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Symptomatic Unilateral Maxillary Sinusitis: A Cross- Sectional Retrospective Study

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Abstract | **Original Research Article**

Objectives*:** The purpose of the present retrospective cross-sectional study was to identify the etiologies, clinical and radiological aspects of symptomatic unilateral maxillary sinusitis requiring hospitalization and to discuss surgical treatment indications. ***Material and methods: The medical records of 115 patients suffering from symptomatic unilateral maxillary sinusitis (SULMS) between 2010 and 2019, were examined. A total of 46 patients were selected by collecting data from the patients' medical records. ***Results:*** The aetiology of SULMS was in 23.9% of cases of dental origin and in 76.1% of cases of rhinogenic origin. Rhinological signs were predominant, dominated by nasal obstruction (56.52%) and headache (52.17%). The computerized tomography (CT) scan showed diffuse sinus opacity without fluid level in 43.5% of cases. The surgery indication was in 41.3% of cases due to medical treatment failure and to the presence of intra-sinusal foreign body in 10.9% of cases. ***Conclusions*:** The results of this study indicate that general state of health, age, sex, sinusitis etiology, middle meatus obstruction and local anatomical factors do not appear to be factors influencing management compared to the chronic evolution of sinusitis (P=0.03). This study has shed light on dental infectious foci involvement in both the initiation and flare up of unilateral maxillary sinusitis.

Keywords: symptomatic unilateral maxillary sinusitis (SULMS), computerized tomography(CT), medical treatment.

INTRODUCTION

Nowadays, maxillary sinusitis is the most common acute sinusitis. It is an inflammatory and/or infectious condition of viral, bacterial or fungal origin developed in the maxillary sinus mucosa [1]. Symptomatic unilateral maxillary sinusitis (SULMS) is generally chronic with flare-up episodes involving acute symptoms including: headaches, purulent nasal discharge, unilateral pain that worsens with bending or stooping. SULMS has two possible aetiologies: rhinogenic or odontogenic [2]. In some cases, the two origins may coexist. The management of SULMS is based on aetiological treatment. Furthermore, symptomatic treatment is very important in order to relieve the patient as soon as possible, limit the evolution towards chronicity and avoid serious complications. It includes: antibiotics, analgesics, local vasoconstrictors, antihistamines, and corticosteroids by local or general route [2]. Surgical treatment is not systematic and is based on the medium meatotomy (MM), currently concidered as the reference technique to restore physiological mucociliary drainage and the maxillary sinus aeration [3]. The aim of this cross-sectional retrospective study was to identify the etiologies, clinical and radiological aspects of symptomatic unilateral maxillary sinusitis requiring hospitalization and to discuss the surgical treatment indications.

MATERIAL AND METHODS

A retrospective cross-sectional study was carried out over a period of 9 years, from May 19, 2010 to January 12, 2019, including all patients hospitalized in the Ear, Nose and Throat (ENT) department of Farhat Hached Hospital Sousse for SULMS treated by medical or surgical treatment by collecting data through medical records filed in the archive.

The definition of SULMS was based on the clinical and radiological findings as recommended by the American Academy of Otolaryngology and Head and Neck Surgery (AAO-HNS) [4]. The interpretation of CT images has been done as suggested by Maillet *et al.*, (2011) [5].

Cases with unilateral clinical symptoms of maxillary sinusitis but with bilateral radiologic signs were included and were considered as SULMS [6].

Records with only a panoramic radiography showing unilateral shadowing of a maxillary sinus associated with clinical signs of sinusitis were also included in the study.

Data Collection

A data collection sheet was drawn up including the following variables: the patient's civil status, general health state, main complain, consultation grounds, rhinological examination, etiology of the sinusitis, radiological aspect, indications and surgical intervention type, complications and evolution after treatment. In this study we collected 115 records of patients hospitalized with SULMS, treated by medical or surgical treatment. 69 records were excluded: 29 were unclassified records and 40 were incomplete records, records of patients followed for bilateral sinusitis, and records of patients who underwent endonasal surgery without sinus intervention. Thus, 46 records were included.

Data analysis

Data analysis was performed using SPSS version 22.0 software. All variables studied were qualitative variables except age. Qualitative variables were expressed as percentages. Age was expressed as mean and standard deviation after checking the normal distribution by the Kolmogorov-smirnov test. The comparative analysis was done using the pearson chi-2 test and the Fisher exact test to investigate the qualitative variables associations. A P value of less than 0.05 was considered as significant.

RESULTS

Forty-six patients: 28 (60.9%) women and 18 (39.1%) men with a mean age of 41.5 (±15) years suffering from SULMS were included in this study. 31 patients (67.4%) had no underlying pathology and 13 patients (28.3%) had a systemic disease including diabetes (5 cases) and hypertension (3 cases).The etiology of SULMS was distributed as follows: 35 cases (76.1%) of rhinogenic origin and 11 cases (23.9%) of odontogenic origin (Table 1 and Table 2). Depending on the case, different radiological examinations were performed: facial computerized tomography (CT) scan for 43 patients (93.5%), panoramic radiography for 2 patients (4.3%), cone beam computed tomography for 1 patient (2.2%). Table 3 summarizes all the data concerning the radiological aspects observed. Middle meatus obstruction was observed in 16 patients (34% of cases). No bone damage was observed in 35 patients (76.1% of cases). Lysis of one or more maxillary sinus bone walls was found in 6 patients (13% of cases), osteosclerosis in 5 patients (10.9% of cases).Surgical treatment was indicated following medical treatment failure for 19patients (43.3% of cases), the presence of intra-sinusal foreign body for 5 patients (10.9% of cases) and for other non mentioned reasons for 22 patients (47.8% of cases). Medium meatotomy alone was indicated for 20 patients (43.5%) and associated to other surgical procedures for 6 patients (13%), these procedures were: tooth extraction, intraoral surgery to close an oral-sinusal communication, debridement of an osteochemonecrosis site, septoplasty, lower turbinectomy and ethmoidectomy. Table 4 summarizes all the data concerning the nature of therapeutic management.Table 5 illustrates the association between sinusitis etiology, clinical course, middle meatus obstruction, local factors presence, and surgical or medical treatment indication.

Table 1: Distribution according to dental aetiologies

Odontogenic origin	Number (n)	Percentage %
oroantral communication	**3**	**6,5**
chronic apical periodontitis	2	4,3
Infected cysts and benign odontogenic tumors	1	2,2
Osteochemonecrosis of the jaw	1	2,2
Partially impacted third upper molar	2	4,3
Foreign body of dental origin	2	4,3
Total	11	23, 9

Table 2: Distribution according to rhinogenic aetiologies

Rhinogenic aetiologies	Number (n)	Percentage %
Polyps	12	26,1
Mucosal retention cysts	2	4,3
Middle meatus obstruction related to local anatomical factors	**19**	**41,3**
Invasive aspergillosis	1	2,2
Rhino-sinus mucormycosis	1	2,2
Chronic aspergillar sinusitis	1	2,2
Inverted papilloma	1	2,2
Total	37	80,4

Table 3: Distribution according to radiological features

Radiological features	Number (n)	Percentage %
Total filling of maxillary sinus extended to the homolateral nasal cavity	**11**	**23,9**
Maxillary sinus filling with the presence of calcifications	7	15,2
Sinus mucosal thickening	7	15,2
Shadowed sinus without fluid level	**20**	**43,5**
Opacity with liquid level.	1	2,2
Total	46	100,0

Table 4: Distribution according to treatment modalities

Treatment modalities	**Number (n)**	**Percentage %**
Medium meatotomy with maxillary sinus debridement	**26**	**56,5**
Cald-well-luck	9	19,6
Medical treatment only	7	15,2
Maxillary sinus puncture	3	6,5
Medium meatotomy + cald-well-luck	1	2,2
Total	46	100,0

Table 5: Association between sinusitis etiology, clinical course, middle meatus obstruction, presence of local factors, and surgical or medical treatment indication

	Etiology of sinusitis		**Clinical course**		**Middle meatus obstruction**		**Local anatomic factors**	
	Dental	rhinogenic	acute	chronic	+	-	+	-
Surgical treatment	6	21	13	14	11	16	11	16
Medical treatment	5	14	1	18	5	14	13	6
P value	0,749		**0,03**		0,312		0,064	

DISCUSSION

Maxillary sinusitis of dental origin (MSDO) remains a common condition. In our study, 35 patients (76.1%) were of rhinological origin and 11 patients (23.9%) were of dental origin. The results of this study do not totally support the findings in the recent literature that the majority of unilateral maxillary sinusitis cases are of odontogenic origin [7]. The underestimation of dental origin in our study could be explained since only patient's records from the ENT department were included. Indeed, the study by Troeltzsch *et al*., [6] which included records of the maxillofacial surgery department revealed that 75% of SULMS were of dental origin.

The most frequent dental aetiologies were post-extraction oral-sinusal communication (OSC) for 3 patients (6.5%) and chronic apical periodontitis (CAP) for 2 patients (4.3%). Our results are in agreement with the study of Arias-Irimia *et al*., 2010 [8] which reported iatrogenic causes in 55.97% of cases in relation to apical periodontitis on maxillary posterior teeth in 40.38% of cases and dental cysts in 6.66% of cases.

As for the rhinological etiologies of SULMS, they were related to the presence of local anatomical factors favouring obstruction of the middle meatus in 19 patients (51.4%), to naso-sinus polyps or to inflammation of fungal origin associated with an extension to the other sinuses of the face (ethmoido-frontal) particularly in invasive forms mucormycosis and invasive aspergillosis in 3 patients (26%).

These figures support the results obtained by Kaplan (2004) [1] and Chen (2010) [9] which show the predominance of inflammatory origin and the low involvement of tumour lesions: only 1 case of inverted papilloma according to our study.

For all cases, the clinical symtomathology was dominated by rhinological signs, and the dental cause often goes unnoticed by the patient and the ENT specialist. Indeed, there was no significant difference between unilateral maxillary sinusitis of dental origin and unilateral maxillary sinusitis of rhinogenic origin in terms of symptomatology and clinical course (P=0.77).

In our study, the rhinological clinical signs of SULMS were distributed as follows: nasal obstruction 56.5% (26 patients), headache 52.17% (24 patients), purulent anterior rhinorrhea 41.3% (19 patients), and posterior rhinorrhea 21.7% (10 patients). The results of our study are in agreement with those of Fadda *et al*., [10] which showed the following results: purulent anterior rhinorrhea 64.5% (20 patients), nasal obstruction 61.3% (19 patients), posterior rhinorrhea 58.1% (18 patients), headache 45.2% (14 patients).

Facial CT scan is mandatory in some cases of maxillary sinusitis to evaluate local extension and for follow-up of sinus pathology. Radiographically, the normal maxillary sinus is radiolucent (due to their air content), with clearly defined margins. The sinus floor appears as a well-defned, uninterrupted radiopaque line [11].

The most common radiologic aspect of SULMS on CT scans examinations in our study was diffuse sinus opacity without fluid level, found in 20 patients (43.5%). Isolated maxillary sinus involvement was observed in 55% of cases, however, these opacities were present in more than one sinus in 45% of cases, resulting in unilateral pansinusitis. This high frequency of pansinusitis is due to the invasive nature and medical treatment failure, which was the first indication for surgery according to this study (42%).

Maxillary sinusitis of dental origin (MSDO) management requires joint treatment of both the sinus pathology and the dental cause.

In the absence of a chronic fungal infection or an intra-sinusal foreign body, medical treatment of maxillary sinusitis should always be the first line in addition to the dental cause management. Middle meatus obstruction does not appear to be a factor requiring surgical treatment. Indeed, obstruction of the middle meatus was present in 5 medically treated patients and 11 surgically treated patients with a non-significant difference between the two groups (P=0.312).

Once the sinus infection has been treated and the dental aetiology removed, surgery may be required after a period of re-evaluation to restore drainage, ventilation of the sinus cavity, and to correct some anatomical contributing factors. An endoscopic approach with reopening of the ostium by medium meatotomy is the procedure of choice [12]. It finds its indication in chronic, bacterial and fungal sinusitis, naso-sinus polyposis, mucoceles, inverted papillomas...

It is important to note that having more accurate data available at the time of diagnosis leads to better treatment planning [5].

In our study, the indication for surgery was in 41.3% of cases due to medical treatment failure.

The medium meatotomy was more indicated for the chronic form, with a statistically significant difference (P=0.03), which suggests that the clinical course of maxillary sinusitis appears to be a decisive factor in the indication for surgery.

In addition, the association between condition, gender, and etiology of sinusitis with the indication for surgical treatment was insignificant, suggesting that all these factors do not appear to influence the indication for surgery. Also, the presence of local anatomical factors favouring obstruction of the middle meatus does not appear to be a factor influencing the indication for surgical treatment. Indeed, the association between local anatomical factors and the indication for surgery was non-significant (P=0.064). These insignificant results may be due in part to the reduction in our sample size due to files excluded for missing data, therefore further studies with larger samples are recommended to confirm these results.

It is important to note that although this study did not address the issue of sinusitis associated with dental implant placement and maxillary osteotomies in orthognathic surgery (as these procedures are performed within Oral and Maxillofacial Surgery department), these conditions have been noted in the literature [12].

CONCLUSIONS

Unilateral maxillary sinusitis is a multifactorial condition resulting from the interaction of exogenous mechanisms with pre-disposing anatomical factors.

The results of this study indicate that general state of health, age, sex, sinusitis etiology, middle meatus obstruction and local anatomical factors do not appear to be factors influencing management compared to the chronic course of sinusitis (P=0.03).

This study has shed light on the involvement of dental infectious foci in both the initiation and flare up of unilateral maxillary sinusitis. Thus, close collaboration between dentist and otolaryngologists is essential in order to develop a multidisciplinary treatment plan and ensure adequate care.

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