

Nasal obstruction in the adult: is CT scan of the sinuses necessary?*

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SUMMARY

Objective: To determine whether CT (computerized tomography) scan of the paranasal sinuses is essential in the diagnosis and medical/surgical management of nasal obstruction.

Design: One hundred thirteen adult patients with nasal obstruction but without signs of sinusitis who underwent CT examination prior to surgery, were included in the study.

Results: Fifty seven percent of the CT scans revealed a variety of abnormal findings. Of the patients with an abnormal CT scan, surgical planning had to be altered in 16 patients due to significant abnormalities found on the CT scans.

Conclusions: We conclude that CT scan of the nose and paranasal sinuses is an effective pre-surgical planning tool in patients with nasal obstruction.

Keywords: CT scan, nasal obstruction, sinuses

INTRODUCTION

Nasal obstruction is one of the more common complaints encountered in the general otolaryngology practice. The evaluation and treatment of nasal obstruction is generally straightforward. A proper history with detailed nasal examination, may be adequate in those cases where clinical history is not suggestive of sinusitis. However, one of the dilemmas encountered by the clinician is whether to order CT scans of the paranasal sinuses in patients with nasal obstruction without clinical symptoms of sinusitis.

The literature contains several articles which address the incidence of positive CT findings in the pediatric and adult populations (Diament et al., 1987; Havas et al., 1988; Van der Veken et al., 1990; Calhoun et al., 1991; Gualtney et al., 1994; Lasserson et al., 1994). Incidental CT scan findings in the symptomatic adult population have focused on findings in patients with asthma, sinusitis or allergy.

We could find no guidelines as to whether a CT scan of the sinuses in cases of nasal obstruction would be helpful in diagnosis, treatment and surgical planning. This study was undertaken to see whether a CT prior to contemplated nasal septal and/or turbinate surgery would be helpful diagnostically, and as a pre-surgical planning tool.

MATERIALS AND METHODS

One hundred and thirteen patients over the age of 13 years were evaluated for nasal obstruction. There were 70 males and 43 females with an age range of 13 to 54 years, with a mean of 26 years. Patients with a history of chronic sinusitis (purulent rhinorrhea with facial pain, loss of smell) were not included in the study. No patients had undergone prior sinus or nasal surgery. One patient underwent rhinoplasty in the past and eight had sustained nasal trauma. Most patients were referred from outpatient ENT clinics and all patients received prior medical treatment consisting of topical steroid sprays, histamines and/or decongestants. This group of patients was evaluated for possible septal surgery and/or turbinectomy.

Fourteen patients complained of generalized headache while 9 had unilateral or bilateral facial pain (Table 1). Fourteen (12%) patients had clear nasal drainage or part nasal drip with no complaints of anosmia. Fourteen (12%) patients reported hyposmia. Forty one (36%) patients had bilateral nasal obstruction with 72 (64%) complaining of unilateral or alternating obstruction. Forty one (36%) patients had seasonal allergy while 14 (12%) patients reported a history of asthma. All 113 patients underwent thin section (3 or 4 mm) limited coronal computerized tomography of the paranasal sinuses. Seventy patients underwent office endoscopy with decongestion and topical 4% lidocaine using a 2.7 mm diagnostic rigid fiberoptic scope.

Table 1. Associated symptoms in 113 patients.

symptom	no. of patients	% of patients
Unilateral or alternating nasal obstruction	72	64%
Seasonal allergy	41	36%
Bilateral nasal obstruction	41	36%
General Headache	14	12%
Clear postnasal drip	14	12%
Hyposmia	14	12%
Asthma	14	12%
Facial pain	9	8%

Table 2. CT Findings.

Finding	no. of patients	(%)
Sphenoid	0	
Frontal thickening	3	(3%)
Ethmoid thickening	3	(3%)
Maxillary retention cyst	12	(11%)
Ethmoid/maxillary thickening	14	(12%)
Maxillary thickening	17	(15%)
Concha bullosa	23	(20%)
Deviated septum	73	(65%)

RESULTS

Forty nine (43%) of the 113 CT scans of the nose and paranasal sinuses were completely normal.

Sphenoid disease was not noticed on any of the scans (Table 2). Frontal sinus thickening was found in 3 (3%) patients, two of which also had ethmoid sinus thickening. Three (3%) patients had isolated ethmoid thickening. Fourteen (12%) patients had combined ethmoid and maxillary sinus disease with 8 (7%) having bilateral disease, and 8 (7%) moderate to severe findings. Seventeen (15%) patients had maxillary sinus disease only, with bilateral disease in 8 patients and moderate to severe disease in 7 patients. Twelve (11%) patients had maxillary retention cyst.

Table 3. Altered treatment plan due to CT findings (from SMR and/or inferior turbinectomy).

CT finding	no. of patients	change in medical/surgical treatment
1) Concha bullosa	8/113	FESS concha bullosa resection
2)		
a. Moderate to severe ethmoid/maxillary opacification	15/113	Prolonged antibiotic therapy
b. Antibiotic therapy failure	8/15	FESS

Twenty-three (20%) patients had concha bullosa in whom eight (7%) had moderate thickening of the ethmoid and/or maxillary sinus. Fifteen (13%) occurred as the sole finding and were unilateral. Eight (7%) had bilateral concha bullosa. All of the concha bullosa were of moderate size except one with a massive appearance.

Seventy three (65%) patients had significant deviation of the septum with bilateral inferior turbinate hypertrophy in 45 (40%) patients. Sixty eight (60%) patients had unilateral turbinate hypertrophy. Significant sinusitis was associated with a deviated septum in only 7 (6%) patients. Fourteen patients complained of headache, with 1 having a maxillary retention cyst and 1 maxillary sinus thickening. Significant CT findings were noted in only 1 of the 9 patients with facial pain. Significant CT findings were noted in 3 of the 14 patients with hyposmia, while no positive CT scans were found in the 14 patients with post nasal drip. Of the patients with concha bullosa which were moderate to large in size, 8 (7%) patients in whom this was the only finding had the proposed surgery changed from inferior turbinectomy to partial middle turbinectomy via an endoscopic approach (Table 3). Of the 8 patients with moderate to severe findings of the ethmoid and maxillary sinus, all received antibiotic therapy with 5 (4%) eventually requiring functional endoscopic sinus surgery (FESS) (Table 3).

Of the 7 patients with moderate to severe maxillary sinus disease alone, 3 eventually required FESS after antibiotic therapy failure (Table 3).

Overall, a total of 16 (14%) patients had their surgical treatment altered due to the findings noted on the coronal CT scan of the sinuses. Planned initial inferior turbinectomy was not performed. Septoplasty was performed to facilitate FESS.

Of the 70 (62%) patients who underwent office endoscopy, the findings correlated well with the CT findings regarding septal deviation, however, only if the concha bullosa was very large was it noted by office endoscopy. Septal deviation did not preclude examination of the middle meatus. Polypoid findings of the middle meatus were found in 3 of 8 patients with concha bullosa and moderate sinusitis. Endoscopy in the other 5 patients with concha bullosa was normal.

DISCUSSION

Nasal obstruction is one of the most common complaints encountered by the otolaryngologist. Detailed history and physical examination and conservative treatment consisting of topical sprays and/or antihistamines and decongestants will suffice in many cases. Those cases refractory to treatment may be candidates for more aggressive evaluation and possibly surgery. Endoscopic nasal examination may be helpful along with computerized tomography of the paranasal sinuses. On review of the literature, we found articles concerning CT evaluation of the common cold, correlation with asthma, eosinophilia and allergy, (Newman et al., 1994; Philips et al., 1995), incidence of positive sinus CT scan in the pediatric population (Diament et al., 1987; Van der Veken et al., 1990; Lasserson et al., 1994), association with anatomical abnormalities (Zinreich et al., 1988;

Clark et al., 1989; Yousem et al., 1991) and incidence of positive sinus CT scans in the asymptomatic adult populations (Havas et al., 1988; Calhoun et al., 1991). This study was undertaken to evaluate the incidence of abnormal sinus CT scans in a population without clinical sinusitis but with nasal obstruction. In the literature we could find no guidelines regarding CT evaluation of sinuses in a patient population whose main complaint was nasal obstruction. The CT evaluation of the sinuses might affect the diagnosis and subsequent surgery in the population whose main complaint was nasal obstruction. In addition, cost effectiveness of treatment could be significantly impacted by more accurate diagnosis in the adult population with nasal obstruction. The average cost of a coronal CT of the sinuses is \$200 for our patients. Therefore, the cost of CT for 113 patients was \$22,600. The average cost for submucous resection and turbinectomy is \$1,500 under local anesthesia with I.V. sedation. Twenty three patients had the proposed surgery altered due to the findings on the screening CT scan. This yielded a saving of \$34,500 (23x\$1,500) in our patients, which covered the \$22,600 cost of the CT scans. In addition, it saved unnecessary surgery in those patients.

Similar to other studies evaluating the incidence of sinusitis in the symptomatic (Kennedy et al., 1988; Van der Veken et al., 1990; Gualtney et al., 1994) or asymptomatic (Havas et al., 1988; Calhoun et al., 1991; Lasserson et al., 1994) population, we also noted involvement, mostly of the maxillary or maxillary and ethmoid sinuses. In Calhoun's study of an asymptomatic population 16% had abnormal CT scan although many did not have significant changes as in our population. The sphenoid and frontal sinuses are relatively spared, possibly due to their more inaccessible location in contrast to the relatively more exposed anterior ethmoid and maxillary sinuses. In addition, the natural drainage of the frontal and sphenoid sinuses may be better. In our particular series, 15 (13%) patients had significant ethmoid and/or maxillary disease which required an alteration in the proposed surgery of submucous resection of the septum and/or turbinectomy. A proper clinical term for these patients may be occult sinusitis presenting with nasal obstruction.

Concha bullosa may also play a role in sinusitis (Zinreich et al., 1988; Clark et al., 1989; Yousem et al., 1991). In our study, 8 of 23 patients with concha bullosa had associated maxillary or ethmoid sinusitis. These numbers are not statistically significant to conclude that concha bullosa is the cause of sinusitis in these patients. In a study by Zinreich (Zinreich et al., 1988), specifically looking at CT evaluation of concha bullosa, sinusitis appears to be secondary to large concha bullosa. Narrowing of the middle meatus causing disturbance in mucociliary flow or decreased ventilation may be factors in the pathogenesis of sinusitis in these cases. Septal deviation was noted in 65% of our patients, but only 7 (6%) patients had associated significant sinusitis. In an evaluation by Yousem (Yousem et al., 1991), of ostiomeatal obstruction risk factors, severe septal deviation seemed to be significantly associated with sinusitis on the side of the deviation, and on the contralateral side. A major difference in his study was that the 100 patients were referred with a background of acute or chronic sinusitis. In our population

without a significant clinical history of sinusitis, septal deviation seems to play a much smaller role in causing sinusitis.

Generalized headache, nonspecific facial pain or nasal drip did not yield significant abnormalities on the CT scan. However, 3 of 14 patients with hyposmia did have significant changes on the CT scan.

The most important clinical outcome was the number of patients who had their treatment plan changed due to the abnormalities on the CT scan. Eight (7%) patients eventually had their surgical plan altered due to the finding of significant concha bullosa on the CT scan. Fifteen patients with moderate to severe sinusitis on the CT scan received antibiotic therapy with 8 (7%) eventually requiring endoscopic sinus surgery.

No clinical symptoms could have been used to decide which patients presenting with nasal obstruction should be screened with CT scan. Patients only with moderate to severe disease had their treatment plan altered medically or surgically. Minimal thickening, especially of the ethmoid sinus, may be part of the normal nasal cycle as noted by Yousem (Yousem, 1993).

CONCLUSION

In light of our findings that 16 patients (14%) had their surgical procedures altered, and 7 patients (6%) required antibiotic therapy preoperatively, the coronal CT scan should be considered as a presurgical planning tool in evaluating nasal obstruction. The limited coronal CT minimizes radiation exposure without significantly sacrificing the quality and accuracy (Zinreich, 1992). It is cost effective because patients will be saved additional possibly unnecessary procedures or inadequate therapy. Therefore, we recommend performing preoperative limited coronal CT of the nose and paranasal sinuses in cases of nasal obstruction.

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