

Acute Complicated Sinusitis: Ten Years Experience from the University Hospital of the West Indies

R Forde¹, EW Williams², P Brown¹, W Mullings¹

ABSTRACT

Objective: Complicated sinusitis is rare. It might not be identified early and might expose the patient to an unfavourable outcome. There is a paucity of data regarding this condition in the Caribbean. This study was undertaken to describe the clinical characteristics and treatment outcomes of patients admitted with this condition.

Methods: A retrospective chart review was performed on patients admitted to the University Hospital of the West Indies (UHWI) with complicated sinusitis between 1999 to 2011. The data were analysed using SPSS statistics 22 software.

Results: There were 30 patients (23 males and 7 females). The mean standard deviation (SD) age was 19 (13.96) years. Twenty-two had orbital complications, two had intracranial complications and one had both. The most common organisms isolated were streptococcus and the most common sensitivity was to amoxicillin and clavulanic acid. Sixteen patients who had an external surgical approach had a mean SD hospital stay of 8.8 (3.71) days compared to the three patients who had a purely endoscopic approach who had a mean SD hospital stay of 7.67 (0.577) days. There was no statistical difference in the mean hospital stay between these two groups (95% CI, -3.49, 5.78; $p = 0.609$). The mean duration of hospital stay for those treated medically was six days versus ten days for the surgical group. The mean difference was three days (95% CI, 0.193, 6.595; $p = 0.039$).

Conclusions: Acute complicated sinusitis is seen more commonly in adolescent males. The most common complication was orbital. Surgical treatment is indicated for those patients who fail medical management and should consist of an endoscopic approach which may be combined with open approaches if indicated.

Keywords: Acute sinusitis, complicated sinusitis, functional endoscopic sinus surgery, rhinosinusitis

Sinusitis Aguda Complicada: Diez Años de Experiencia del Hospital Universitario de West Indies

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RESUMEN

Objetivo: La sinusitis complicada es rara. No podría ser identificada en una etapa temprana, y puede exponer al paciente a una evolución clínica desfavorable. Hay escasez de datos acerca de esta condición en el Caribe. Este estudio se emprendió con el propósito de describir las características clínicas y los resultados del tratamiento de pacientes con esta condición.

Métodos: En el Hospital Universitario de West Indies (HUWI) se realizó un estudio retrospectivo de las historias clínicas de pacientes ingresados con sinusitis complicada desde 1999 a

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2011. Los datos fueron analizados utilizando el software de SPSS estadísticas 22.

Resultados: Hubo 30 pacientes (23 hombres y 7 mujeres). La desviación estándar (SD) media fue 19 años (13.96). Veinte y dos tenían complicaciones orbitales, dos tenían complicaciones intracraneales y uno tenía ambas. Los organismos aislados más comunes fueron los estreptococos y la sensibilidad más común se dio frente a la amoxicilina y el ácido clavulánico. Dieciséis pacientes que tuvieron tratamiento quirúrgico externo tuvieron una hospitalización de una desviación estándar (SD) promedio de 8.8 días (3.71), en comparación con los tres pacientes que tuvieron un enfoque puramente endoscópico y que tuvieron una SD promedio de hospitalización de 7.67 días (0.577). No hubo diferencias estadísticas en la estancia hospitalaria media entre estos dos grupos (IC 95%, -3.49, 5.78; $p = 0.609$). La duración media de estancia hospitalaria para aquellos tratados médicamente fue seis días versus 10 días para el grupo quirúrgico. La diferencia promedio fue de tres días (IC 95%: 0.193, 6.595; $p < 0.039$).

Conclusiones: La sinusitis aguda complicada se ve más comúnmente en varones adolescentes. La complicación más común fue la orbital. El tratamiento quirúrgico se indica para aquellos pacientes que fallan el tratamiento médico, y debe consistir en un enfoque endoscópico que pueda combinarse con enfoques abiertos, en el caso de que así se indique.

Palabras claves: Sinusitis aguda, rinosinusitis, sinusitis complicada, cirugía funcional endoscópica de los senos paranasales

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INTRODUCTION

Sinusitis is defined as the symptomatic inflammation of the paranasal sinuses. Since sinusitis almost always involves the nasal cavity, the term rhinosinusitis is preferred (1). Complicated rhinosinusitis, which may be a sequelae of acute bacterial sinusitis, is defined as rhinosinusitis where there is the extension of the inflammation outside the paranasal sinuses at the time of diagnosis to involve nearby sites such as the orbit, brain or surrounding facial soft-tissue. Rhinosinusitis is relatively common, seen in one in seven patients (1). Complicated sinusitis, however, is seen less frequently (2). Therefore, because of its rarity, it might not be identified early and might expose the patient to an unfavourable outcome. If not appropriately managed, it can result in significant morbidity. Today's mortality rate still remains around 5% (3). Since the orbit is surrounded on three sides by sinuses, bacterial extension to the orbital contents may occur, resulting in orbital complications being most common. The timing and type of treatment is therefore important in obtaining a good outcome in patients. Intracranial complications are even rarer and the adolescent age group is more susceptible because both frontal sinus expansion and the vascularity of the diploic system are peaking (2). Surgical intervention may be necessary for the prevention and treatment of impending complications. Acute sinusitis with complications has been tra-

ditionally managed with an external ethmoidectomy approach. Functional endoscopic sinus surgery (FESS), which was popularised in 1981, has been offered as an alternative, less invasive approach. We report our retrospective chart review of 30 patients with acute complicated sinusitis treated at the University hospital of the West Indies (UHWI) during which we describe the clinical characteristics and treatment outcomes.

MATERIALS AND METHODS

The research proposal for this study was approved by the University Hospital of the West Indies/The University of the West Indies/Faculty of Medical Sciences, Mona, Ethics Committee. We conducted a retrospective chart review. The medical records of all the patients treated for complicated rhinosinusitis at the UHWI from 1999 to 2011 were identified from the hospital operating records and admission records and reviewed. The patients were classified according to the orbital subclassification of Chandler *et al* (4), that is, preseptal cellulitis (inflammatory oedema), orbital cellulitis, subperiosteal abscess, orbital abscess and cavernous sinus thrombosis. Intracranial complications were classified into meningitis, epidural abscess, subdural empyema and intracerebral abscess. The age, gender, duration of all symptoms of respiratory infection before hospitalization, prior antibiotic treatment, computed tomography (CT) findings,

culture and sensitivities, diagnosis, treatment method, duration of hospital stay and complications of surgical treatment were recorded in all the cases. All the cases were followed up for a minimum of one month after discharge. All data were analysed using the statistical package for the social sciences (SPSS) 22 software to determine the male/female ratio, mean and mode age and proportions of complications. Pearson Chi-square analysis was used to compare the outpatient antibiotic group with the non-antibiotic group to determine if there were any association between antibiotic usage and the development of complications. Independent sample *t*-test was used to compare the average hospital stay between the various treated groups.

RESULTS

Thirty patients consisting of 23 males and seven females [male/female ratio 3.3:1] were admitted to the hospital for complicated rhinosinusitis during the 12-year period. Their mean SD age was 19 (13.97) years and the mode 14 years [range, 8–79 years]. The main complications were orbital (22, 73%), intra-cranial (2, 7%), both (1, 3%) and facial [5, 17%] (Fig. 1).

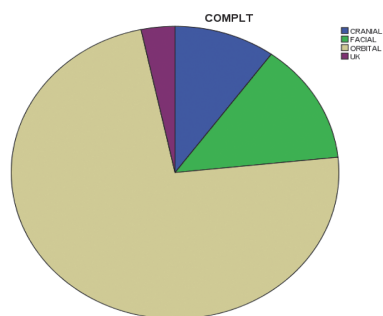


Fig. 1: Distribution of complications between orbital, intracranial and facial.

Abbreviations: UK: unknown; COMPLT: complications.

The patients who received antibiotics prior to admission had a lower association of developing complications ($p = 0.1$, Table).

Table: Number and distribution of complications of acute sinusitis between patients treated with outpatient antibiotics and patients who received no outpatient antibiotics

Complication	Number of patients who received no outpatient antibiotics	Number of patients who received outpatient antibiotics
Intracranial	2	1
Facial	0	4
Orbital	13	9

$p = 0.1$

The diagnoses of complicated rhinosinusitis were based on clinical and radiological findings. The mean SD duration of symptoms before admission was four (2.98) days, [range, 1–14 days]. Twenty-six patients showed the symptoms of a complication occurring within ten days of an acute upper respiratory tract infection (URTI). Using an independent sampling *t*-test, the average SD duration of symptoms prior to admission was 4.7 (3.63) days for the outpatient antibiotic group and 3.9 (2.30) days for the non-outpatient antibiotic group. There was no statistical difference in the mean duration of the symptoms between the two groups prior to their admission (95% CI, -1.630, 3.158; $p = 0.517$). The average SD duration of hospital stay in the outpatient group was nine (4.16) days *versus* an average SD duration of hospital stay in the non-outpatient antibiotic group of 9.9 (4.57) days. Using an independent sampling *t*-test, no statistical difference was found in the average duration of hospital stay in the outpatient antibiotic group *versus* the group who received no outpatient antibiotics (95% CI, -4.35, 2.486; $p = 0.58$). The mean SD leucocyte count was $13.96 \times 10^9/L$ (4.98) in the group received outpatient antibiotics *versus* $12.98 \times 10^9/L$ (4.66) in the group who received no antibiotics. There was no statistical difference in the average leucocyte count whether or not antibiotics were used (95% CI, -2.76, 4.73; $p = 0.593$).

All the physicians started empirical antibiotics in the hospital with the most common empirical antibiotic choices being ceftriazone and metronidazole in 73% of the cases. Twenty-four patients had undergone surgical drainage of the sinuses and the site of complications (brain, orbit) with the exception of one patient with a small frontal lobe abscess which was treated with sinus drainage only. The patients who were managed medically had a mean and SD duration of stay of 6.8 (2.78) days compared to a mean SD duration of hospital stay of 10.2 (4.44) days for the surgical group (95% CI, 0.193, 6.595; $p = 0.039$).

Sixteen patients who had an external surgical approach had a mean SD hospital stay of 8.8 (3.71) days compared to three patients who had a purely endoscopic approach who had a mean SD hospital stay of 7.67 (0.577) days. There was no statistical difference in the average hospital stay between these two groups (95% CI, -3.49, 5.78; $p = 0.609$). The mean SD hospital stay for those four patients who had a combined approach (endoscopic and external) was 14 (0) days. There were statistical significant difference in the average hospital stay between the purely external and combined approach groups of five days (95% CI, 1.21, 9.16; $p = 0.013$). The

species (53%), *staphylococcus* [staph] *aureus* (35%) and other organisms. Streptococcus organisms predominated in keeping with other author's experiences (8). Antibiotic sensitivity was highest to penicillins followed by cephalosporins.

It has been suggested that in hospitals treatment should begin with a cephalosporin and metronidazole because of the high incidence of gram negative organisms present and for the cerebrospinal fluid penetration of the cephalosporins to pre-empt meningitis (9). Other investigators report that anaerobes account for 76% of the organisms found in the flora of intracranial abscesses which shows concordance to the flora found in the sinuses in their studies (10). This suggests that anaerobes are the primary causative agent in brain abscesses and the need for anaerobic coverage. From our local experience and prevalence of microorganisms, amoxicillin-clavulanate and metronidazole are a reasonable initial first choice with cephalosporin as a second-line antibiotic.

Medical therapy is an accepted option for complicated sinusitis when the complication does not require surgical intervention [eg, periorbital cellulitis without abscess formation or facial cellulitis] (5). From our data, patients who received medical treatment alone had a shorter hospital stay. This could have been due to a selection bias which is one of the limitations of this retrospective study. The patients who received medical treatment might have been less ill with milder disease than those who received surgery. If patients have complications that require surgery [eg, orbital abscesses] or there is no improvement with medical therapy then surgical drainage of the affected sinuses is advocated. The options are Lynch-Howarth fronto-ethmoidectomy, external ethmoidectomy, frontal sinus trephination and the insertion of indwelling catheters in both the frontal and maxillary sinuses, FESS or craniotomy for intracranial sepsis.

The advantages of FESS over the external surgical approaches for extracranial complications are low morbidity, no scars or facial distortion and the high success rate. In our study, the patients who underwent FESS had a shorter hospital stay compared to those who underwent an external approach, but the difference was not statistically significant. This has been interpreted in light of the retrospective nature of the study and the possible biases such as the extent of the disease and the experience of the primary surgeon. Functional endoscopic sinus surgery is the least invasive approach and also the most effective because it allows one to remove diseased

ethmoidal air cells which are commonly the source of continued purulence and also facilitates the drainage of an orbital abscess. The risk of FESS major complications is 1 to 2% (11). A national audit done in England and Wales comparing endoscopic surgery to non-endoscopic surgery in terms of complication rate reveals that non-endoscopic surgery carries a higher rate (12). There is still debate as to which surgical option should be used in complicated cases, whether external or endoscopic approaches (2). In some cases, a combined FESS and the frontal sinus external approach will be necessary to drain the frontal sinus collections.

CONCLUSIONS

On average, we see two to three new cases of complicated sinusitis per year at the UHWI. The complications of rhinosinusitis can appear during the first few days of an acute respiratory infection and we would suggest that the prescription of outpatient antibiotics be considered for the at risk adolescent group even with URTI symptoms under ten days, since its usage may have the benefit of decreasing the complications and has been found to have no effect on white cell count or culture yield. Orbital complications were the most common occurring complications. The most common organism isolated was Streptococcus species. Once admitted, amoxicillin-clavulanate and metronidazole are a reasonable initial first choice with cephalosporin as a second-line antibiotics. Surgical treatment is recommended for those patients whose symptoms persist or worsen despite adequate initial medical treatment. It should consist of an endoscopic approach and may be combined with open approaches if indicated.

AUTHORS' NOTE

Roy Forde, writing the manuscript and design of study; Warren Mullings, collection of data; Eric Williams, review of manuscript. The authors declare no conflict of interests.

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