Epidemiological Pattern and Outcome of Surgically Treated Cranial and Intracranial Suppurative Lesions in a Public Tertiary Health Institution in Anambra: A 13-Year Experience

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ABSTRACT

Background: The improvement and increasing availability of diagnostic and treatment armamentarium has continued to improve the outcome of cranial and intracranial abscesses. Over the years, the epidemiological pattern, aetiology and outcome varied with regions. **Objective:** We present here the patterns and outcome of management of these lesions in a tertiary health institution in Anambra State, Nigeria. **Materials and methods:** This is a retrospective study involving patients managed for cranial and intracranial suppurative lesions between 2007 and 2020. Demographic data, aetiology, presenting symptoms, site of lesions, surgery done and outcome were collected and analysed with simple descriptive statistical tools like mean, median, standard deviation as well as charts and tables. Ethical clearance was obtained. **Results:** There were 1432 neurosurgical procedures done in the period, 43 of which were cranial and intracranial abscesses accounting for 3.0% (43/1432). Male preponderance (30/43) was observed. Most of the patients were below 5 years (12/43). For the entire cranial and intracranial lesions, frontal lobe was the most common lobe affected anatomic area (19/43). More than one lobe was affected in 58.1% (25/43) of cases. Craniectomy was the most common surgery done. Average length of hospital stay was 6.3±4.2 weeks. Recently, the number of cases treated per year is on the increase. Four mortalities were recorded. **Conclusion:** Young males are more affected. Frontal lobe is the most affected anatomic region. Near 10% mortality was recorded. Increasing cases are being witnessed in the facility hence there is a need for improved capacity to manage the emerging trend.

Keyword: Cranial, Suppurative, Surgically-treated,

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INTRODUCTION

Cranial and intracranial suppurative lesions, which for the purpose of this study are lesions involving brain and /or its coverings, have continued to be a source of worry given the associated mortality and morbidity suffered by the patients. Though it has been noted to be associated with low mortality, the morbidity is high. [1-2] Some other

studies have found higher mortality rates. [3-5] The overall outcome has continued to change as a result of improvement in diagnostic and therapeutic modalities. [6- 8] Generally, the epidemiological picture varies with time and region at any point. [2,9-12] However, there appears to be male preponderance. [2] Contiguous infection is usually the most common aetiology [10,13] Shilong *et al*., however found trauma as the most common aetiology in their series. [4] The suppurative lesion could be focal, diffuse or multiple. The classical triad of fever, headache and focal neurologic deficit were not usually seen hence high index suspicion is necessary for early diagnosis in most cases. [15-16] The advent of neuro-imaging has improved the yield of clinical review.[5] Treatment options include medical therapy {especially adjuvant antibiotics like cephalosporins and metronidazole},[11] with or without surgical evacuation[11]. Surgical options include craniectomy, craniotomy, burrhole drainage. Ohaegbulam *et al* and other investigators have shown that minimally mutilating surgeries, for example burrhole, are good options for intracranial abscess. [8,10,11,14] This study aims to review our experience while evaluating the epidemiological pattern and management outcome of surgically treated cranial and intracranial suppurative lesions treated in the last 13 years in a tertiary institution in South-East Zone of Nigeria. It will also help to add to the available data in our clime.

MATERIALS AND METHODS

Study design/Area/population

This is a retrospective study of all surgically treated intracranial lesions suppurative lesions in Nnamdi Azikiwe University Teaching Hospital Nnewi, between 2007 and 2020. Data including demographic {age and sex}, aetiology, presenting symptoms, site of lesions, operation done, management outcome were also collected using a data extraction template, was collected from the theatre register for all patients who met the inclusion criteria. The hospital folders were also referred to where available.

Inclusion and exclusion criteria

All patients who were managed for suppurative lesions involving the brain and its coverings (brain, meninges, calvarium, periosteum, scalp) in the hospital were included. Those that had only antibiotics were excluded.

Outcome measures

The outcome measures were based on discharge home or death.

Ethical clearance

This was obtained from Ethics Committee of Nnamdi Azikiwe University Teaching Hospital Nnewi with reference number NAUTH/CS/66/Vol.15/VER.3/190/2022/135

Statistical analysis

Data were analysed using excel spread sheet, while descriptive statistical tools like mean, standard deviation as well as charts, graphs and tables will be used for the presentation of the results.

RESULTS

A total of 1432 neuro-surgical operations were performed in the period under review with cranial surgeries for abscess accounting for 43 cases {3%}. There was male preponderance with male: female ratio of 2:1. Most were paediatric patients aged less than 5 years (modal age group). (See table 1)

Table 1: Age distribution of the participants

Age (years)	Frequency
<5	12
6-10	4
11-15	9
16-20	5
21-25	1
26-30	3
31-35	1
36-40	2
41-45	2
>45	3

The peak age incidence was seen in the under 5
The most common symptoms at presentation were

fever and scalp swelling (see figure 1)

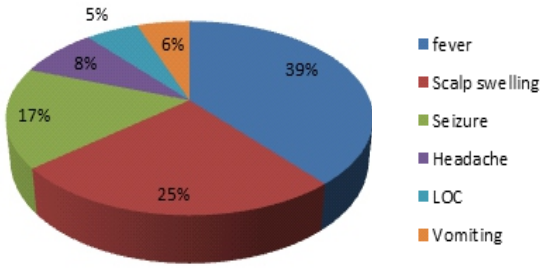

Figure 1: Scalp swelling, fever and seizure were the most common presenting symptoms.

Trauma and post-operative events each.
Contiguous infections (sinusitis and otitis media) were seen in two cases (5%), while in about 63% of cases the causes were not stated.
The frontal lobe was the most affected {see figure 2}

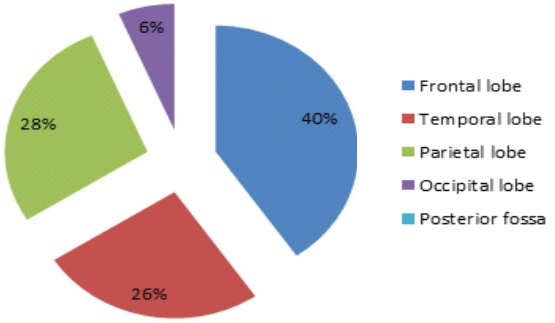

Figure 2: Frontal lobe is the most affected lobe

The abscess affected at least two contiguous lobes of the brain in about 58% of cases, out of which four cases affected bilateral hemisphere. Of the cases of cranial suppurations that presented at the facility, intracerebral abscess accounted for majority of the suppurating lesions. This was followed by paradural abscess, including subdural empyema and extradural abscess. {see figure 3}.

Surgeries done ranged from burrhole to craniectomy. Excision of abscess cavity was done in some patients {see table 2}

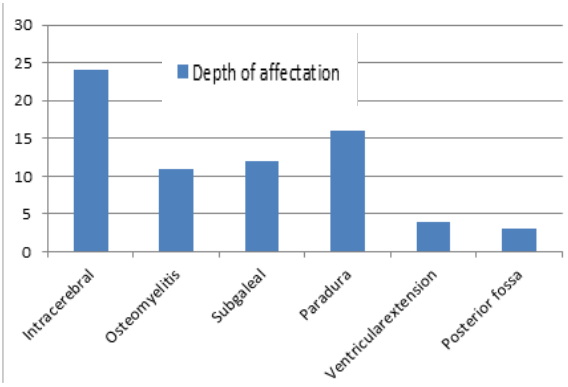

Figure 3: Intracerebral abscess was the most common lesion.

Table 2: Surgeries done in the participants

Surgery	Frequency
Craniectomy	14
Craniotomy	10
Minicraniectomy/burrhole +tube aspiration	11
Incision and drainage	5
External Ventricular Drainage	3
Excision of abscess cavity	9

Most patients had craniectomy and craniotomy
The average length of hospital stay was 6.3 weeks. Of the 8 cases who had their microbiology documented in the folder, Staphylococcus aureus was isolated in the aspirate in two cases (one was methicillin resistant), yeast in one case, while there was no microbial growth in 5 cases. Of the record of the 18 patients available, four mortalities were noted while 14 cases were discharged from the hospital in good condition. On average, 3 cases were managed per year, however, there has been increasing number of cases presenting to the facility {see figure 4}

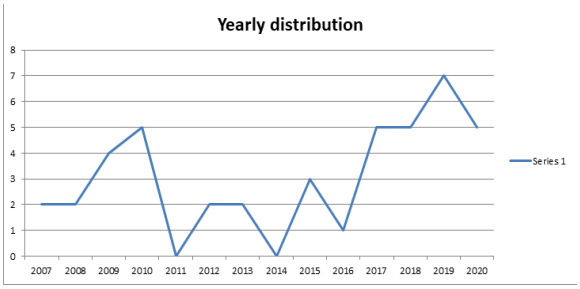

Figure 4: the number of patients presenting per year is on the increase.

DISCUSSION

Cranial and intracranial sepsis and suppurations though still potentially fatal, have continued to improve in outcome because of the availability of good investigative tools, potent antibiotics good surgical skills of drainage. Despite the apparent improvement, patients occasionally suffer residual morbidity. The review of local epidemiology in order to accommodate the ever-changing pattern will help in the build-up of data as well as making policies for improvement in outcome.

In our study, 43 of the 1432 surgeries done within this period, had cranial suppurative lesions with intracranial abscess accounting for 33/1432 cases {2.3%} while Pott's puffy tumour was seen in 10 cases. This predominance of intracranial lesions is similar to studies in other parts of the country.[10,14] The male preponderance also follows the patterns observed in other studies in the country.[10,11] It has been postulated that males especially the younger ones, have a relatively higher risk of sinus/otogenic infections and meningitis and are also more predisposed to trauma.[17-18] This study also showed that, in our setting, cranial suppurations and intracranial abscesses were most common in patients who are less than 5 years old (12, 27.9%). Ndubuisi *et al* found higher age of vulnerability (11-20 years) in another part of the South-East Nigeria.[11] In a review done in Jos also showed a higher age of affectation (median age of 18 years).[14] Further studies may be necessary to evaluate the possible reason for the differences. Of the 15 patients with clear documentation of the aetiology, seven patients, apiece, were from trauma and surgical complications (craniotomies and craniectomies) each while one was sinogenic. Trauma and previous surgeries have gained eminence as the aetiological factors particularly with the availability of effective antibiotics for otorhinogenic infections.[11] In this study, the most common presenting symptoms for cranial suppurations were fever, scalp swelling, seizure, headache and altered level of consciousness. Eghwrudjakpor *et al* and other researchers found a similar pattern. [4,14,19] Also, frontal lobe is the most common lobe affected. [10,11,20] In the same vein, intra-axial lesions appeared more common in our study than the extra-axial intracranial lesion reported in other studies.[10] Craniotomy and craniectomy were the modal surgical procedures that were carried out in our study. Craniotomy and craniectomy gives room for the assessment of loculations, membranectomy, repair of dura breach as well as an adequate washout in the subdural compartment.[21] Recent series have however shown that minimal surgeries like burr hole is often associated with good neurological outcome. [4,5,8,10,11,14] The average 6.3weeks of hospital admission could be explained by the Period of antibiotics use. A minimum of 2weeks of intravenous antibiotics together with a total of 6-8 weeks of antibiotics is usually recommended. [22-25] Unfortunately, due to poor records only 8 patients had proper documentation of their microbiology results in which 5 yielded no growth after culture. One aspirate yielded methicillin resistant Staphylococcus Aureus, while another one yielded same organism which was however sensitive to cephalosporin. Yeast was cultured in one of the aspirates. This is comparable with other studies in Nigeria. [11,14] The abuse of over-the-counter drugs may explain the unfortunate drug resistance and no growth seen in most of the culture of the aspirates. [26-27] The mortality rate recorded was relatively comparable with other studies, though higher. [10,11,28] Inadequate record however precludes proper comparison, however mortalities in cranial abscesses may not be unconnected with the pathology. The average of 3 cases per year seen in our study is lower than what was recorded across the country (about 4 to 7). [4,10.11,14] The increasing number of presenting cases as seen in the last few years may be connected with the increasing awareness and availability of neuroimages {see figure 4}

Limitations of this study include incomplete records for most of the patients managed. The sample size is also small. Multicentre prospective local study may give more information for effective planning.

CONCLUSION

Young males are more affected by intracranial abscess with trauma and surgery being the most common risk factor. There are increasing number of cases presenting in the recent times. Despite this limitation, the following recommendation can safely be made: First, there is a need for increased capacity (Neurosurgeons, neuroimaging, and bed spaces) in view of the apparent increase in number of cases now presenting. Second, there is a need for a nationwide standardized protocol since different centres appear to adopt different protocols (craniectomies versus burrhole drainage with tube aspiration). Third, the problem of abuse of antibiotics will need to be tackled head-on.

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Author contributions:
SPN conceptualized and designed the study. JKCE and OCE contributed in the design of the project and AIA contributed in data acquisition. All authors were involved in the writing and revision of the manuscript. The authors read, approved the final manuscript and agreed to be accountable for all aspects of the work.

Data availability
The data used to support the findings of this study are available from the corresponding authors upon reasonable request.

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Conflict of interest
None declared

Ethical approval
The study was approved by the institutional Ethics Committee

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