



Patterns of Complications of Rhinosinusitis in Sokoto Nigeria

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ABSTRACT

Background: Local or distant spread of paranasal sinus infection can lead to significant morbidity and mortality. **Aim:** The aim of this study is for audit intent and to determine the patterns of the complications of rhinosinusitis and the management of the complications. **Method:** A 10-year retrospective chart review of patients who had complications from rhinosinusitis at the Usmanu Danfodiyo University Teaching Hospital, Sokoto, from January 2008 to December 2017. The data extracted were biodata, duration of symptoms, site of paranasal sinus involvement, acute or chronic rhinosinusitis, allergic rhinosinusitis, non-allergic rhinosinusitis, radiological investigations, complications encountered, treatment given and outcome of treatment. Data were analyzed with IBM SPSS version 21.0. **Results:** The prevalence of the complication of rhinosinusitis in this study was 6.4%. The mean age was 30.9 years and the age range was 9-77 years. There were 31 (47.7%) Males and 34 (52.3%) Females with a Male: Female ratio of 1:1.1. The complications were most common in children and young adults. Non-allergic rhinosinusitis comprised 46 (70.8%) and allergic rhinosinusitis accounted for 19 (29.2%). Computerized tomographic scan of the paranasal sinuses and brain were done for 49 (75.4%) patients and plain X-rays for 16 (24.6) patients. Complications occurred predominantly in chronic rhinosinusitis, which constituted 64 (98.5%) whereas acute rhinosinusitis was responsible for complication in only one patient. The observed complications were most common with multisinusitis 35 (53.8%). Surgical intervention was mainly invasive paranasal sinus surgeries and few functional endoscopic sinus surgeries. Overall, the patients responded well to medical and invasive surgical intervention. **Conclusion:** The complications were predominant in chronic multisinusitis and occurred exclusively in children and young adults. Paranasal sinus wall and cavity complications were most common. Provision of low cost functional endoscopic sinus surgery is desirable, and it will reduce the number of open and invasive paranasal sinus surgeries.

Keywords: AIDS, Antiretroviral drugs, HIV, Needle stick injury, Sexually transmitted infection

INTRODUCTION

Rhinosinusitis can be defined as inflammation of the mucous membranes of the nose and paranasal sinuses [1,2]. Moreover, it can be further defined as acute or chronic based on the duration of symptoms. In acute rhinosinusitis, the length of symptoms is less than 12 weeks, whereas chronic rhinosinusitis is more than 12 weeks [2,3]. Annually, acute rhinosinusitis affects about 6-15% of the population worldwide, and it is usually caused by respiratory viral infection [2].

Nevertheless, secondary bacterial infection sometimes superimposed [2,4]. The prevalence of chronic rhinosinusitis in the United States of America is reported as 5% of the population [4]. Local or distant spread of paranasal sinus infection can lead to significant morbidity and mortality [5]. Complications of acute rhinosinusitis are uncommon, while that of chronic rhinosinusitis is relatively common [4]. Complications may occur in orbit, paranasal sinus wall and nasal cavities, oropharynx, and intracranial cavities [5,6]. Most complications tend to occur in children and young adult [5-8]. Children and young adult are vulnerable because of anatomical predispositions such as thin, porous bony septa and sinus walls, besides, open suture lines and larger vascular foramina [5].

The aim of this study is for audit intent and to determine the patterns of the complications of rhinosinusitis and the

management of the complications in Sokoto, Northwestern Nigeria. Iseh, et al., conducted a retrospective analysis of the clinical pattern and the outcome of conventional management of rhinosinusitis in Sokoto from 1999 to 2001 [9].

MATERIALS AND METHODS

This was a 10-year retrospective study of patients who had complications from rhinosinusitis at the Usmanu Danfodiyo University Teaching Hospital, Sokoto, from January 2008 to December 2017. The case notes of the patients with rhinosinusitis were retrieved and studied. Those with complications were separated and analyzed. The diagnosis of rhinosinusitis was based on the clinical history of nasal blockage, rhinorrhoea, hawking, hyposmia, anosmia, excessive sneezing, inferior turbinate hypertrophy, itching of the nose, eyes, ears, and throat.

Moreover, mucosal thickening, fluid level, opacification of the nasal cavities, paranasal sinuses on plain radiograph and computerized tomographic scan. Six case notes with an incomplete record were excluded from the study. The data extracted were biodata, duration of symptoms, site of paranasal sinus involvement, acute or chronic rhinosinusitis, allergic rhinosinusitis, non-allergic rhinosinusitis, radiological investigations, complications encountered, treatment given and outcome of treatment. Diagnosis of acute rhinosinusitis was based on symptoms duration of <12 weeks, while >12 weeks was chronic rhinosinusitis.

Inclusions criteria were children and adult with features of rhinosinusitis, and those with previous sinonasal surgery and incomplete record were excluded. Data were analyzed with IBM SPSS version 21.0. Frequencies, obtained by descriptive statistical analysis, were presented in tables and charts.

RESULTS

Overall, 1,011 patients had rhinosinusitis during the period under review. Out of 1,011 patients, 65 had a complication. Therefore, the prevalence of the complication of rhinosinusitis in this study was 6.4%.

The mean age of the 65 patients that had the complication was 30.9 years (Std. Deviation 14.4), and the age range was 9-77 years. There were 31 (47.7%) males and 34 (52.3%) females with a male: female ratio of 1:1.1. The complications were most common in children and young adults (Table 1).

Table 1 Distribution of the rhinosinusitis complications by age group

Age group	Frequency (%)
1-10 years	4 (6.2%)
11-20 years	17 (26.2%)
21-30 years	11 (16.9%)
31-40 years	22 (33.8%)
41-50 years	6 (9.2%)
>51 years	5 (7.7%)
Total	65 (100%)

Non-allergic rhinosinusitis comprised 46 (70.8%) and allergic rhinosinusitis accounted for 19 (29.2%). Computerized tomographic (CT) scan of the paranasal sinuses and brain were done for 49 (75.4%) patients and plain X-Rays for 16 (24.6) patients. Complications occurred predominantly in chronic rhinosinusitis, which constituted 64 (98.5%) whereas acute rhinosinusitis was responsible for complication in only one patient. Complications arising from combined right and left paranasal sinuses disease were most common (Figure 1).

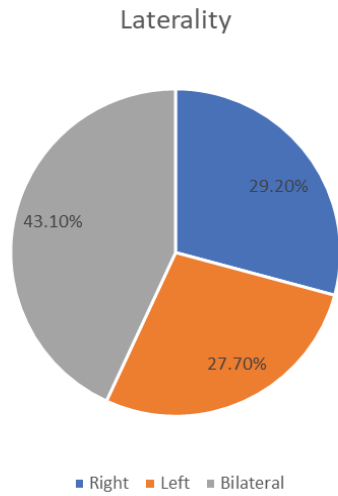


Figure 1 Laterality of the complications of rhinosinusitis

Majority of the complications in chronic rhinosinusitis in this study was encountered in patients whom symptom duration was more than 16 months with 32 (49.2%), 13-15 months and 7-9 months with 9 (13.8%) each, 10-12 months with 7 (10.8%), 4-6 months with 5 (7.7%) and 1-3 months with 3 (4.6%). The observed complications were most common with multisinusitis 35 (53.8%), as shown in Figure 2.

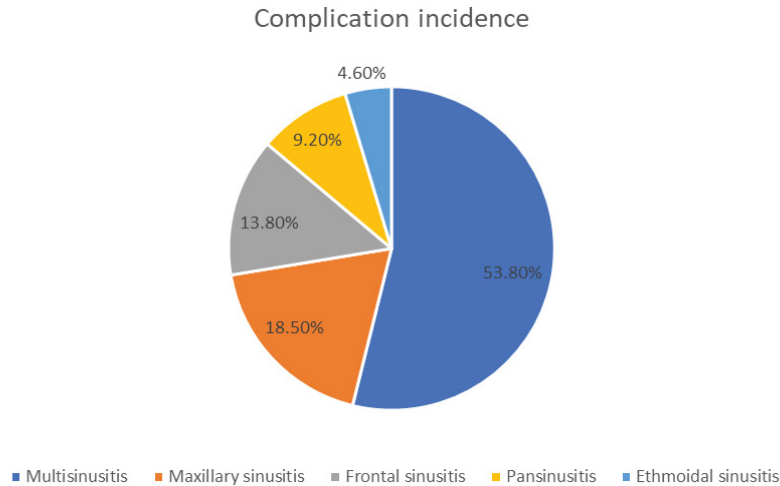


Figure 2 Types of rhinosinusitis and complication incidence

The most frequent site of rhinosinusitis complications and other detail is depicted in Table 2.

Table 2 The sites and incidence of complications of rhinosinusitis

Sites	Incidence (%)
Sinus wall and cavity (37, 56.9%)	
Sinus mucosal thickening, fluid or opacification	40 (61.5%)
Fronto-ethmoidal mucocele	8 (12.3%)
Ethmoidal mucocele	4 (6.2%)
Frontal mucocele	3 (4.6%)
Pott's puffy tumour	2 (3.1%)
Fronto-cutaneous fistula	1 (1.5%)
Fluid collection	1 (1.5%)
Nasal cavity 15 (23.1%)	

Inferior turbinate hypertrophy	17 (26.2%)
Nasal polyps	13 (20.0%)
Nasal blockage	8 (12.3%)
Orbit 4 (6.2%)	
Orbital cellulitis	1 (1.5%)
Oropharynx 4 (6.2%)	
Recurrent tonsillitis	3 (4.6%)
Chronic pharyngitis	1 (1.5%)
Intracranial 2 (3.1%)	
Epidural abscess	1 (1.5%)
Subdural abscess	1 (1.5%)

Surgical intervention comprised fronto-ethmoidectomy with 12 (18.5%), followed by functional endoscopic sinus surgery (FESS) and partial inferior turbinectomy 11 (16.9%), FESS 7 (10.8%) patients, Caldwell-Luc procedure, lateral rhinotomy, maxillary antral puncture and lavage, and only antibiotics plus antihistamine 4 (6.2%) each, inferior meatal antrostomy 3 (4.6%), intranasal polypectomy and inferior meatal antrostomy 3 (4.6), tonsillectomy with inferior meatal antrostomy 2 (3.1%), brain abscess drainage via burr hole plus fronto-ethmoidectomy 2 (3.1%), submucous diathermy of the inferior turbinate 1 (1.5%) and bicoronal incision, drainage and sequestrectomy in the 2 (3.1%) patients with Pott's Puffy tumour.

There was a resolution of all complications after the surgical intervention and at six weeks postoperative period. However, some were lost to follow-up. One of the patients who had external ethmoidectomy developed epiphora due to distal obstruction of the nasolacrimal duct, which was solved by external dacryocystorhinostomy.

DISCUSSION

In this study, the prevalence of the complications of rhinosinusitis was 6.4%. In contrast, the complication rate in an earlier study from Sokoto was 14.4%, and the survey from Ibadan reported 37% complications [6,9]. The reason for the lower frequency of complications in this study may be due to the larger population size. Secondly, the duration of symptoms before the development of complications was longer in the 2 earlier reports from Sokoto and Ibadan, Nigeria. Moreover, the complications were most common in children and young adults in this study [6,9]. This agrees with various reports [5-8].

The complications of rhinosinusitis were most common in patients with chronic non-allergic rhinosinusitis in this study. This finding supports earlier studies in Sokoto, Ibadan, and Enugu Nigeria [6,9,10]. Contrast-enhanced CT scan of the paranasal sinuses and brain gives a superior assessment of the complications of rhinosinusitis [11]. CT scan imaging confirms the diagnosis and defines the extent of complications because of its' ability in demonstrating bony anatomy, orbit, and paranasal sinus pathology [4,5]. However, Magnetic resonance imaging (MRI) is the investigation of choice if there is clinical evidence of intracranial complication [5,12]. MRI is more expensive, and the only one available where this study was done is not functional. Majority 49 (75.4%) of the patients in this study had CT scan imaging. The financial standing of the patients dictated the choice of the CT scan. Those patients who could not afford the cost of the CT scan imaging were asked to do plain X-rays of the paranasal sinuses.

In this study, the frequency of complication was higher in bilateral and multisinusitis. The reason for this observation is because isolated rhinosinusitis is not common. Therefore, simultaneous rhinosinusitis usually affects more than one paranasal sinus group [5].

Paranasal sinus mucocele was the 2nd most frequent complication observed in the sinus wall and cavity in this series. There is more mucocele in this study than the previous report from Ibadan, Nigeria [6]. The predominance of the frontal and ethmoidal sinus mucocele buttress similar findings in other studies [13,14]. The aetiology of paranasal sinus mucocele is attributed to chronic rhinosinusitis, trauma, previous sinonasal surgeries and allergy [15]. Cystic degeneration of seromucous gland and or polyps in the paranasal drainage duct cause obstruction and retention of the paranasal sinus mucus secretion [14,15]. Also, mucocele cause loco-regional invasion by pressure effect, lymphocytes, and monocytes inflammatory infiltration and reaction lead to the release of osteolytic cytokine interleukin-1 which

stimulates fibroblasts in the mucocele mucosal lining to produce prostaglandins and collagenases responsible for the bone resorption with the resultant expansion of the mucocele [14,16]. Thus, paranasal sinus mucocele is capable of eroding into surrounding structures to produce an unpleasant cosmetic and functional deficit.

In the early 1980s, Evans managed fronto-ethmoidal mucocele by external fronto-ethmoidectomy in London [15]. FESS supplanted the external surgical approach for uncomplicated cases since 1990 [17-19]. In the report from Ibadan, Nigeria, the 12 cases in their series had the external fronto-ethmoidectomy [13]. Moreover, Iseh, et al., reported 14 external surgical approaches and four by FESS in Sokoto [20]. The choice of the procedure in this study was influenced by financial constraint as FESS is more expensive, and most of the patients are low-income earners without National Health Insurance cover. Furthermore, the experience of the Surgeon, extent, and location of the mucocele influenced the surgical approach.

Pott's puffy tumour is rare, and it is associated with significant cosmetic deformity (subgaleal abscess), osteomyelitis of the bones of the frontal, ethmoid and sphenoid sinuses which have the potential risk of spread of infection into the cranial cavity by direct invasion through area of osteitic bone or retrograde via the valveless diploic vein of Breschet [5,7,8]. The 2 children had Pott's puffy tumour from the complication of chronic frontal rhinosinusitis in this study, and Otolaryngologic and Neurosurgical teams jointly managed them. The 2 children had broad-spectrum antibiotics, bicoronal incision and drainage, sequestrectomy and exenteration of the frontal sinus mucosa. The children remained symptom-free at the follow-up visit. Similarly, earlier reports documented the bicoronal osteoplastic flap approach with excellent results [5,8].

Intracranial complications of rhinosinusitis are sporadic, and the most common is a subdural abscess, which often arises from acute frontal sinusitis [4,5,11]. Epidural and intracranial abscesses, meningitis and venous sinus thrombosis, may also occur. These intracranial complications may be due to the contiguous spread of infection through bone erosion or retrograde thrombophlebitis [5,21]. Additionally, they may be asymptomatic [22]. Therefore, early suspicion and CT or MRI imaging are the keys to their diagnosis [21]. Intracranial complications of rhinosinusitis constitute a medical emergency, and appropriate treatment can prevent neurological sequelae [4]. Accordingly, broad-spectrum antibiotics, a joint and single definitive Otolaryngologic, and Neurosurgical surgical intervention is favoured by many reports [11,21,22]. The patients in this series had a joint surgical intervention with a good outcome.

Orbital complications of rhinosinusitis are more common in children than adults. Also, mostly occur in children with acute ethmoidal rhinosinusitis [5,11,23,24]. The infection spread from the ethmoidal sinus quickly to the orbit because the lamina papyracea is a fragile bone and forms a relatively weak barrier to spread of infection [5]. Furthermore, the orbit can be involved through the ophthalmic and emissary vein thrombophlebitis. The complications are preseptal cellulitis, orbital cellulitis, subperiosteal abscess, orbital abscess, and cavernous sinus thrombosis. Early diagnosis and medical and or surgical management prevent loss of vision. The adult patient that had orbital cellulitis in this study was successfully managed with broad-spectrum antibiotics. The reason for the low incidence of orbital complication in this study, unlike the earlier report, is not apparent, presumably, due to awareness and early treatment of rhinosinusitis [9].

Sinus wall mucosa thickening, accumulation of fluid or opacification of the paranasal sinus cavities and the accompanying changes in the nasal cavities were managed by FESS, and the higher number by maxillary antral lavage, inferior meatal antrostomy, submucous diathermy or inferior partial turbinectomy of obstructing engorged turbinate. Caldwelluc-procedure was done for large maxillary antral polyps while lateral rhinotomy was administered for one-sided pansinusitis with florid opacification of the involved paranasal sinuses.

Overall, there is the resolution of the complications at 6-weeks post-operative follow-up visit. Although, majority of the patients were lost to follow-up. The patient whose external ethmoidectomy was complicated by nasolacrimal duct stenosis was relieved by external dacryocystorhinostomy.

CONCLUSION

The prevalence of the complication of rhinosinusitis in this study was 6.4%. The complications were predominant

in chronic multisinusitis and occurred exclusively in children and young adults. Paranasal sinus wall and cavity complications were most common. Overall, the patients responded well to medical and invasive surgical intervention.

DECLARATIONS

Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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