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Do You Need to Operate Following Recovery from Complications of Pediatric Acute Sinusitis?

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Abstract

Objective—There are many studies that evaluate the role of surgery in the treatment of complications of pediatric acute sinusitis; however there are few studies, if any, that report the incidence of surgery following recovery from acute complicated sinusitis. The goal of this study was to report the incidence and indications for surgical intervention after recovery from complications of pediatric acute sinusitis.

Methods—We reviewed the records of all children admitted to a tertiary care children's hospital between January 2005 to September 2010 with a diagnosis of sinusitis and an orbital or intracranial complication. Eighty-six patients met inclusion criteria. Charts were reviewed for type of complication, initial treatment (medical or surgical), type of procedure, secondary procedures, age, and comorbidities. Statistical analysis was completed using independent samples student t-tests and Mann-Whitney tests.

Results—A total of 86 patients with a mean age of 6.38 years (2 months to 18 years) were identified. Eighty patients had orbital complications while six presented with intracranial complications. Twenty-seven patients (31%) underwent sinus surgery during the acute phase of their illness whereas 59 patients (69%) were treated medically. After hospitalization and recovery for acute complicated sinusitis, surgery was performed on nine patients (mean age 4.86 years) within 1 month to 2 years post hospitalization. Of the nine patients who required secondary surgery following resolution of the initial complicated sinusitis, four patients were following initial surgical intervention and five patients had initially resolved their complication with medical

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Conflict of Interest

There are no conflicts of interest to report.

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therapy alone. Indications for subsequent surgery included failure of medical therapy for persistent rhinosinusitis (8 patients) and second complication (1 patient).

Conclusions—This study suggests that following resolution of complicated pediatric rhinosinusitis, very few patients may need further surgical intervention. Subsequent intervention is best guided by clinical judgment, symptoms during outpatient clinic visits, and failure of medical therapy.

Introduction

Rhinosinusitis is one of the most common diseases in the pediatric population, accounting for nearly a quarter of all pediatric antibiotic prescriptions.[1] Given the ease at which communicable disease spread in the pediatric population, children can experience up to six to eight upper respiratory infections (URIs) per year. Up to 5% of these URIs can be complicated by acute sinusitis.[2] Most patients with acute sinusitis will recover; however it is estimated that 5–10% will go on to develop an orbital and/or intracranial complications. [3, 4] Orbital complications are more common than intracranial complications and are typically due to spread from ethmoid sinusitis. These complications can be classified using the criteria devised by Chandler et al.[1, 5, 6] Briefly, class I is ‘preseptal cellulitis’, class II is ‘orbital cellulitis’, class III is ‘subperiosteal abscess’, class IV is ‘orbital abscess’, and class V is ‘cavernous sinus thrombosis’.[5] This classification system does not represent a disease spectrum with one stage progressing to the next but rather a description of increasing severity of orbital complications. Intracranial complications include meningitis, epidural abscess, subdural empyema, or cerebral abscess.[1, 7]

Management of these complications can be either medical, surgical, or a combination of both. In regard to subperiosteal abscess, several groups note that in certain groups of patients, subperiosteal abscesses (SPA) can be managed medically. This typically includes younger patients, with medial, small to moderate sized abscesses, and minimal proptosis.[1, 8, 9] Intracranial complications are generally considered a surgical disease, and require a combination of intravenous antibiotics and surgical drainage. However, small intracranial abscesses and meningitis without any intracranial fluid collections can be managed medically.[7, 10]

Although there is literature exploring the prevalence and treatment options for sinusitis complications, there is little evidence on the prevalence of sinus disease following recovery from complicated sinusitis and the incidence of subsequent or secondary surgery. The purpose of this study is to present the incidence and indications for surgical intervention after initial recovery from complications of acute sinusitis.

Methods

A retrospective chart review was conducted following IRB approval at the Children’s Hospital of Wisconsin (CHW) from January 2005 to September 2010 looking for children diagnosed with orbital and/or intracranial complications of acute sinusitis. A CHW database search was created for all hospitalizations containing the International Classification of Diseases-9 (ICD-9) code of ‘sinusitis’ (461.0, 461.1, 461.2, 461.3, 461.8, 461.9, 473.0,

473.1, 473.2, 473.8, and 473.9) and 'disorders of the orbit' (376.00, 373.13, 376.01, 376.02, 376.03) or 'intracranial abscess' (324.0) or 'phlebitis and thrombophlebitis of intracranial venous sinuses' (325) or 'meningitis' (320).

Initial search resulted in 112 patients. Twenty-six patients had incomplete charts or incorrect ICD-9 codes and were excluded resulting in a total of 86 patients available for analysis. The following information was collected: age at diagnosis, comorbidities, type of complication, surgical intervention during initial hospitalization (if applicable), type and time of surgical intervention following resolution of acute complicated sinusitis (secondary surgery), and length of follow-up. One patient was removed from the analysis of the secondary surgery group since this patient presented 6 years after initial hospitalization for a second complication. This complication was likely independent of the initial complication and therefore considered an outlier.

Statistical analysis was completed using independent samples t-test to compare mean ages between the surgical and non-surgical group. Mann-Whitney tests were used to compare median ages of those that required secondary surgery to those that only required primary surgery or medical therapy.

Results

A total of 86 patients met inclusion criteria for this study. Twenty-seven patients underwent surgical intervention during the acute phase of their illness while fifty-nine patients were treated medically (Table 1). The mean age for the surgical treatment group was 8.96 years whereas the mean age for the medical therapy group was 5.20 years, $p < .0005$. Nine patients required secondary surgery following recovery from their initial complication of acute sinusitis within 2 years of initial hospitalization (mean 6.6 months). The mean length of follow-up for all patients was 7.6 months whereas the mean length of follow-up of patients requiring secondary surgery was 11.5 months.

Subperiosteal abscess was the most common complication observed in the initial surgical group (22 patients) while intracranial complications were found in 5 of the 27 patients (Table 2). One surgical patient was diagnosed with an intracranial abscess (subdural empyema) and meningitis. SPA was only observed in 46% of the medically treated patients. There was a higher proportion of preseptal cellulitis (16/59) and orbital cellulitis (25/59) in the medical therapy group compared to the surgical therapy group (Table 2). There were no differences in comorbidities between the surgical and medical therapy groups.

Of the 86 patients admitted for complicated sinusitis, secondary surgery was performed on nine patients (Table 3). The average age at presentation of those that required a secondary surgery was 4.86 years and the median age was 4.68 years. Of the nine patients requiring secondary surgery, four patients initially had surgery and five had medical therapy alone. Patients that required secondary surgery (9 patients, median age 4.68 years) tended to be younger than those patients that only required an initial surgical intervention (23 patients, median age 10.38 years, $p = .02$). There was no significant difference in median age when comparing the medical therapy group (54 patients, median age 4.92 years) to those that

underwent secondary surgery, $p = .82$. Indications for secondary surgery included failure of medical therapy for persistent rhinosinusitis and second complication.

Discussion

Pediatric rhinosinusitis is primarily a medically treated disease. Surgery is indicated in chronic rhinosinusitis refractory to medical therapy and certain complications of acute sinusitis.[2, 11] There is an abundance of literature exploring the incidence and indications for surgery in pediatric sinus disease in both acute and chronic settings, however there is a paucity of information in regards to outcomes of patients after recovery from acute pediatric complicated sinusitis. Specifically there is a lack of information regarding incidence and indications for subsequent surgery.

Mortimore et al conducted a five-year review looking at management of acute complicated sinusitis.[12] Their series consisted of 87 patients admitted with acute pansinusitis, of which 63 patients were diagnosed with one or more complications. Fifteen patients recovered with medical therapy alone while forty-eight patients required surgical intervention during the initial hospitalization. Only two patients (2/63) in their cohort required surgery (frontoethmoidectomy for recurrent acute sinusitis) following their initial hospitalization. All patients were followed up two weeks after discharge; however follow-up thereafter was variable up to two years. Although this study included a mixed population with a mean age greater than 20 years, it suggests that patients can be managed conservatively following resolution of acute complicated sinusitis.

In our case series, patients who were medically managed tended to be younger than those managed surgically (mean 5.20 years versus 8.96 years, $p < .0005$). This finding is in agreement with management of subperiosteal abscesses. In a review by Garcia and Harris, intravenous antibiotics and observation was initiated in patients younger than age nine with small to moderate sized medial SPAs. In their series, 93% of patients who met their criteria for expectant management responded to medical therapy.[9]

Of the eighty-six patients included in this series, four patients from the surgical group (14.8%) and five patients from the medical therapy group (8.5%) went on to undergo subsequent surgery within two years of initial presentation. Using the Fisher exact test, there was no significant difference ($p=.45$) in the rate of secondary surgery between the two groups. In addition, patients who required initial surgical therapy were followed for nearly twice the length of patients requiring initial medical therapy (mean 11.2 months versus 6 months respectively). Therefore, given that there is not a significant difference in rate of secondary surgery between the two groups, we suggest that physicians consider following all patients for up to one year after recovery from complications of acute sinusitis. However, the overall rate of secondary surgery was only 10%, suggesting a low likelihood of a need to operate following resolution of acute complicated sinusitis.

One limitation of this study is its retrospective nature. Without prospectively cataloging the data, some patients had incomplete charts and follow-up times were relatively short. In addition, many patients transferred to the institution did not have initial imaging available.

Complete charts with actual imaging would have facilitated calculation of Lund-Mackay scores as a surrogate marker for disease severity.[13] This might have been helpful in testing the potential association between Lund-Mackay score during initial hospitalization and need for subsequent surgery.

Conclusion

In our series of eighty-six patients, nine patients required at least one surgery following resolution of acute complicated sinusitis. A majority of these patients presented within one year of their initial hospitalization and required secondary surgery for persistent rhinosinusitis. Consequently, otolaryngologists should consider following patients with a complication of acute sinusitis for up to one year. However, the incidence of surgical intervention following resolution of acute complicated rhinosinusitis was quite low and subsequent intervention is best guided by clinical judgment.

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Table 1

Medical versus surgical therapy

Category	N	Average Age (years)	Median Age (years)
All patients	86	6.38	5.51
Initial medical treatment	59	5.20	4.61
Initial surgical treatment	27	8.96	10.03
Those requiring secondary surgery*	9	4.86	4.69

* Four patients from initial surgical therapy group and five patients from medical therapy group

Table 2

Types of complications

Complication	N	Initial Surgical Treatment (27 patients)	Initial Medical Treatment (59 patients)
preseptal cellulitis	18	2	16
orbital cellulitis	31	6	25
subperiosteal abscess	49	22	27
orbital abscess	1	1	0
cavernous sinus thrombosis	0	0	0
intracranial abscess	4	4	0
meningitis	6	2	4

Table 3

Intervention after recovery from acute complicated rhinosinusitis

Patient	Initial Complication	Initial Treatment	Secondary Surgery	Indication
1	SPA, orbital cellulitis	AE, MA, orbitotomy	MA, revision MA, revision AE	persistent CRS symptoms
2	Orbital cellulitis, meningitis	AE, MA, orbitotomy, frontal sinus trephination	maxillary and frontal sinus irrigations	persistent CRS symptoms
3	SPA	orbitotomy, DCR AE, MA,	AE, endoscopic frontal sinusotomy	persistent CRS symptoms
4	SPA, epidural abscess	orbitotomy, craniotomy	adenoidectomy	persistent CRS symptoms
5	SPA, preseptal cellulitis	antibiotics	maxillary sinus irrigations	persistent CRS symptoms
6	SPA orbital	antibiotics	TE, MA	second complication (SPA)
7	cellulitis orbital	antibiotics	adenoidectomy	persistent CRS symptoms
8	cellulitis preseptal	antibiotics	adenoidectomy	persistent CRS symptoms
9	cellulitis	antibiotics	adenoidectomy	persistent CRS symptoms

AE - anterior ethmoidectomy TE - total ethmoidectomy MA - maxillary antrotomy DCR - dacrocystorhinostomy SPA - subperiosteal abscess CRS - chronic rhinosinusitis