ORIGINAL CONTRIBUTION

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Long-term follow-up of patients with facial pain in chronic rhinosinusitis - correlation with nasal endoscopy and CT*

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SUMMARY

Aims: *Commonly attributed to chronic rhinosinusitis (CRS), facial pain is a frequent presenting complaint in otolaryngology clinics. This study aimed to investigate nasal endoscopy and CT in a cohort of CRS patients presenting primarily with facial pain and to report on their long-term follow-up.*

Setting: *The setting was a busy otolaryngological practice on a small Mediterranean island. A cohort of 305 consecutive patients with chronic rhinosinusitis refractory to maximal medical therapy was assessed clinically, by nasal endoscopy and coronal sinus CT.*

The primary presenting symptom in 154 of these individuals was facial pain and this paper studied this particular subgroup of CRS patients. Using the Lund-Mckay scoring system, a CT positive for sinusitis was set at 2 or higher. A score of 0 or 1 was considered negative for sinusitis. The findings in CT positive and CT negative patients were compared.

Results: *The CT in 61 (40%) patients with facial pain scored positive while 93 (60%) patients had a negative CT. Patients with facial pain as the presenting symptom in rhinosinusitis were significantly less likely to score positive for sinusitis on CT (chi squared test, $p < 0.0001$). CT positive patients were significantly more likely to have pus or nasal polyps (chi squared test, $p < 0.0001$) on nasal endoscopy than CT negative patients. Only 36% of patients with facial pain and other sinusitis symptoms had chronic rhinosinusitis as confirmed by CT and presence of pus or polyps on nasal endoscopy. Patients with positive CT were significantly more likely to be treated surgically while those with a negative CT were significantly more likely to be treated by medication (chi squared test, $p < 0.0001$).*

Conclusion: *Patients were followed up for a mean of two years and their outcomes analysed. The outcome for conservative treatment in CT negative patients (68% good or improved) was not as good as the outcome for surgical treatment in CT positive patients (87% good or improved).*

Key words: sinusitis, rhinosinusitis, facial pain, CT

INTRODUCTION

'Rhinosinusitis' has replaced the term 'sinusitis' for infections of the paranasal sinuses since rhinitis and sinusitis usually coexist. Clinical studies have been called for in order to establish the nature of the pain reported by patients with chronic rhinosinusitis [1]. Long-term follow-up has been recommended for diagnosis of facial pain [2,3].

This prospective study was set in a busy otolaryngological practice on the Mediterranean island of Malta, using a computerised database for recording patient data. It aimed to provide long-term follow-up on patients presenting with facial pain as the primary chronic rhinosinusitis symptom refractory to maximal medical therapy.

The Maltese islands are an archipelago in the centre of the Mediterranean Sea (14° East longitude and 35° North latitude) with one main populated island having an area of 313 km^2 and a population of 390,000. The climate alternates between a hot dry summer and a mild rainy winter with a mean annual rainfall of 530mm [4,5].

From 6030 Maltese patients presenting with rhinological complaints to an ENT clinic, 1523 (25.2%) were recorded as having some form of facial pain (personal data). Such patients often attended the clinic with a presumed diagnosis of chronic rhinosinusitis. The definitions of chronic rhinosinusitis (CRS) used in this paper originated from the 1997 report of an American Academy of Otolaryngology task force [6]. 'Major'

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symptoms (facial pain, nasal congestion, purulent discharge, hyposmia/anosmia) and 'minor' symptoms (fever, headache, halitosis, fatigue, dental pain, cough or otalgia) were identified. A strong history consistent with CRS included 2 or more major, or 1 major and 2 minor symptoms for at least 12 weeks. The task force definitions emphasised symptoms rather than objective findings. Finding specific diagnosis and aetiology needed further history, examination, endoscopy and CT. CT has been shown to be useful in objective diagnosis and in identifying causative factors for chronic rhinosinusitis [7].

The above criteria were recently updated in the European Position Paper of 2007 [8] where CRS with or without polyps was defined by the presence of two or more symptoms for over 12 weeks. These symptoms were nasal obstruction, congestion or nasal discharge (with anterior nasal or postnasal drip), facial pain or pressure, or reduction of the sense of smell [8]. Clinical examination ought to elicit endoscopic signs of polyps, mucopurulent discharge or oedema in the middle meatus or else radiological signs on sinus CT scan.

There has been a lack of close correlation between subjective and objective measures of rhinosinusitis [9]. Radiological examination has been considered one such objective measure. However, plain radiographs have not played a significant role in the routine management of rhinosinusitis for some years due to their low specificity and sensitivity when compared to clinical and surgical findings [10]. Computerised tomography (CT) has taken over as the standard test for the assessment of CRS [11], rhinosinusitisis being characterised by mucosal thickening, air-fluid levels and bony changes. Attempts have been made to standardise the assessment of CT scans of the sinuses by means of grading systems.

One of the most widely used systems for assessing radiological abnormalities in rhinosinusitis has been the Lund-Mckay staging system [12,13]. To categorise the extent of chronic rhinosinusitis this staging system assessed the CT scan by assigning grades 0, 1 or 2 depending on the extent of opacification (0 = no abnormality, 1 = partial opacification, 2 = total opacification) to all sinus groups: maxillary, anterior ethmoid, posterior ethmoid, sphenoid and frontal, for right and left sides. The maximum score possible was 10 per side. The ostiomeatal complex was assessed and graded 0 if not obstructed or 2 if obstructed. Therefore the maximum score total was 12 per side, or 24 for both sides. The minimum score was 0 (no abnormality) [14]. This staging system correlated well with other markers of disease severity, the nature of surgery and its outcome [15,16]. The Lund-Mckay scoring system did not define a cut-off score for a positive or negative scan. An abnormal scan may have shown radiological abnormalities such as mucosal thickening, but did not necessarily diagnose CRS. In a study of 199 patients undergoing CT sinuses for non-sinusitis causes Lund-Mckay scoring showed average scores of between 0 and 5 for asymptomatic individuals [17]. Selecting lower Lund-Mckay scores as a cut-off points for positivity, such as greater than 2 increased the sensitivity for diagnosis of CRS albeit at a cost of lower specificity [18].

In this study the Lund-Mckay staging system was applied, with standard coronal CT scans having a score of 0 to 1 classified as negative for sinusitis and scans having a score of 2 and above classified as positive for sinusitis. In this study the CT was used as the definitive yardstick by which the diagnosis of CRS was verified, and CT-positive patients are compared against those having a negative CT.

MATERIALS AND METHODS

Patients

Information was gathered prospectively on a cohort of CRS patients using a computerised database. These patients had symptoms of CRS that had failed to respond to maximal medical therapy. This therapy usually consisted of several courses of antibiotics, with or without intranasal steroids, oral steroids or decongestants. From this cohort of 305 patients, 154 patients identified facial pain as their primary symptom and this was the particular subgroup of CRS patients under investigation.

Since this study was commenced before 2007 the 1997 AAO definition was used. Patients with CRS had to have 1 major and 2 minor or 2 major criteria as described above in the introduction, with continuous symptoms over 12 weeks.

Treatment and analysis

All symptoms were recorded in the clinical interview. Patients with pain were asked to describe the main site of their pain, whether it was unilateral, bilateral or alternating, and whether they had a history of migraine. Seasonal allergic symptoms or systemic conditions such as asthma were noted. Atopic individuals with positive skin tests were identified, as were those exposed to cigarette smoke (whether active or passive). Nasal endoscopy was carried out and findings in the middle meatus such as normal mucosa, oedema, pus or polyps were recorded.

A standard coronal sinus CT was carried out within 24 hours of the clinic visit. Scans positive for sinusitis had a Lund–Mckay score of 2 or over. Patients whose CT had a Lund-Mckay score of 0 or 1 were classified as CT negative, including scans showing turbinate enlargement (rhinitis). Anatomical abnormalities such as a deviated septum or conchae bullosae were noted.

Details of further medical or surgical treatment undertaken were recorded together with the type of treatment.

Patient outcome was recorded as good (significant improvement to quality of life), improved (improvement in quality of life), same (no change in overall patient symptoms) or worse. The length of follow-up was noted.

Exclusion criteria

Patients with previous surgery were excluded since they may have had bony changes on CT giving rise to misinterpretation. Other exclusion criteria included cystic fibrosis, immunodeficiency, congenital mucociliary abnormalities (such as primary cystic dyskinesia), systemic vasculitis, neoplasia (including inverted papilloma), fungal disease and cocaine misuse.

Statistics

Statistical calculations were carried out using SPSS for Windows version 16.0.

RESULTS

Facial pain was the single most distressing complaint in 154 individuals with CRS. Their age was 39.9 years ± 1.09 SD with a range 12 to 72 years. Ninety-nine were female and 55 were male.

The frontal region was the most common area of pain described in 69 patients. The peri-orbital region was cited by 63 patients, and the cheek region in 41 individuals. In the latter, pain was bilateral in 32, unilateral in 32 (right or left) and alternating in 8 individuals. In 6 patients different regions were involved simultaneously. These other areas of pain involved outside the face included the temporal (3 patients) and occipital regions (3 individuals).

From the original cohort of 305 patients with clinical CRS, the 154 patients with facial pain as their principal symptom were significantly less likely to score positive for sinusitis on their CT scan while patients with other principal complaints such as nasal obstruction or postnasal drip were significantly more likely to be subsequently associated with a positive CT (Table 1, Chi squared test; $p < 0.0001$).

In 154 patients presenting predominantly with facial pain 61 were CT positive while 93 were CT negative (Table 2). Men with facial pain were significantly more likely to subsequently have signs of sinusitis on CT than women (chi squared test; $p < 0.033$). Facial pain patients were thus divided and analysed according to whether they were CT-positive or CT-negative.

The nasoendoscopic findings in 154 patients with facial pain and CRS are summarised in Table 3. Patients with normal mucosa were significantly more likely to have a negative CT while patients with pus and nasal polyps were significantly more likely to go on to have a positive CT (chi squared test; $p < 0.0001$). Mucosal oedema was present in 86 from 154 patients (56%) presenting primarily with facial pain. Mucosal oedema was a non-specific finding with no significant difference in frequency between CT-positive and CT-negative patients.

Not all CT-positive patients had surgery. On the other hand, patients with CT negative for sinusitis may still have had conservative turbinate reduction for, say, rhinitis in order to treat nasal obstruction. However, patients with a positive CT were significantly more likely to be treated by operation only, while those with a negative CT were significantly more likely to have medical treatment only (Table 4, chi squared test; $p < 0.0001$). Forty-eight patients had operation only while 75 had medication only. In 30 patients surgical treatment was combined with medication, for example, in operative and postoperative treatment of sinusitis in patients with nasal polyps. Patients with rhinitis having turbinate reduction may also have needed further medical treatment postoperatively once their airway obstruction was reduced.

All 154 patients with facial pain were followed up for a mean of 23.6 months (range 1 to 120 months). The 2-year outcome was classified as good, improved, same or worse. A good outcome meant that there was a marked improvement in quality of the patient's life following treatment. A moderate but noticeable change for the better in the patient's sinus symptoms was classified as 'improved'. Those with no change after treatment were categorised as 'same'.

Table 1. CRS Patients presenting with primarily with facial pain were significantly less likely to have CT scan positive for sinusitis compared to those with other symptoms. (*Chi squared test, $p < 0.0001$).

	Pain principal symptom	Postnasal drip or nasal obstruction
CT positive (n=172)	61	111
CT negative (n=133)	93	40
Total numbers (n=305)	154	151

Table 2. Female CRS patients with facial pain were less likely to have a CT positive for sinusitis. (Chi squared test, $p = 0.033$).

	Males	Females
CT positive (n=61)	28	33
CT negative (n=93)	27	66

Table 3. Nasal endoscopic findings in 154 patients with facial pain and CRS. (*Chi squared test, #ns=not statistically significant). Chi squared analysis of whole table $p < 0.0001$.

	Normal (p= 0.009)*	Pus (p= 0.04)*	Nasal polyps (p= 0.01)*	Oedema (p= 0.82) #ns
CT positive (n=61)	5	16	8	32
CT negative (n=93)	29	9	1	54
Total numbers (n=154)	34	25	9	86

Table 4. In this study, 153 patients with facial pain were treated by operation only, with medication only or by a combination of surgery and medication. Surgical treatment was significantly more likely in CT positive patients while treatment with medication was more likely in CT negative patients. One patient refused treatment. (Chi squared test, $p < 0.0001$).

	Surgery only	Medication only	Surgery and medication
CT positive (n=61)	29	18	13
CT negative (n=93)	19	57	17

Table 5. This table shows the 'good' and 'improved' long-term outcomes in facial pain patients undergoing different forms of treatment. Good outcomes were seen in CT positive patients having surgery, and in CT negative patients having medication ($p = 0.034$, chi squared test). Patients having combined treatment showed good outcomes regardless of their CT.

	Patients having surgery only	Patients having medication only	Patients having combined treatment
CT positive patients with good/improved outcome (n=53)	28	14	11
CT negative patients with good/improved outcome (n=63)	17	33	13

Patient outcome in the CT positive group was compared to that in the CT negative group. A good or improved outcome was found in 87% of CT positive patients and 68% of CT negative patients and Table 5 showed the patients with good or improved outcomes in the various treatment groups. Facial pain patients with a positive CT generally had a good outcome by being operated while pain patients with a negative CT still had a good outcome but by being treated conservatively (chi squared test; $p = 0.034$). The outcome for conservative treatment in CT negative patients (68%) was therefore not as good as the outcome for surgical treatment in CT positive patients (87%). Those patients having combined treatment had a good outcome regardless whether their CT was positive or negative.
Twenty-eight patients did not have any noticeable change after treatment. Ten patients were lost to follow-up. No patients were worse 2 years after treatment.

CRS patients with concomitant systemic disease, such as asthma, have exhibited higher CT grades in other studies [19,20]. In this series, asthma was present in 21 patients with facial pain but their CT grade or outcome was not significantly different from the other 133 individuals.

DISCUSSION

One of the advantages of this study was that a single clinician was able to correlate all clinical data together as happened in a real-life setting. Conducted on a small island with a correspondingly small population, patient follow-up was easy. However, the single author assessed the CT scans and eventual outcome so potential bias could have been introduced.
The mean age of 154 CRS patients with facial pain as a primary symptom was just under 40 years and 64% were female. In a series of 973 individuals with facial pain and rhinosinusitis symptoms, Daudia and Jones [21] found a mean age of 46 years and 55% were female.

A study of 94 patients with facial pain by Holbrook et al. did not establish any correlation between the site of pain and the Lund-Mckay grade on CT scan [22]. Kenny et al. concluded that headache or facial pain was an unreliable predictor of CT scan findings in rhinosinusitis [23]. Maltese patients presenting mainly with facial pain were significantly more likely to have a negative CT than patients presenting with other principal rhinosinusitis symptoms. A negative CT, however, did not mean that rhinosinusitis was completely excluded but that it was less likely as a diagnosis.

Facial pain has been a feature of chronic rhinitis, and was a symptom in 27% of 415 Maltese patients with chronic atopic and non-atopic rhinitis [24].
Rhinitis with mucosal oedema was the commonest finding on nasal endoscopy and was present in 86 from 154 patients presenting primarily with facial pain. Out of these 86 patients, 35 (or 22.7% of facial pain patients) had rhinitis with turbinate enlargement on CT. Rhinitis has been shown to be highly prevalent in Malta [25].
Jones [26] in his series of 973 patients with facial pain and rhinosinusitis found that 20% of patients with facial pain as a primary symptom had some form of rhinitis. From this large series of 973, the great majority of patients with purulent secretions visible at nasal endoscopy did not have facial pain [27,28].
Similarly, nasal polyps rarely have been a cause of facial pain. From 973 patients, 220 (22.6%) had nasal polyps. From these 220 patients with polyps, only 39 (18%) had facial pain [29].
In this study of 305 Maltese patients with sinusitis symptoms, 51 (17%) had nasal polyps. Nine from these 51 patients (17.6%) had facial pain. Patients with polyps were significantly more likely to have a CT grading positive for sinusitis.
In short therefore, the major signs of sinusitis such as pus and nasal polyps are rarely associated with facial pain.

Pain of sinus origin was usually unilateral, exacerbated during an upper respiratory tract infection and associated with nasal obstruction, hyposmia, and rhinorrhoea. Facial pain that increases in severity on bending forwards, traditionally thought to be diagnostic of sinusitis, might have a neurological origin [25]. Causes of facial pain included migraine and trigeminal neuralgia involving the second division of the trigeminal nerve.
It was common for patients to show a form of facial neuralgia with all the characteristics of tension-type headache but affecting the mid-face.
Jensen et al. [30] described the aetiology of tension-type headache as a central sensitisation of the trigeminal nucleus following prolonged nociceptive input caused by peripheral injury, surgery or inflammation. Psychological factors and emotional disturbances could contribute by reducing supraspinal inhibition.
Mid-facial pain has emerged as a distinct clinical entity. Jones [31] described this pain as symmetrical pressure over the nasion, under the bridge of the nose, paranasally, around the peri- or retro-orbital regions or across the cheeks. No consistent exacerbating or relieving factors have been noted. Analgesics have

had no effect, except for non-steroidal anti-inflammatory drugs, which have helped to a minor extent.
Low-dose amitriptyline given for periods of up to six months has been found to provide relief for these patients. Nasal endoscopy and CT would be normal in such patients.

In this series medication prescribed included tricyclic antidepressants in low dosage, beta-blockers for migraine prophylaxis, and non-steroidal anti-inflammatory drugs for migraine or temporomandibular joint-related dysfunction.
Surgical treatment consisted of endoscopic sinus surgery in patients with overt sinusitis. Those with nasal obstruction due to deviated nasal septum would have had a septoplasty accordingly. Conservative turbinate reduction was also carried out in some cases to improve the airway.
Patients having both surgical and medical treatment would have had rhinitis with congestion and therefore the surgical treatment would have been for nasal obstruction, followed by intranasal steroid spray. Patients with nasal polyposis not responding to medical treatment had surgery followed by topical intranasal steroids.

Outcome for CRS patients with facial pain was most successful in CT positive patients having surgery. This was probably the ideal clinical situation with a success rate of 87%. Realistically however, patients presenting with facial pain often had a negative CT. These CT negative patients were generally treated with medication rather than with surgery. The outcome success rate of this latter CT negative group was lower (68%), and was attributed to decreased patient compliance when using long-term medication, especially if dosages or prescriptions had to be repeatedly adjusted after periods of time. Due to the strong affective component of facial pain, patients tended to get disheartened if they did not feel any better after short periods of medication. Self-medication was common in this group of patients.

CONCLUSION

The multitude of possible diagnoses makes facial pain a challenging area for the medical practitioner.
In facial pain associated with chronic rhinosinusitis symptoms the CT scan frequently shows no signs of mucosal thickening or fluid levels and correlation of symptoms with nasal endoscopic findings is necessary to establish the diagnosis. In this series only 36% of patients with rhinosinusitis symptoms and facial pain had sinusitis as confirmed by CT and nasal endoscopy. The rest had rhinitis (atopic or non-atopic) or a range of neurological diagnoses such as mid-facial segmental pain, facial migraine and trigeminal neuralgia. Clinical experience suggested that many patients may have a combination of the above conditions, and therefore may need more than one modality of treatment. In those patients with facial pain and oedematous mucosa on nasal endoscopy a CT is likely to be normal. The outcome for conservative treatment in CT negative patients (68% good or improved) was not as good as the outcome for surgical treatment in CT positive patients (87% good or improved).

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ANNOUNCEMENT