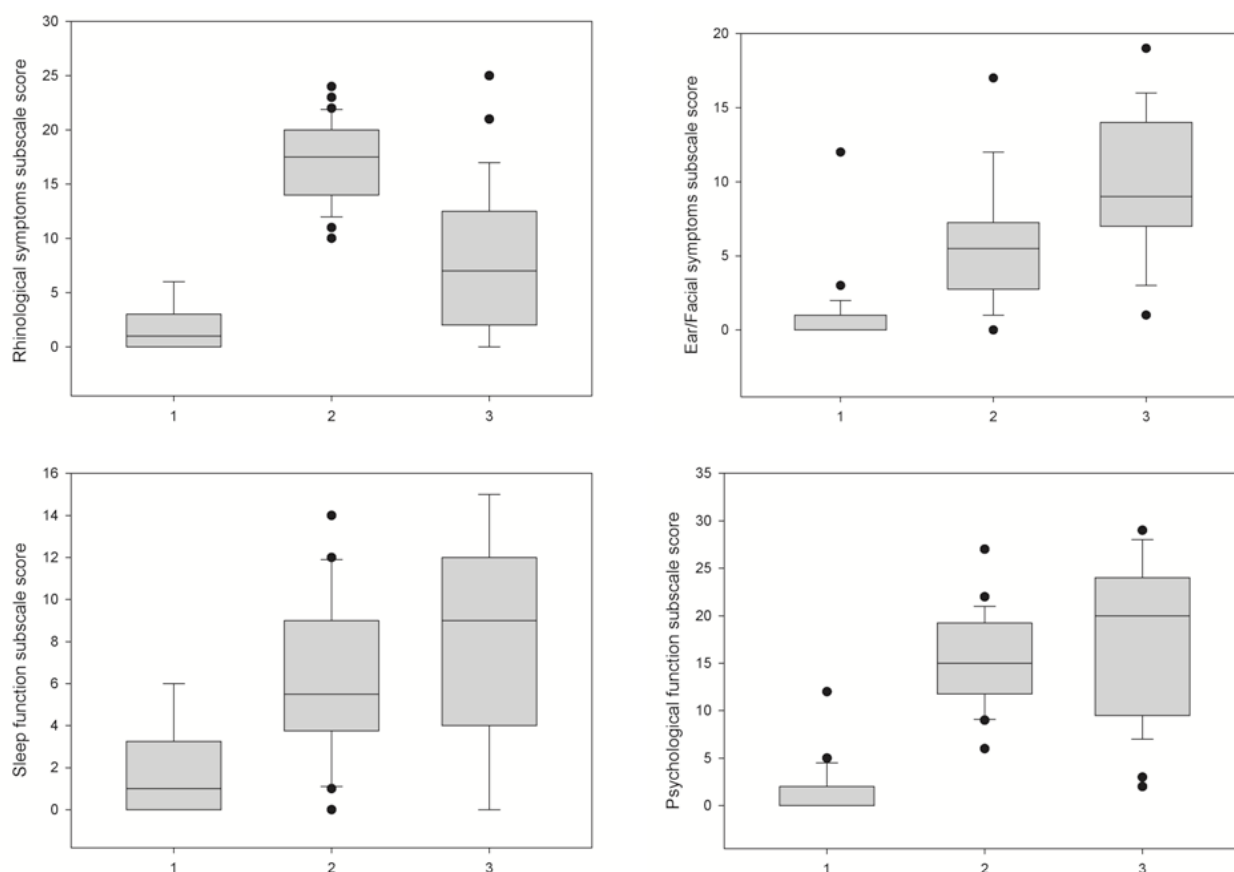
Figure 3. A comparison of box plot of subscale scores between normal healthy volunteers (1), chronic rhinosinusitis (2) and midfacial segment pain (3) patients.

range 10 - 24). This was significantly higher than MSP patients (p < 0.05) for all five questions (blow nose, sneezing, runny nose, postnasal discharge, and thick nasal discharge) within this subscale (Figure 4).

Conversely, the reported ear and facial symptoms of MSP patients were highly unfavourable. The average SNOT (mean 9.7, range 1 – 19) of this subscale was significantly higher compared to both CRS (mean 5.7, range 0 – 17) patients and healthy volunteers (mean 0.8, range 0 – 12). Overall, MSP patients had higher average SNOT scores for all four questions (ear fullness, dizziness, ear pain, and facial pain/pressure) within this subscale compared to CRS patients although this difference only achieved statistical significance for ear and facial pain (Figure 4). A similar trend was observed in reported sleep function where MSP patients recorded significantly higher subscale scores than the other two cohorts. Out of a maximum score of 15, the mean was 8.3 for MSP compared to 6.1 and 1.9 in CRS and normal healthy average scores, respectively (Figure 3).

The psychological issues faced by patients with MSP appear not insignificant in contrast to the normal healthy population (Figure 3). The subscale mean score for psychological function of

MSP patients was 17.2 (range 2 - 29). Interestingly, this subscale SNOT score did not achieve statistical significance when compared to the mean score of patients diagnosed with CRS (15, range 6 - 27). Nevertheless, when the six questions within this subscale were individually analysed, patients suffering with MSP reported feeling more fatigued, reduced productivity, poorer concentration, greater frustration/restlessness/irritability and sadness whilst CRS patients experienced greater embarrassment in relation to their disease (Figure 4).

Discussion

The incidence of facial pain in the general population has been estimated at 38.7 per 100,000 population per annum, with trigeminal neuralgia and cluster headache being the most common forms [13]. Facial pain is a common reason for referral to an otorhinolaryngologist. In a large series of 973 consecutive patients attending a tertiary rhinology clinic, 42% presented with facial pain or pressure. Among these patients attending with facial pain, 25% had normal endoscopy and CT scan findings. The most common diagnosis in this subgroup of patients was midfacial segment pain (MSP) [14]. Our clinic database also showed that MSP constitutes the largest (31%) group of patients suffering with facial pain. To our knowledge, this is the first study which
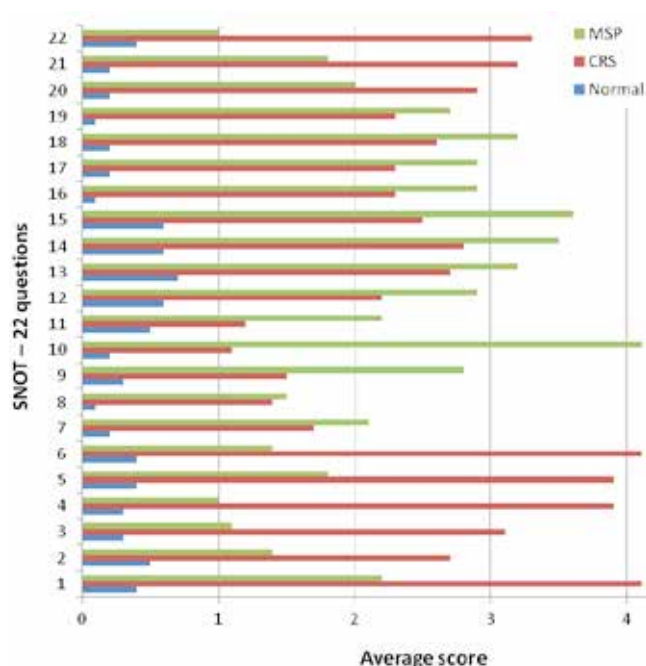
Figure 4. Average scores reported by normal healthy volunteers, chronic rhinosinusitis and midfacial segment pain patients for each SNOT-22 question.

describes the characteristics of patients diagnosed with MSP using the Sino-Nasal Outcome Test. The data presented here is relevant to any otorhinolaryngologist, especially those providing a comprehensive rhinology service. The results also provide reference baseline data in which to monitor treatment response where long-term follow-up of patients with MSP is currently underway in this unit. In addition, the data allows comparison with the normal healthy population to quantify the disease burden of MSP patients. The average SNOT-22 score of the healthy volunteers in this study was comparable to an earlier study by Gillett et al. [15] who reported the mean score of 9.3 (range 0 – 50).

Despite the availability of facial pain specific assessment tools, such as the Brief Pain Inventory – Facial (BPI-Facial) [16], it was decided to use the Sino-Nasal Outcome Test in the facial pain clinic due to its widespread familiarity and acceptance amongst otorhinolaryngologists. The BPI – Facial is a 16 item questionnaire, which includes items that assess how pain interferes with a patient's general activity, mood, walking ability, normal work, relationships with other people, sleep and enjoyment of life. Whilst we acknowledge that these variables were important, it was felt that the SNOT had a better balance of questions related to symptomatology and impact on quality of life, with half of the questions within the SNOT tool addressing physical symptoms, and the remainder covering aspects of health-related quality of life such as sleep, energy, cognition and emotional problems.

There are numerous studies on the impact of orofacial pain on patients with temporomandibular joint dysfunction, none have studied MSP in great detail. In the present study, the overall SNOT-22 score was comparable between patients with CRS and MSP. The gross score may indicate similar disease burden, but further analysis of the SNOT subscales has revealed that specific issues affect these patients very differently. Sinonasal symptoms featured more prominently in CRS patients whereas facial and ear symptoms were more severe in MSP patients, as was the impact of facial pain on sleep and rest. Although the psychological distress reported by MSP patients in the psychological function subscale was higher than patients with CRS, this did not reach statistical significance. This could be a result of a Type I error given the small patient cohorts available for comparison.

All patients referred to our facial pain clinic have undergone routine computed tomography. Amir et al. [17] reported that strict adherence to contemporary guidelines for migraine and CRS significantly reduced CT scan requests for patients attending their clinic. This difference is likely reflective of different practices between the departments.

Conclusion

Sinusitis is not the cause of all midfacial pain. Clinicians should remember that not every pain in the face is caused by sinusitis. A structured history of the pain and its associated symptoms, nasendoscopy and relevant targeted investigations (such as CT) should lead to a correct diagnosis and the appropriate treatment. Using the Sino-Nasal Outcome Test, this study has demonstrated that midfacial segment pain has an adverse impact on both physical and psychological well-being. This study highlights some of the subtle differences between MSP and CRS, but more importantly provided greater insight into the character and disease impact of MSP. We propose that the SNOT may be suitably utilised in MSP to document disease severity and measure response to treatment.

Acknowledgement

Authorship contribution

SCL: study concept, data collection and analysis, drafting of manuscript.
HKT: data collection, drafting of manuscript.
MDW: data collection.
GB: data collection, drafting of manuscript.

Conflict of interest

None to declare.

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